



Project Reference: 13364 Review  
25 August 2021

Scott McKerrow  
Isthmus

Dear Scott

## **TE PANUKU TU**

### **PHASE I AND II ENVIRONMENTAL SITE MANAGEMENT REVIEW**

We have been engaged by our client Scott McKerrow of Isthmus to undertake an environmental site management review for works till date, and future development works at Te Panuku Tu (Titirangi Summit), Gisborne, including a review of previous soil contamination investigations undertaken by LDE, and the management approach for pending earthworks.

This report shall be submitted to the Gisborne District Council for their consideration as part of the consent requirements for the proposed new building and associated earthworks.

#### **1 SITUATION**

It is understood that the bulk earthworks have been completed to level most of the site. This involved the removal offsite of a unknown volume of cleanfill (disposed locally) as well as a small volume of uncontrolled fill that was disposed of to landfill as contaminated material.

#### **2 REVIEW OF PREVIOUS INVESTIGATIONS**

LDE have previously undertaken the following investigations at the Titirangi Summit:

1. A '*Soil Contamination Preliminary and Detailed Site Investigation*' (PSI/DSI) report, reference 13364 PSI/DSI and dated 11 December 2018 (Appendix A).
2. A '*Classification of Soil at Titirangi, Gisborne*' report, dated 6 August 2019, and numerous site visits/inspections undertaken throughout June and September 2019 (when required) with a summary of each site inspection emailed to the GDC and site contractor (Appendix B).
3. '*Site Validation Report for Titirangi Summit, Gisborne*' reference 13364 SVR and dated 7 October 2019 (Appendix C).

## 2.1 PSI/DSI

The investigation comprised a combined PSI (i.e. site history review) and DSI (i.e. intrusive soil sampling investigation). Evidence from the PSI identified uncertified/uncontrolled fill, former defence force buildings which are now removed, and an existing gun embankment.

HAIL's, G3 (associated with the uncontrolled filling), I (associated with building material from former buildings) and C1 (associated with the gun embankment and site use during WW2) were considered more likely than not to have occurred across parts of the site. As such, soil sampling was undertaken to provide an indication of the level of contamination in the soil (if any) from the contaminants associated with these activities.

The soil inspections identified both uncontrolled fill and natural soils at the site. Lab testing of these soils showed that all contaminant concentrations in the soil samples (both fill and natural soils) were well below MfE's soil contaminant standards (SCS) for a '*Parks/recreational*' land use scenario applicable to land disturbance at the site. Therefore, the risks to human health associated with the soil disturbance were considered very low, and no further soil testing was considered necessary by LDE.

There were however exceedances of the Hawkes Bay Region Background Soil Concentrations however were not reported at the time nor a site management plan (SMP) developed.

## 2.2 Classification of Soil and Inspections

A condition of resource consent (LU-2019-108839-00) was that no uncontrolled fill was to be taken off site as cleanfill, therefore LDE were engaged by the client (at that time) to undertake site monitoring to ensure that the contractors were observing the conditions of the resource consent.

During the demolition of the old observatory building, potential asbestos containing materials (ACM) was identified. Laboratory testing confirmed that asbestos was present within the black bitumastic layer of waterproofing material adhered to the concrete roof. As the observatory building had already been mostly demolished prior to identifying ACM onsite, there was potential for free fibre releases to air and ground during demolition which posed a potential health risk. While the risk was considered as low, precautions were undertaken to ensure the health and safety of site workers and future site users, and off-site disposal facilities.

Accordingly, building demolition rubble (largely concrete) and soils located beneath the stockpiled material, were removed off site and disposed of at Tonlyn Landfill under the guidance, monitoring and validation by LDE.

## 2.3 Site Validation Report (SVR)

Validation soil sampling was undertaken from beneath the stockpiled building rubble and wider area upon removal of asbestos contaminated waste.

No asbestos was detected in any of the soil samples, and we therefore consider that the remedial works have been managed appropriately and that the site is suitable for its intended recreation land use in accordance with the NESCS (2011).

## 3 FUTURE SITE WORKS

The exact building location and other construction details were not known at the time the initial PSI/DSI was undertaken, however we consider that the investigations undertaken to date have sufficiently addressed existing and future site works, and that no further soil sampling is required.

Additionally, we understand that in addition to landscaping works, further cut-to-fill earthworks are planned with remaining fill material (adjacent to the gun embankment) removed and placed in 2 areas that require infill (see fig 1 below). DSI sampling (up to 2.2m bgl) of this material shows that it meets NES SCS for a recreational scenario and are below the Hawkes Bay Region Background Soil Concentrations, therefore may be re-utilised onsite as planned, and any offsite disposal may be as cleanfill however, it is likely the cleanfill facility will require additional testing to ensure that it complies with their acceptance criteria.

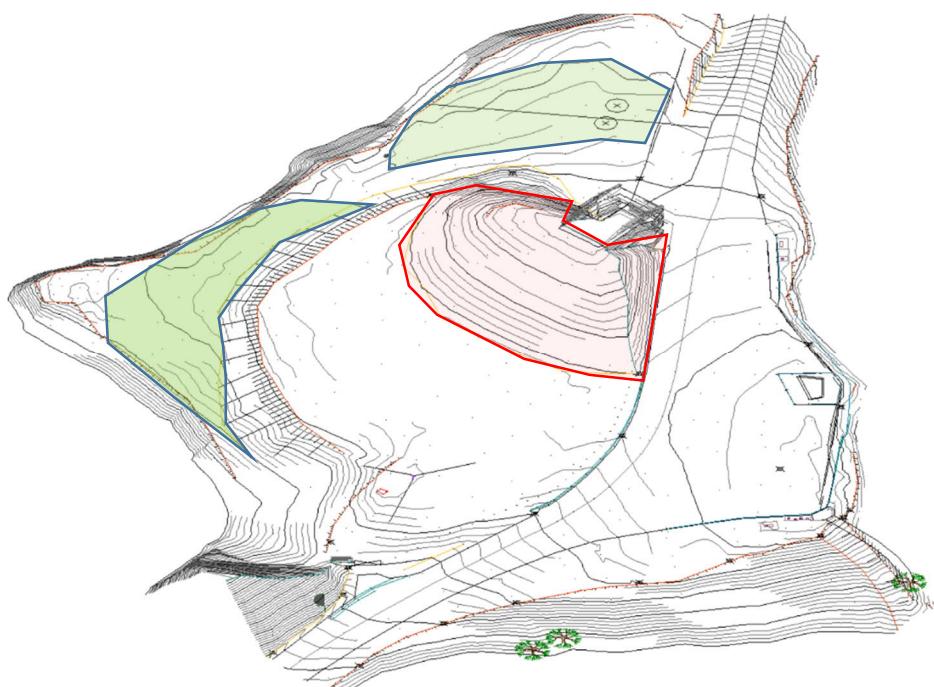


Figure 1: Future cut (red) to fill (green) earthworks.

It is possible that either >25m<sup>3</sup>/500m<sup>2</sup> of soil disturbance, or >5m<sup>3</sup>/500m<sup>2</sup> of soil removal offsite will occur therefore it is recommended that these works proceed under a controlled activity consent obtained from GDC.

### **3.1 Validation Reporting**

LDE will undertake any necessary site inspections/monitoring of the site during the proposed earthworks to ensure compliance with any soil contamination related consent conditions generated as part of this proposed development.

We note that any soil disposal off site exceeding 20m<sup>3</sup> requires soil testing for waste characterisation purposes from the GDC.

## **4 CONTINGENCY FOR UNANTICIPATED CONDITIONS**

In the event that buried waste, suspected asbestos, or other chemical or environmental hazards are encountered during, we advise the following:

- Cease all excavation within the immediate vicinity of the suspected contaminated area
- LDE Environmental Scientist will undertake an assessment and provide appropriate management advice for handling and disposal of this material.
- At this time, it may be necessary to undertake further lab sampling of the suspected contaminated material prior to it being removed or re-used on site.

Contingency plan activities should be undertaken in accordance with MfE Contaminated Land Management Guidelines No. 5 - Site Investigation and Analysis of Soils (revised 2021) and current WorkSafe regulations.

## **5 OTHER CONSIDERATIONS**

This letter has been prepared for submittal to the Gisborne District Council to supplement our clients resource consent application for the proposed new building and earthworks at Titirangi Summit, Gisborne. Information, opinions and recommendations contained in it cannot be used for any other purpose or by any other entity without our review and written consent.

Land Development & Exploration Ltd accepts no liability or responsibility whatsoever for or in respect of any use or reliance upon this report by any third party. Opinions given in this report are based on LDE's soil contamination investigations completed to date and from information provided by our client.

There is still some possibility that the degree of contamination at the site is in excess of that described in this report and we should be contacted immediately if the conditions are suspected to differ from that presented.

For and on behalf of LDE Ltd

Report prepared by:



Sarah Robinson  
Environmental Scientist

Report reviewed by:



Jeff Davenport  
Senior Environmental Scientist  
(SQEP)

M:\LDE - Project\ID2\152DC18A-601D-4CF9-8ACA-6EF80FEBB7A9\0\25000-25999\25882\L\L\13364-09-Environmental Report-Soil Site Validation -25882.2  
(ID 25882).docx





RANELL NIKORA – GDC

**SOIL CONTAMINATION PRELIMINARY & DETAILED SITE INVESTIGATION REPORT  
OF PART LOTS 2 & 3 DP 5159, TITIRANGI DRIVE, GISBORNE**

Project Reference: 13364PSI/DSI  
11 December 2018

## TABLE OF CONTENTS

Executive Summary.....	iii
1 Introduction .....	4
2 Site Details & Setting.....	4
2.1 Proposed Site Development.....	4
2.2 Site Identification and Zoning.....	5
2.3 Site Description and Current Land Use .....	5
2.4 Geology.....	7
3 Preliminary Site Investigation .....	7
3.1 Search of Council Records.....	7
3.2 Historic Aerial Imagery.....	8
1943 Photograph .....	8
1948 Photograph .....	9
1953 and 1958 Photographs.....	9
1967 Photograph .....	9
1974 Photograph .....	9
1980, 1986 and 1988, 1992 Photographs .....	9
2005, 2010, 2012 and 2017 Photographs .....	9
3.3 Certificate of Title .....	9
3.4 Geotechnical Investigations.....	10
4 Site Walkover Assessment .....	12
5 Conceptual Site Model .....	14
5.1 Hazardous Substances and Potential Contaminants of Concern.....	14
5.2 Potential Receptors .....	14
5.3 Exposure Pathways .....	15
6 PSI Conclusions.....	17
7 Detailed Site Investigation .....	17
7.1 Contaminants of Concern .....	17
7.2 Field Investigation .....	17
7.3 Exposure Scenario .....	19
7.4 Selected Soil Contaminant Standards and Guideline Values .....	20
7.5 Soil Sample Results .....	20
8 DSI Conclusions .....	21
9 Recommendations .....	21
10 Report Limitations.....	22

Appendix A: Proposed Site Development Plans

Appendix B: NES Search of Council Records

Appendix C: Historical Aerial Photographs

Appendix D: Certificates of Title

Appendix E: Chain of Custody Record

Appendix F: Laboratory Test Results

## EXECUTIVE SUMMARY

A contamination preliminary and detailed site investigation (PSI & DSI) has been conducted for the site located at the Titirangi Observatory site, Gisborne, legally described '*Part Lots 2 & 3 DP 5159*'.

The objectives of the assessment were to identify any potential sources of contamination from past and present land use activities at the site and surrounding area, to determine the contamination status of soils at the site, and to subsequently assess compliance with the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health in regards to the proposed earthworks at the site.

The investigation comprised a PSI (i.e. site history review) and DSI (i.e. intrusive soil sampling investigation). Evidence from the site history review identified uncertified fill, former army buildings which are now removed and an existing gun embankment. Therefore it is more likely than not, HAIL G3 (associated with the filling), HAIL I (associated with building material from former buildings) and HAIL C1 (associated with the gun embankment and site use during WW2) has occurred across parts of the site. Soil sampling was therefore carried out to provide an indication of the level of contamination in the soil (if any) from the contaminants associated with these activities.

All contaminant concentrations in the soil samples were well below MfE's soil contaminant standards for a '*Parks/recreational*' land use scenario applicable to land disturbance at the site.

Based on the information provided by the client, the volume of soil disturbance exceeds that of the permitted activity thresholds, therefore the activity will require a consent under the NES as a controlled activity.

## 1 INTRODUCTION

Land Development & Exploration (LDE) Ltd has been engaged by Ranell Nikora of the Gisborne District Council (GDC) to undertake a combined soil contamination Preliminary and Detailed Site Investigation (PSI and DSI) of the site located at the summit of Titirangi Drive, and legally described as '*Part Lots 2 & 3 DP 5159*' and herein referred to as the 'site'.

The PSI will identify if there were any historical or current activities that could have caused soil to become contaminated. This will be useful to identify potential risks associated with future use of the property. The PSI will also identify if the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES) applies to the site and whether the investigation would need to accompany the consent application for the proposed change of land use under the NES.

This investigation has been carried out in general accordance with the *Contaminated Land Management Guidelines No. 1- Reporting on Contaminated Sites in New Zealand* (Revised 2011) and *Contaminated Land Management Guidelines No.5: Site Investigation and Analysis of Soils* (revised 2011).

The two-part investigation included a PSI and a DSI. The PSI included a review of available historic aerial photographs showing the site, site-specific council records, existing investigation reports, an interview with the site owner and a walkover/inspection of the site. The DSI component of the investigation included the collection and analysis of soil samples taken at the site.

The objectives of the investigation were to:

- Identify any potential sources of contamination from past and present land use activities at the site which are listed on the Ministry for the Environment's (MfE) Hazardous Activities and Industries List (HAIL) (MfE, 2011),
- Assess compliance with the soil contaminant standards for a '*Parkes/Recreational*' land use scenario,
- Assess applicability with the NES for the proposed development (including earth works/soil disturbance) at the site.

## 2 SITE DETAILS & SETTING

### 2.1 Proposed Site Development

At this early stage of the proposed site development, we understand that our client is intending to cut down the site to the approximate level of the summit carpark to create a new flat area. In doing this the existing observatory building shall be removed, however, we

understand that the gun emplacement will remain. A new building will then be constructed in the area of the newly created building platform and will likely incorporate the gun emplacement.

Refer to Appendix A for a rough sketch of the proposed site development plans provided by the client.

## 2.2 Site Identification and Zoning

The site is located at the summit of Titirangi, which is approximately 1.5km southeast of Gisborne City [Figure 1] and approximately 140m above sea level. The site is zoned '*Heritage Reserve*' in the Tairawhiti Plan.



Figure 1: Location map showing the site. Source: Land Information New Zealand (annotated image).

## 2.3 Site Description and Current Land Use

The modified hilltop site comprises the James Cook Observatory (including infrastructure), a World War 2 gun emplacement recessed into the slope, telecommunication poles, and a formed carpark. The surrounding land is moderately steep with grass as the ground cover. Refer to Figures 2 and 3.

Generally the site is used by the public for recreational purposes (site seeing, walking etc). We understand that the Observatory Building is currently closed due to potential earthquake risk.



Figure 2: Site location and area of investigation. The legal lot boundaries are shown in yellow. Source Tairawhiti Maps [annotated image].

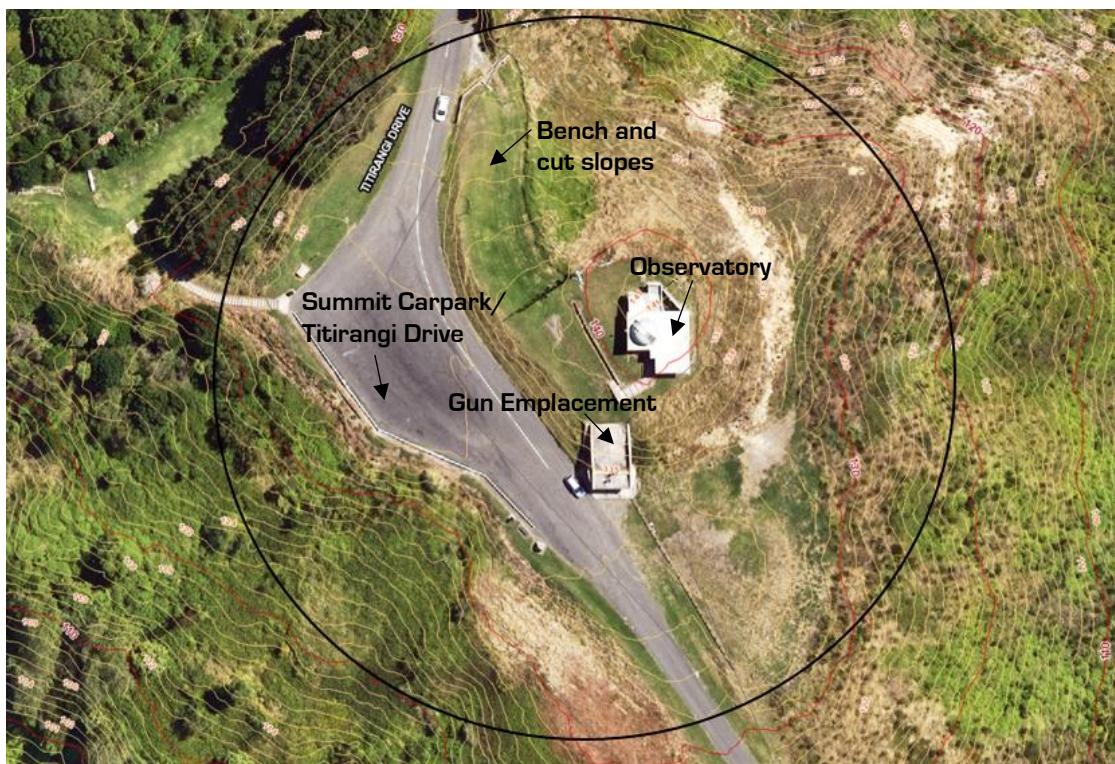


Figure 3: Area of investigation shown by black border. Source Tairawhiti Maps 'Rural Towns Aerials 2012' [annotated image].

## 2.4 Geology

The New Zealand Geology Web Map by GNS<sup>1</sup> science identifies the site as being underlain by '*Early Pleistocene [Mangatuna Formation] river and estuary deposits*' described as '*Gravels, sands, silts, muds; minor ignimbrite and tephra*'.

## 3 PRELIMINARY SITE INVESTIGATION

A PSI was undertaken to identify potential past or present HAIL activities, or potential contaminants at the site.

The following information was reviewed to establish the history of the site:

- Search of Council Records.
- Historical aerial photographs.
- Certificates of Title.
- Existing geotechnical reports.

### 3.1 Search of Council Records

A '*Search of Council Records for the Soil Contamination National Environmental Standard*' document dated 31 October 2018 and comprising of 322 pages was provided to LDE. Refer to Appendix B for a copy of the GDC search of council records report (excluding all appendices).

The planning and soil conservation departments have not commented specifically on any potential HAIL's having occurred or occurring on the site.

The Environmental Health department have identified that an underground fuel storage tank was removed from the '*Chorus site*' in 2003. We note that the former underground fuel storage tank location is more than 100m north of the site, and outside the area of investigation. Refer to Appendix B, Figure 10 showing the Chorus site and fuel storage location plan.

The Environmental Health department also stated that '*Historic Places Trust investigations have identified construction of gun emplacement at Y18/468 during 1942 including the construction of an ordinance magazine – possible ancillary activities during this time are likely to have been maintenance and storage of ordinance up to 1950.*' We note that this activity is considered to be HAIL 'C1', defined as '*Explosive or ordinance production,*

---

<sup>1</sup>GNS Science New Zealand Geology Web Map: <http://data.gns.cri.nz/geology/>. Retrieved November 2018.

*maintenance, dismantling, disposal, bulk storage or repacking' by MfE. Refer to Appendix B, Figure 11 showing the Historical places trust record of the gun emplacement history.*

Additionally, the Environmental Health department have outlined that the site was leased for grazing and pastoral use from 1920 to 1999, and that a number of complaints have been received in regards to dumping of rubbish (*'generally household but occasionally vehicles'*) along Titirangi Drive.

The Building Department have listed the building permits/consents undertaken at the site. We note that none of the listed activities indicate actual or potential HAILs. Refer to Figure 4 showing the list of building permit/consent records.

Building Permits/Consents		
Date	Permit/Consent no.	Project
14 April 1971	C057699	Erect an observatory
15 June 1971	5047	Install septic tank and drains
21 September 1971	5191	Plumbing work, 2 WC, TV, and sink bench
11 October 1984	B089835	Construct a floor in the dome room of the James Cook Observatory

Figure 4: Extract from NES search of records showing building permits/consents undertaken at the site.

### 3.2 Historic Aerial Imagery

Aerial images taken from 1943 to 2017 have been analysed as part of this investigation. A summary of our review of these images is shown below. Copies of the pertinent sections of the available photographs are presented in Appendix C.

#### 1943 Photograph:

- This is the earliest available image of the site.
- The gun emplacement building and observatory building are evident in this image.
- South of the observatory, the square shaped chamber is evident.
- An unknown feature is also identified just south of the observatory building.
- A lineal feature, known as the above ground culvert is evident, north of the observatory.
- An access way leading to a building and possibly a large vehicle are also evident at the northern part of the site.
- The cut slope at the southern part of the site is evident, and some soil disturbance is also evident to the southeast part of the site.
- The hill slopes are covered by grass.
- What is known to be World War 2 camp buildings are identified outside of the area of investigation, north of the site.

### **1948 Photograph:**

- The building and a possible vehicle (or small structure) identified at the northern part of the site has been removed, as has the access way.
- An unknown linear feature (possible trench) is noted in this image.
- Vegetation evident across a portion of the southwest part of the site.
- No other changes noted.

### **1953 and 1958 Photographs:**

- No changes noted.

### **1967 Photograph:**

- An area of soil disturbance (likely land slippage/erosion) is noted near the eastern part of the site.

### **1974 Photograph:**

- A significant change has occurred, where now a portion of the western part of the site is covered by a car parking area.
- Additionally, the observatory building has been extended, and an access way leading to the observatory and gun emplacement building is clearly evident.

### **1980, 1986 and 1988, 1992 Photographs:**

- Vegetation is now evident in the 1986 image, located across the eastern part of the site
- No changes other changes noted.

### **2005, 2010, 2012 and 2017 Photographs:**

- The 2005 image is the first colour image of the site available.
- The mature trees are not evident in the 2017 image.
- No other changes noted during this time period.

### **3.3 Certificate of Title**

The current Certificate of Title (CoT) for Lots 1 and 3 DP 5159 was issued on 24 January 1968 to the proprietors '*The Gisborne City Council*', whilst the CoT for part Lot 2 DP 5159 was issued on 25 January 1933 to the proprietors '*The Gisborne District Council*'. Refer to Appendix D showing the certificates of title.

Earlier Certificate of Titles were not requested as there was sufficient information from other sources to establish that soil sampling would be required on the site without the additional support from earlier records.

### **3.4 Geotechnical Investigations**

LDE have completed the report titled '*James Cook Observatory, Part Lot 3 DP 5159, Titirangi Drive, Gisborne, Geotechnical Investigation Report*' dated 6 June 2017. The following text [in part] has been extracted from the section of the report titled '*Buildings and Site Use History*'. An image from the report showing an interpretation of the in-ground features observed in the 1943 image over a modern is shown in Figure 5.

*"It is our understanding that the site was used in pre-European times by Maori. Our investigations indicate that a significant amount of earthworks have occurred within and around the site since World War Two. Our investigations did not encounter any obvious materials or soils, which may represent pre-European use.*

*During World War II the observatory site and surrounding land were set up as a centre for military defence. In addition to the construction the original 1942/43 observation building, a large concrete gun emplacement [Colchester Gun shelter] was constructed and recessed into the slope 18m to 20m to the south of the observation building, with the construction of the 1971 addition, this feature is now some 10m from the building.*

*It appears that a large excavation into the slope was made to construct the gun emplacement which was then backfilled up against its rear, sides (up to 4m thick), and over the top (soil on top now removed). A series of trenches, in-ground chambers and pits were also installed in the ground between the emplacement and the original observation building. Our investigations indicate that newer 1971 section of the observatory extends out to and over ground, which was over ground, which was and in some respects, is still occupied by these features."*



Figure 5: Extract from LDE Geotechnical report (annotated in yellow) showing an interpretation of in-ground features observed from the 1943 image over recent site plan. Note that the image predates forestry clearance on the eastern and northern sides of the buildings.

The report also identified the presence of non-engineered fill across parts of the site. The following text has been extracted from the report in regards to the non-engineered fill.

*'In summary, our investigations encountered a unit of non-engineered fill and topsoil ranging in thicknesses of between 0.2m and 1.2m immediately adjacent to the building. In general, the thicker fill units were found on the southern side of the observatory. In addition to this, the testing found that the fill material extends under the 1971 portion of the observatory [up to 1.2m thick]. It was found to be generally very thin or non-existent around the older 1942 building.'*

*'Away from the observatory, the testing found the fill material to be up 2.7m in thickness on the outside edge of the slope above Titirangi Drive. As a large excavation was made into the slope to build the gun emplacement [10m south of observatory], the fill is expected to be up to 4m thick behind the back wall of that building. Only minor thicknesses of fill were found'*

*below the site to the north (back towards Gisborne City) and east (inland towards suburb of Kaiti).*

*The fill material generally comprises mixtures of light brown clay and silty clay, black sandy silt and fine gravel. Some foreign material (glass/nails and gravel) were also encountered in the fill unit."*

We consider this information sufficient to establish that HAIL G3 '*Landfill sites*' may have occurred at the site, as it is unknown where the non-engineered fill has been sourced from.

## 4 SITE WALKOVER ASSESSMENT

A site walkover inspection was undertaken on 30 November 2018.

The observatory building is located at the summit of the site (Figure 6), with the gun emplacement located south and below the observatory (Figure 7). The benched grassed area located at the west and northwest of the site has been mowed (Figure 8).



Figure 6: Observatory building located at the summit of Titirangi.

Further out from the edges of the building, the site comprises very long grass/vegetation and steep slopes (Figure 9. As such any remnant building foundations from the now removed building (evident in the 1943 image) were unable to be identified.

We note that it appeared that the level of the former building was below the proposed soil disturbance level/area, thus reducing the risk of contact from any potential contaminants associated with the former building.



Figure 7: Gun emplacement building.



Figure 8: View of site from Titirangi Drive level, facing southeast towards the carpark area



Figure 9: Photograph taken from approximate location of former building looking north towards the chorus site.

## 5 CONCEPTUAL SITE MODEL

The potential effects of the proposed activity of the site from contaminated soils are outlined in a preliminary site Conceptual Site Model (CSM) in Figure 10. The following is an analysis of potential contaminants, receptors and pathways.

### 5.1 Hazardous Substances and Potential Contaminants of Concern

Hazardous substances potentially exist at the site because of past activities.

- Heavy metals, mercury, and asbestos may be present within the fill material identified at the site as the source of this fill is unknown.
- Heavy metals (including lead from paint) and asbestos may be present within the soil around the footprint of the former building located at the site.
- Pentachlorophenol (PCP) may have been stored at the site during WW2 (specifically near the gun emplacement and at former building located at the site).

### 5.2 Potential Receptors

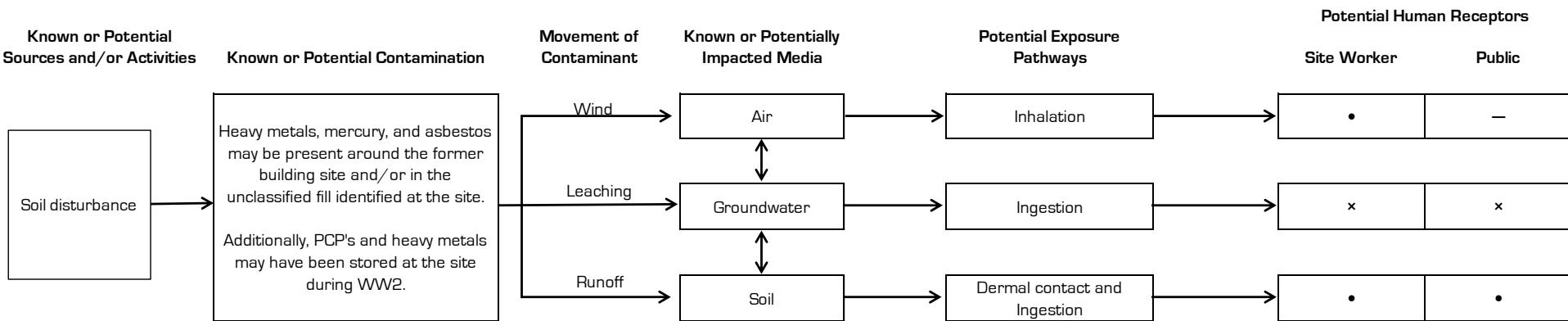
Potential receptors include:

- Excavation and construction workers during earthworks and redevelopment of the site.
- Recreational site users including small children.
- Landfill staff or end receivers of any soil removed off site as part of the proposed development.

### 5.3 Exposure Pathways

A human health risk can only occur where there is a complete pathway between contaminant sources and a receptor. Building floors, paved areas and grass will largely or completely prevent contact with soil and therefore direct exposure pathways are or will be incomplete for such areas. Potential complete pathways are:

- Direct contact (dermal) with soil;
- Direct contact and inhalation of dusts and soil during earthworks and construction phases, as well as ongoing site maintenance and/or subsurface maintenance works.



**LEGEND:**

—	Pathway is not complete, no evaluation required
x	Pathway is or may be complete, but is judged to be minor or unlikely. Quantitative data collection not required.
•	Pathway is or may be complete, collect quantitative data.

Figure 10: Conceptual Site Model at PSI stage for earthworks and site development.

## 6 PSI CONCLUSIONS

Due to the uncertainty of the origins of the fill and its contents, we consider that HAIL G3: '*Landfill sites*' is more likely than not to have occurred at the site. Additionally, HAIL activities I and C1 due to the former buildings located on the site and the use of the site during WW2 as a gun embankment.

LDE considers that the NES applies under Regulation 5(4) due to the anticipated volume of earthworks. As HAIL G3, I, and C1 have been identified to have possibly occurred, occurred or occurring at the site, a Detailed Site Investigation (including specific site sampling) was therefore required to establish any actual human health risks associated with the future earthworks.

## 7 DETAILED SITE INVESTIGATION

Based on the findings of the PSI, further investigation was required to establish if contamination is present at the site. Our investigation was designed to establish if the site soil exhibit contaminant concentrations exceeding the soils contaminant standards applicable to a '*parks / recreational land*' use scenario and to determine the type of consent required for the earth works associated with the proposed site development.

### 7.1 Contaminants of Concern

Potential contamination sources identified in the PSI are associated with uncontrolled landfilling at the site and military activities during WWII. Heavy metals, mercury, asbestos and PCPs may be present within the soils. A visual inspection of the fill (during the collection of the samples) will help further identify if other potential contaminant such as hydrocarbons are present.

### 7.2 Field Investigation

The field investigation was undertaken on 30 November 2018 by LDE.

Each one of the sample locations has a rationale based on site history/desktop study. The samples were collected from locations where the geotechnical investigation had identified areas of deep and shallow fill, as well as the location of the former army building, and existing gun emplacement building. Refer to Table 1 for the soil sample and borehole descriptions and Figure 7 for the soil sampling plan.

At each soil sample location, samples were collected using a pre-cleaned hand auger. The hand auger was cleaned between samples to prevent cross contamination. All samples

were placed into labelled jars supplied by Analytica Laboratories. Following collection, the samples were placed into a chilly bin which was sent with chain of custody documentation on to Analytica Laboratories located in Hamilton for analysis. The chain of custody documentation is attached in Appendix E.

Table 1: Soil sample descriptions.

Name	Description	Depth	Lab Analysis
S1	Dark brown silt topsoil.	0-0.2m	Heavy Metals, Asbestos and PCP.
S2	Dark brown, silt fill with rare brick fragments, dry and friable soil.  Note that a deeper sample was sought, however, after several attempts we were unable to advance the hand auger deeper due to an obstruction [possibly from the building foundations].	0-0.2m	Heavy Metals and Asbestos
S3	Dark grey silt with angular gravel [no brick or deleterious materials identified].	0-0.2m	Heavy Metals, Asbestos and PCP.
S3.1	Orange brown reworked clay with layers of buried topsoil, rage gravel and minor orange mottling.	1-1.2m	Heavy Metals and Asbestos
S3.2	Orange brown reworked clay, rage gravel and minor orange mottling.	2-2.2m	Heavy Metals and Asbestos
S4	Brown silt topsoil fill to 0.3m.	0-0.2m	Heavy Metals and Asbestos
S4.1	Light greyish brown reworked clay.	0.5-0.7m	Heavy Metals and Asbestos
S5	Dark brown silt topsoil to 0.4m.	0-0.2m	Heavy Metals and Asbestos
S5.1	Light brown clay.	0.5-0.7m	Heavy Metals and Asbestos
S6	Brown silt topsoil.	0-0.2m	Heavy Metals and Asbestos
S7	Brown silt topsoil.	0-0.2m	Heavy Metals and Asbestos
S7.1	Reworked silt fill. Some rare brick fragments noted at 0.6m, clay soil identified at 1m depth.	0.5-0.7m	Heavy Metals and Asbestos
S8	Brown silt topsoil.	0-0.2m	Heavy Metals and Asbestos
S9	Brown silt topsoil.	0-0.2m	Heavy Metals and Asbestos
S10	Brown silt topsoil.	0-0.2m	Heavy Metals, Asbestos and PCP.



Figure 11: Soil sampling site plan [approximate].

### 7.3 Exposure Scenario

The site is considered a public reserve and is used for recreation activities.

Based on the conceptual site model and taking into consideration the methodology for deriving soil contaminant standards (SCS) and the proposed development at the site, a 'Parks/recreational' land use is applicable to the site.

## 7.4 Selected Soil Contaminant Standards and Guideline Values

The NES references the *Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health* (MfE, 2011) with regard to establishing a national risk-based methodology for deriving soil contaminant concentrations protective of human health.

Following the guidance, the Soil Contaminant Standards (SCS) for selected priority contaminants for non-priority contaminants guidelines values were selected following the Contaminated Land Management Guidelines No. 2: Hierarchy and Application in New Zealand of Environmental Guideline Values (Revised 2011) as screening criteria for the risk to humans at the site and to inform on-site management actions. If exceeded, further investigation and a Tier 2 assessment would be considered.

No applicable New Zealand guideline criteria exist for some of the tested metals (i.e. nickel and zinc) and therefore Health Investigation Level (HIL) values from the Australian Guideline on the Investigation Levels for Soil and Groundwater<sup>2</sup> have been used under the residential land use scenario as outlined in the MfE document.

The soil samples were tested at the laboratory for total chromium. However, the Methodology document distinguishes between the stable chromium III and the potentially toxic and less stable chromium VI. For the purposes of this analysis all total chromium results have been conservatively compared to the chromium VI.

Qualitative asbestos testing (presence/absence only) has been requested from the laboratory. If asbestos is present in any of the soil samples, quantitative testing would be required.

We note that there is no database for natural background concentrations of trace elements in soils for Gisborne.

## 7.5 Soil Sample Results

Table 2 summarises the laboratory results for soils tested for metals heavy metals and mercury.

Concentrations of metals and PCP in soil were all well below the respective SCSs for a ‘parks/recreational’ land use. Also, asbestos was not detected in any of the soil samples collected at the site. Refer to Appendix F for a full copy of the laboratory test results.

Table 2: laboratory tests (heavy metal suite and mercury) and PCP compared against the soil contaminant standards (SCS) for a 'Parks/ Recreational' land use.

<b>Sample Name</b>	<b>As</b>	<b>Cd</b>	<b>Cr</b>	<b>Cu</b>	<b>Hg</b>	<b>Ni</b>	<b>Pb</b>	<b>Zn</b>	<b>PCP</b>
S1	4.95	0.046	14.4	8.56	0.065	11.7	12	50.9	<0.05
S2	38.3	0.19	62.4	40.4	0.065	15	35.3	109	-
S3	6.24	0.17	10.9	7.49	0.029	11.5	9.25	67.4	<0.05
S3.1	4.48	0.018	19.6	16.4	0.077	25.3	12.5	63.4	-
S3.2	7.04	0.05	20.7	15.4	0.064	25.5	10.6	58.6	-
S4	3.82	0.16	7.66	7.63	0.056	9.79	31.8	97.1	-
S4.1	5.61	0.013	21.8	11.5	0.042	17.8	10.4	54.4	-
S5	5.1	0.095	10.6	10.5	0.042	11.6	11.9	61.2	-
S5.1	5.29	<0.005	18.7	13.3	0.063	12.3	9.24	40.3	-
S6	5.74	0.067	15.9	14.9	0.047	16.8	11.2	63.1	-
S7	6.73	0.21	19.2	21.4	0.056	18.7	31.7	156	-
S7.1	9.9	1.5	18.5	30	0.065	21.2	35.8	934	-
S8	3.66	0.14	10.8	10.9	0.036	11.5	26.3	91.7	-
S9	5.25	0.02	15.9	10	0.025	12.8	10.1	47.7	-
S10	3.36	0.09	10.3	11.3	0.035	10.3	11.4	63.7	<0.05
S11	4.95	0.046	14.4	8.56	0.065	11.7	12	50.9	
<b>SCS<sup>3</sup></b>	<b>80</b>	<b>400</b>	<b>2,700</b>	<b>NL<sup>5</sup></b>	<b>1,800</b>	<b>800<sup>4</sup></b>	<b>880</b>	<b>30000<sup>4</sup></b>	<b>150</b>

1. All results and standard values are presented in mg/kg
2. All metals tested for 'Total Recoverable' at screen level
3. Methodology for Deriving Soil Guideline Values Protective of Human Health (MfE, 2011)
4. 'Recreational C' values - Guideline on the Investigation Levels for Soil and Groundwater (NEPC, 2013)
5. NL - 'No Limit'. Derived value exceeds 10,000 mg/kg.

## 8 DSI CONCLUSIONS

HAIL activities G3, I, and C1 were identified at the site and therefore soil sampling and analysis was undertaken to identify if these HAILs have contributed soil contamination exceeding the applicable standard.

The testing indicates that no soil is present at the site that exceeds soil contaminant standards applicable to '*Parks/ Recreational*' land use. Based on these conclusions no further testing is considered necessary.

## 9 RECOMMENDATIONS

Based on the findings of the preliminary and detailed site investigations we consider that the proposed development on the piece of land is suitable.

As the soil testing results were below the applicable soil contaminant standard we consider the risks to human health associated with the soil disturbance as very low.

A resource consent under the NES will be required for the soil disturbance and we consider that the proposed works can be undertaken as Controlled Activity. In order to meet the requirements of a Controlled Activity this report shall be submitted to the GDC (NES 9(1)(C)).

As part of the resource consent process, the GDC will have control of the transport, disposal and tracking of the soil and other material taken away in the course of the activity, as well as the other listed items as shown in the NES legislation.

## 10 REPORT LIMITATIONS

This investigation presents a preliminary and detailed site investigations of the potential for ground contamination, prepared exclusively for Ranell Nikora of the Gisborne District Council with respect to the particular brief given to us.

Information, opinions and recommendations contained in it cannot be used for any other purpose or by any other entity without our review and written consent. Land Development & Exploration Ltd accepts no liability or responsibility whatsoever for or in respect of any use or reliance upon this report by any third party.

Opinions given in this report are based on a review of existing data, evidence gathered during a site walkover, anecdotal information and specific soil sampling at discrete locations. There is still some possibility that contaminating activities have taken place or contamination at the site is in excess of that described in this report and we should be contacted immediately if the conditions are suspected to differ from that described.

For and on behalf of LDE Ltd

Report prepared by:



Sarah Robinson  
*Environmental Scientist*

Report reviewed by:



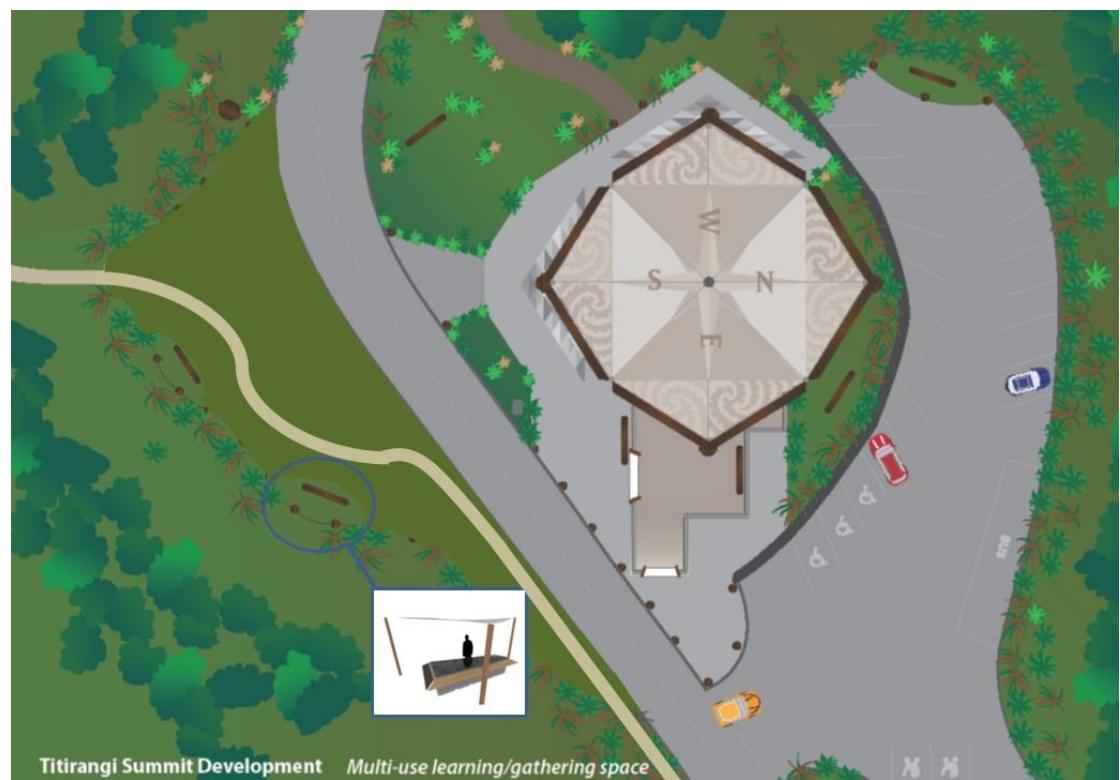
Jeff Davenport  
*Senior Environmental Scientist (SQEP)*

Report authorised by:



Georg Winkler  
*MIPENZ, CPEng*  
*Principal Engineering Geologist-Geotechnical Engineer*

## APPENDIX A: PROPOSED SITE DEVELOPMENT PLANS



## APPENDIX B: NES SEARCH OF COUNCIL RECORDS

SOCR218329

31 October 2018

Land Development & Exploration  
32 Grey Street  
**GISBORNE 4010**

Attention: Sarah Robinson



Dear Sir/Madam,

### SEARCH OF COUNCIL RECORDS FOR THE SOIL CONTAMINATION NATIONAL ENVIRONMENTAL STANDARD

A Search of Council Records has been undertaken for **Titirangi Drive**, legally described as **Lot 3 Deposited Plan 5159 and Part Lot 2 Deposited Plan 5159**. The property is outlined in yellow in the image below. The information is the most up-to-date information that Council holds on its records, databases and registers in relation to any activities listed on the Hazardous Activities and Industries List (HAIL).

The information can be used in conjunction with any information the property owner(s) or neighbour(s) have to determine whether or not the property includes any HAIL land. This is one part of the process of determining whether or not the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES) applies to a proposed development or activity. The onus is on the property owner(s)/developer(s) to confirm whether or not the NES Soil Contamination applies to their proposed activity.



#### Planning:

- The decision reports and applications for the following Resource Consents have been attached LU-2014-106553-00, LU-2014-106522-00, LL-2014-106523-00, LU-2015-106522-01, LL-2015-106523-01.
- Resource consent PD207059A has been attached as it specifically lists part Lot 3 as the subject site.
- There are multiple historical resource consents relating to land disturbance in a Waahi Tapu and vegetation clearance where no specific legal descriptions are listed in the decision report. These reports often refer to the site as Titirangi Reserve. It is unclear if they include the subject sites. These consents have not been attached as there is no information contained within these decision reports relating to any HAIL activities.
- See attached aerials from 1958, 1967, 1974, 1980, 1986 and 1992.

SOCR218329 - Part Lot 3 Deposited Plan 5159 and Part Lot 2 Deposited Plan 5159 Titirangi Drive - LDE  
(A1409377).docx

PO Box 747 Gisborne 4040 New Zealand

PHONE +64 6 867 2049 • FAX +64 6 867 8076 • EMAIL [service@gdc.govt.nz](mailto:service@gdc.govt.nz) • [www.gdc.govt.nz](http://www.gdc.govt.nz)

- Attached is an historical aerial showing the WW2 military complex and structure that now forms part of the observatory.
- Attached are pages from an archaeological survey undertaken on Titirangi it refers to the modifications and earthworks undertaken at the site and gives some history behind the WW2 Gun Emplacement and Military camp.

**Soil Conservation:**

Historical Aerial Photographs of Subject Area	
Date of Photograph	Description of Possible Land Uses
1942	Bare land, road, scattered scrub

- Resource consent LL2014-106523-00 and subsequent variation to harvest plantation forest and associated earthworks. Expires 26/02/20.

**Environmental Health:**

Underground fuel storage tank removed from the Chorus site in 2003 (site plan of where this was included). This site appears to have been established in the early 1980's and includes an ancillary building ("Telecom building") which may house electrical transformers (unconfirmed). Plans also indicated the presence of a septic tank (near the area of the now removed fuel tank - see map). No details as to whether this is remaining or has been removed and back filled. Chorus site has resource consents for the erection and maintenance of (originally microwave) cell towers.

Historic Places Trust investigations have identified construction of gun emplacement at Y18/468 during 1942 including the construction of an ordinance magazine - possible ancillary activities during this time are likely to have been maintenance and storage of ordinance up to 1950.

From early 1920's to 1999 much of Kaiti Hill was leased for grazing and pastoral use - documented by Council records.

Numerous complaints received of dumping of rubbish, generally household but occasionally vehicles along Titirangi Drive.

**Documents attached:**

- Site plan of Chorus site showing location of underground fuel storage tank
- Site plan of Chorus site showing location of septic tank
- HPT record of gun emplacement history
- Email confirming size and removal details of UST

**Building:**

Building Permits/Consents		
Date	Permit/Consent no.	Project
14 April 1971	C057699	Erect an observatory
15 June 1971	5047	Install septic tank and drains
21 September 1971	5191	Plumbing work, 2 WC, TV, and sink bench
11 October 1984	B089835	Construct a floor in the dome room of the James Cook Observatory

Attached.

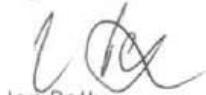
N.B. Cook County records pre 1948 were destroyed in a fire. The Gisborne District Council cannot prove whether a Building Consent or Permit was or was not issued for any given property before this date.

**Water Conservation:**

Outside of the Waipaoa Catchment therefore any water take would likely be subject to public notification.

Dated at Gisborne this Wednesday, 31 October 2018.

Signed for and on behalf of the Gisborne District Council by:



Ian Petty  
**BUILDING SERVICES MANAGER**

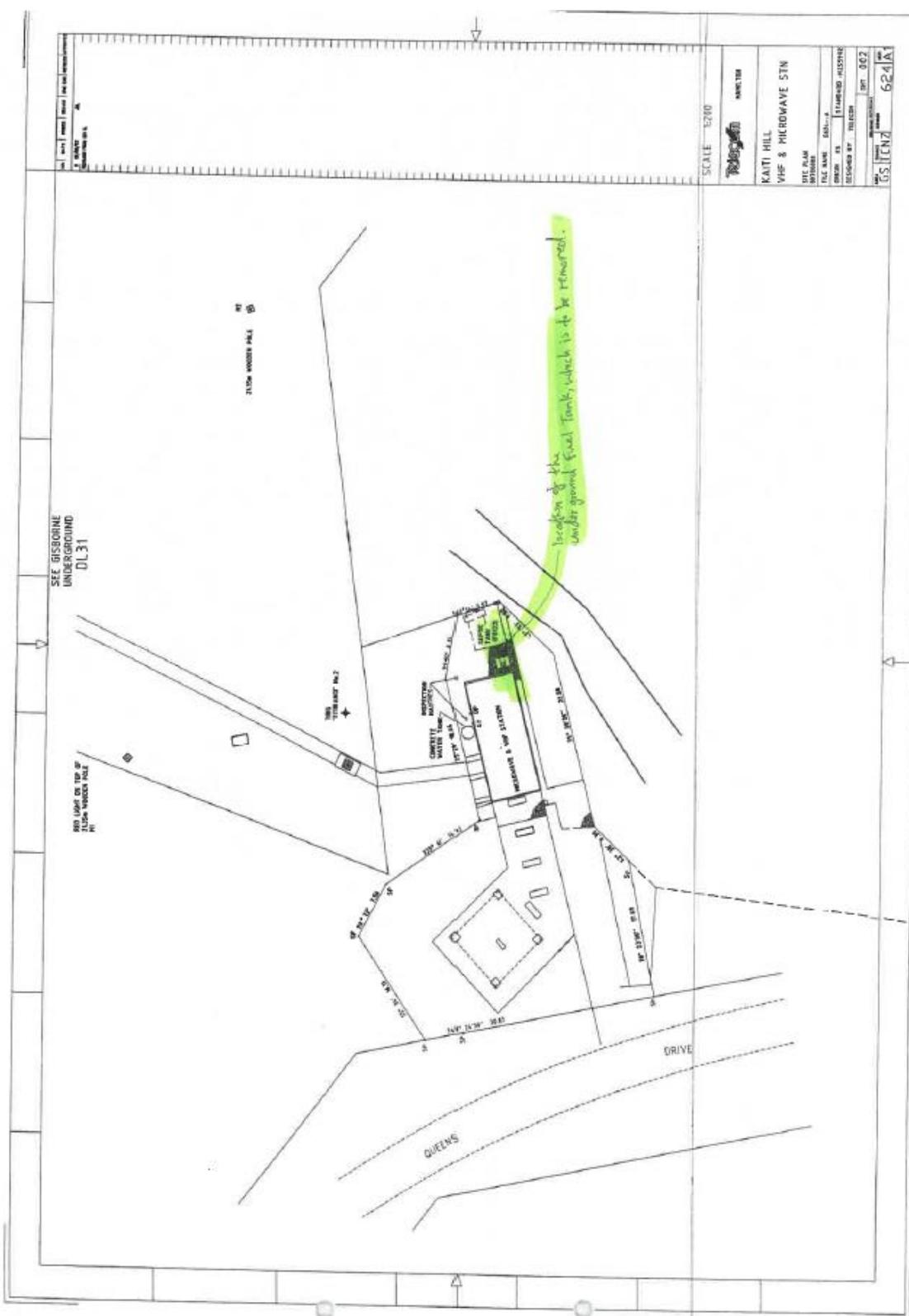


Figure 12: Site plan showing location of chorus site and former underground fuel tank location. We note that this is outside of our investigation area.

<b>NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION SITE RECORD FORM (METRIC)</b>  Metric map number sheet Y18 Metric map name Gisborne NZMS 260 map 1 <sup>st</sup> Edition 1984	<b>NZAA METRIC SITE NUMBER Y18/468</b> <b>DATE VISITED</b> February 2002 <b>SITE TYPE</b> Historic Military WW2 <b>SITE NAME:</b> OTHER
Grid Reference	Easting 2947636 Northing 6268182
<b>1. Aids to relocation of site (attach sketch map)</b> Located on summit of Titirangi Reserve	
<b>2. State of site and possible future damage.</b>  Site in good condition. Site is within Titirangi Reserve and no apparent threats.	
<b>3. Description of site (Supply full details: history, local environment, references, sketches, etc. If extra sheets are attached, include a summary here)</b>  Construction of the Gun Emplacement (Y18/468) and accommodation buildings (Y18/469) commenced in July 1942 and was completed in January 1943. The gun was one of eight 5 inch United States navy guns understood to have come from a scrapped US navy vessel. A command post, war shelters, a magazine, and an overhead gun cover supported the gun emplacement. (One of these latter structures was utilized in the construction of the observatory) In addition to the gun emplacement, accommodation for army personnel was erected comprising eight buildings of a total floor area of 4,480 square feet. These included ablutions, laundry & drying rooms, cooking shelter, food stores, mess and recreation room. The unit stationed at Kaiti Hill was the 77 <sup>th</sup> Heavy Battery; a territorial unit. While the gun emplacement and camp were being built the unit slept and ate at Poho-O-Rawiri. Once their living quarters were finished they moved up the hill. The Kaiti Hill Gun Emplacement was one of 14 constructed at secondary ports around New Zealand in 1942-43 as part of a major coastal defense strategy that also saw the construction of 37 pillboxes in the Gisborne District. Within six months of completing the gun emplacement the perceived threat from coastal invasion had gone and the 77 <sup>th</sup> Heavy Battery unit was re posted. A six man maintenance crew remained until the end of the war. By 1950 most of the camp buildings had been removed.	
<b>4. Owner Current – Gisborne District Council</b> Address	Tenant/manager
<b>5. Nature of information (hearsay, brief or extended visit)</b>  Photographs (reference numbers and where held) photos taken  Aerial photographs (reference numbers and clarity of site)	
<b>6. Record Update:</b> Ken Phillips Address P.O.Box 855 Whakatane	File keeper Pam Bain Date
<b>7. New Zealand Historic Places Trust (for office use)</b>	
Type of site  Local environment  Land classification	Present condition and future danger of destruction  Local body

Figure 13: Historical Places Trust record, extracted from NES search of records document.

## APPENDIX C: HISTORIC AERIAL PHOTOGRAPHS

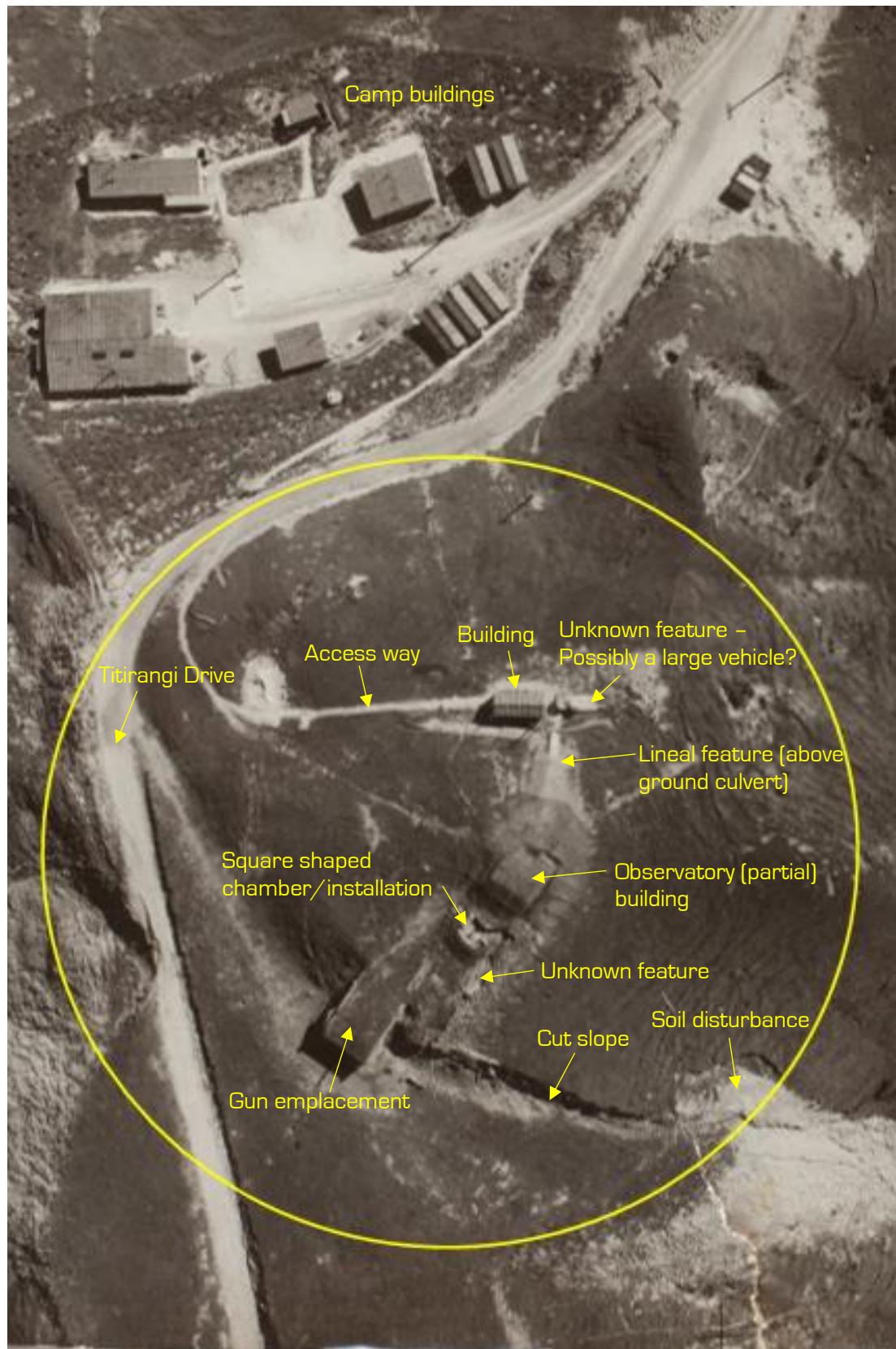


Figure 14: Photograph Dated 1943 [annotated]. Image supplied courtesy of Tairawhiti Museum. Approximate area of site investigation shown in yellow.

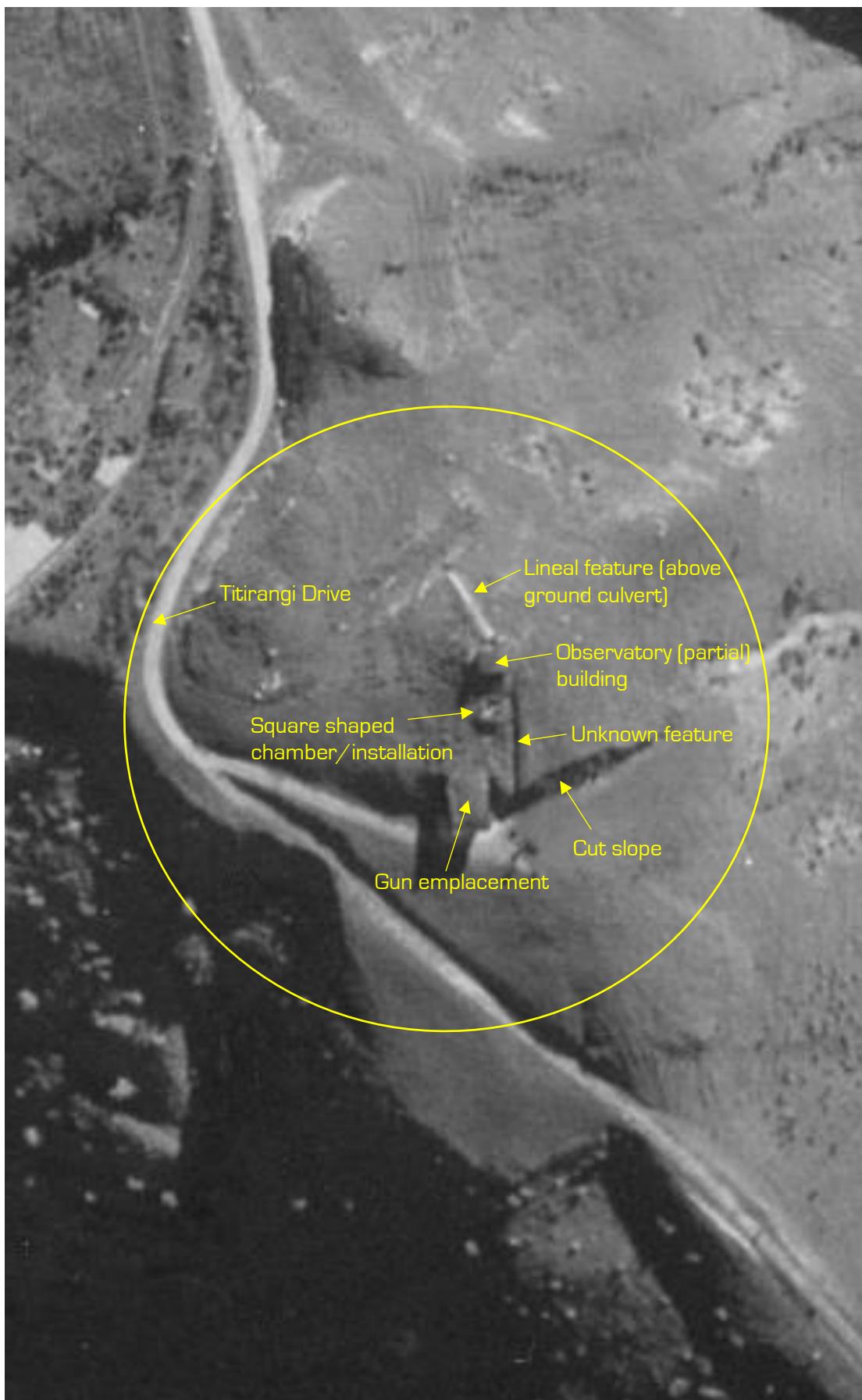


Figure 15: Photograph dated 6 July 1948. Source Retrolens. Approximate area of site investigation shown in yellow.



Figure 16: Photograph dated 24 August 1953. Source Retrolens. Approximate area of site investigation shown in yellow.

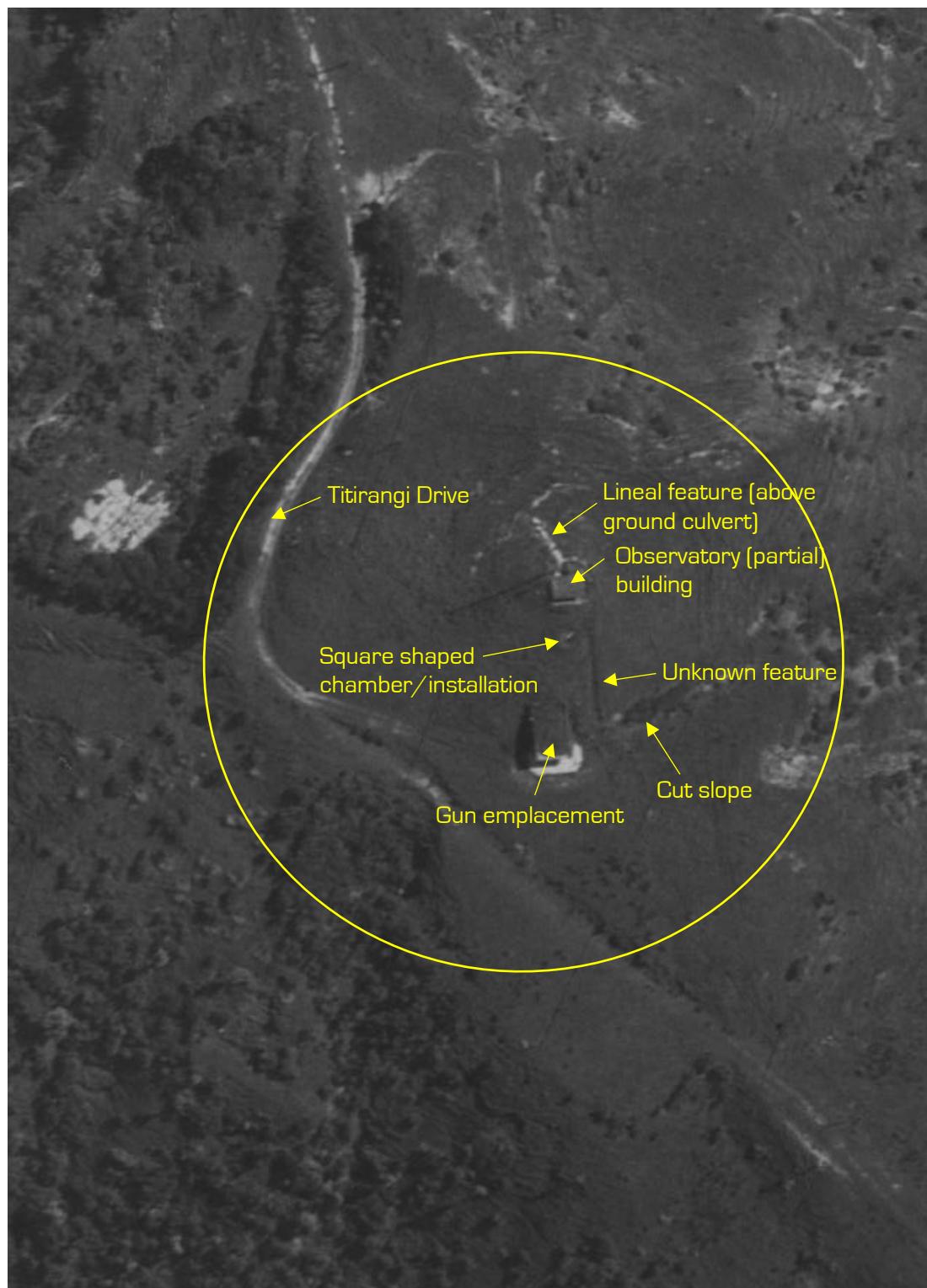


Figure 17: Photograph dated 6 November 1958 [annotated]. Source GDC. Approximate area of site investigation shown in yellow.

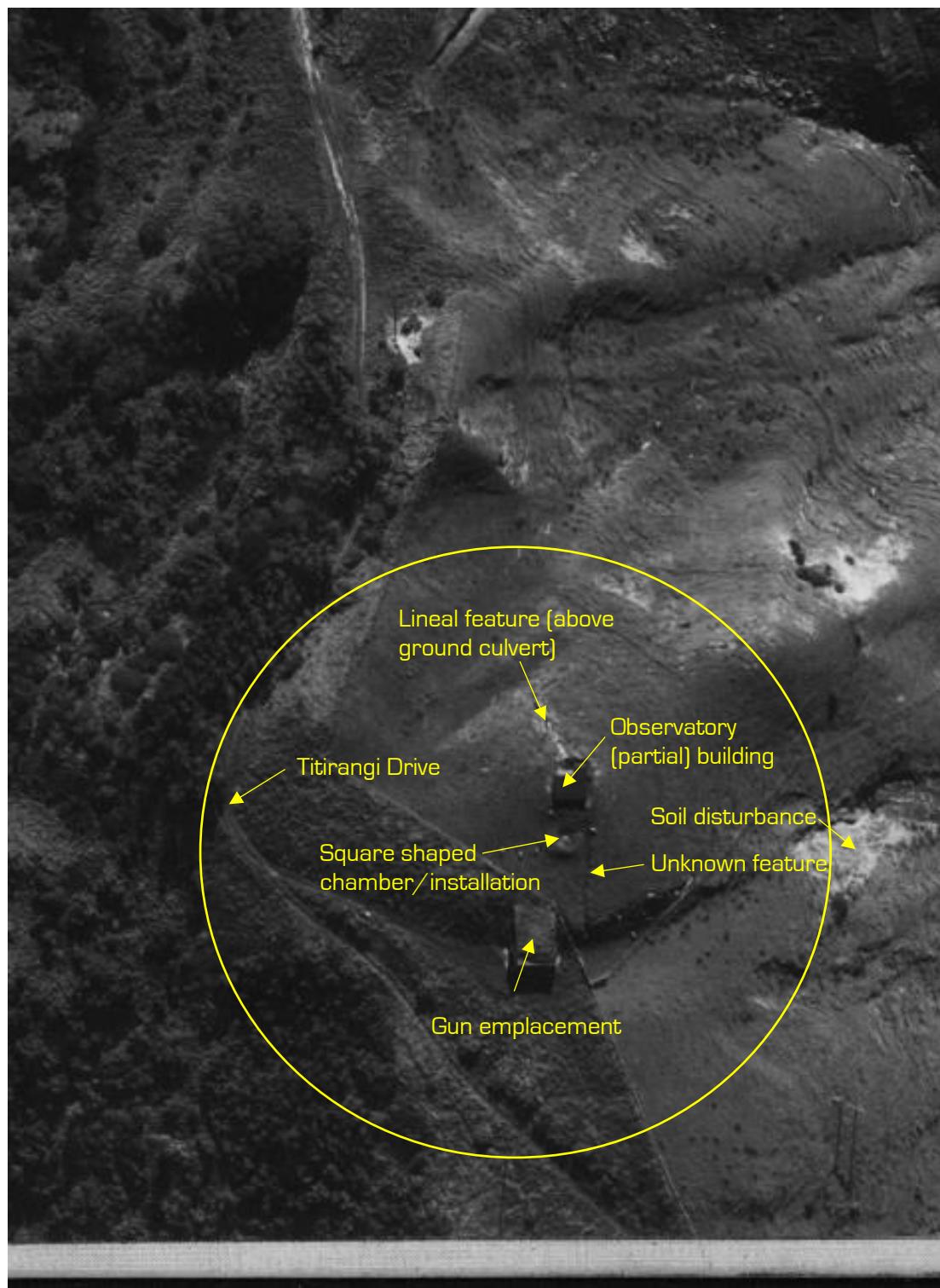


Figure 18: Photograph dated 7 May 1967 [annotated]. Source GDC. Approximate area of site investigation shown in yellow.

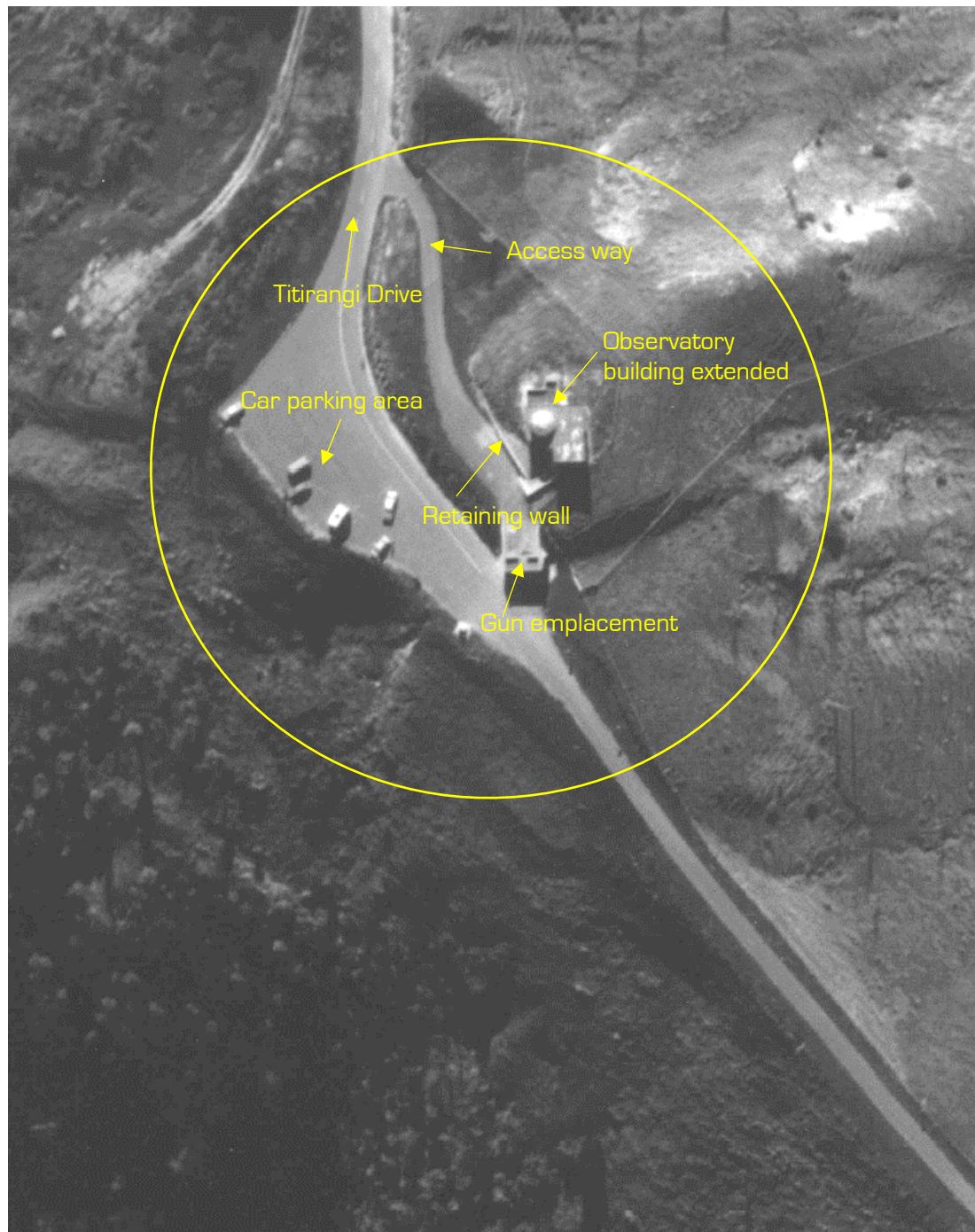


Figure 19: Photograph dated 18 May 1974 [annotated]. Source GDC. Approximate area of site investigation shown in yellow.



Figure 20: Photograph dated 7 February 1980 [annotated]. Source GDC. Approximate area of site investigation shown in yellow.

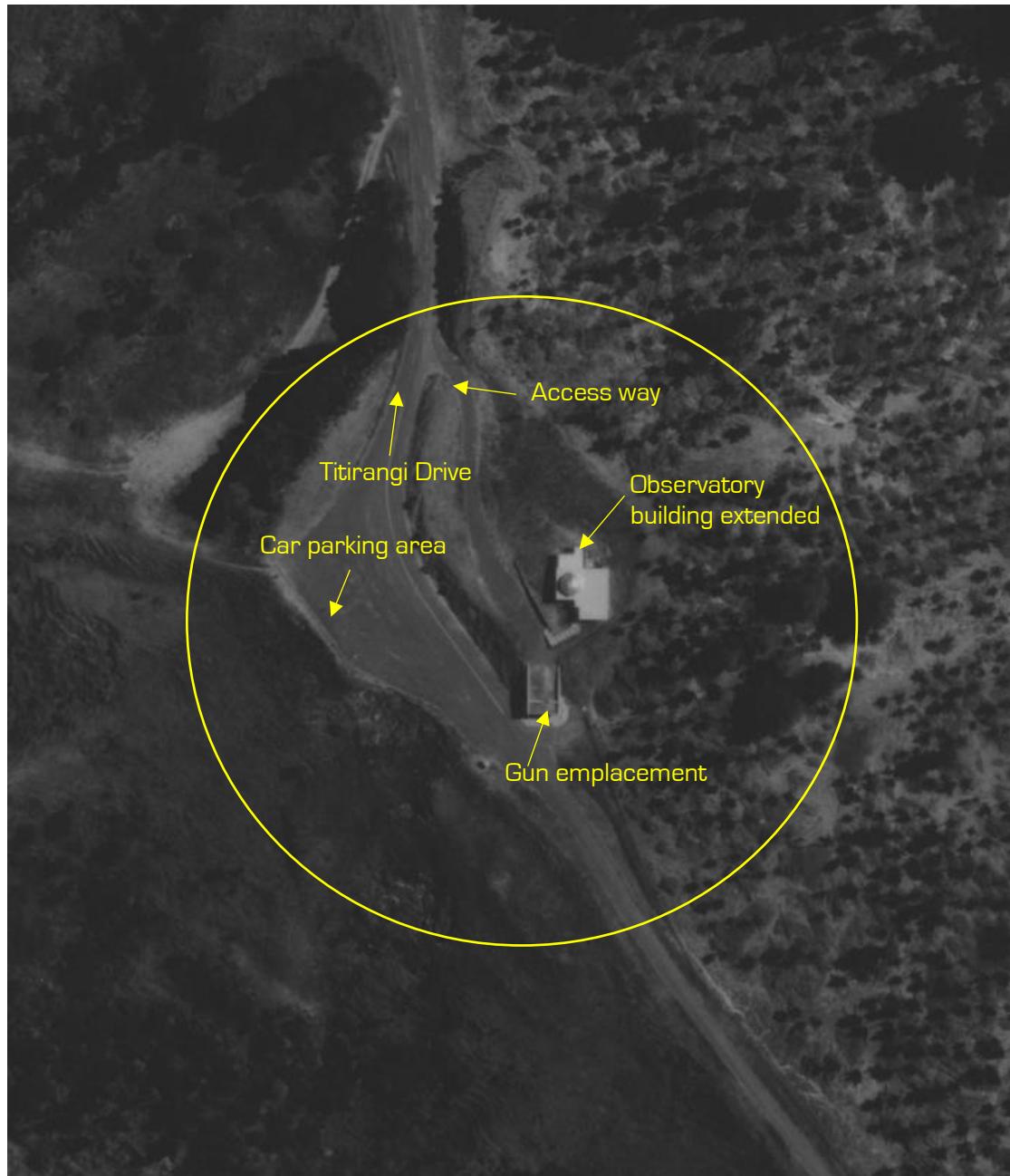


Figure 21: Photograph dated 28 January 1986 [annotated]. Source GDC. Approximate area of site investigation shown in yellow.



Figure 22: Photograph dated 27 October 1988 [annotated]. Source Retrolens. Approximate area of site investigation shown in yellow.



Figure 23: Photograph dated 24 March 1992 [annotated]. Source GDC. Approximate area of site investigation shown in yellow.



Figure 24: Photograph 3 November 2005 [annotated]. Source Google Earth. Approximate area of site investigation shown in yellow.



Figure 25: Photograph 9 October 2010 [annotated]. Source Google Earth. Approximate area of site investigation shown in yellow.



Figure 26: Photograph dated 2012 [annotated]. Source Tairawhiti Maps. Approximate area of site investigation shown in yellow.



Figure 27: Photograph dated 2017 [annotated]. Source Tairawhiti Maps. Approximate area of site investigation shown in yellow.

## APPENDIX D: CERTIFICATE OF TITLE



### COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952

Historical Search Copy



R. W. Muir  
Registrar-General  
of Land

Identifier **GS1D/1379**  
Land Registration District **Gisborne**  
Date Issued 24 January 1968

**Part-Cancelled**

Prior References  
GS123/33 GS61/186 GS80/152

Estate Fee Simple  
Area 6.3493 hectares more or less  
Legal Description Lot 1 and Lot 3 Deposited Plan 5159  
Purpose Pleasure Grounds and Gardens

Original Proprietors  
The Gisborne City Council

#### Interests

Subject to a right of way, right to erect and support VHF station aerials and to underground telephone cable rights created by Proclamation 82386 (Affects Lot 1 DP 5159)  
Appurtenant hereto are water rights created by Transfer 19262 (Affects Lot 1 DP 5159)  
Appurtenant hereto are water rights created by Transfer 19263 (Affects Lot 1 DP 5159)  
101054 Gazette Notice proclaiming as a limited access street part Lot 3 DP 5159 (2 acres, 1 rood, 16.7 perches) - 31.8.1971 at 9.32 am  
159404.1 Gazette Notice declaring part of the within land containing 22m<sup>2</sup> is hereby acquired for post office purposes (VHF Station) - 6.8.1985 at 11.15 am

Identifier

GS1D/1379

References 80/152  
Prior C/T. 61/186  
123 33  
Transfer No. 87312  
N/G. Order No.

**PART - CANCELLED**  
**PART TAKEN BY GAZETTE REGISTER**  
**NOTICE**  
**CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT**

This Certificate dated the 24th day of January one thousand nine hundred and sixty eight under the seal of the District Land Registrar of the Land Registration District of Gisborne

**WITNESSETH** that THE MAYOR COUNCILLORS AND CITIZENS OF THE CITY OF GISBORNE for the purpose of pleasure grounds and gardens.

It is stated of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon, to be the several admissions a little more or less, that is to say: All that parcel of land containing 15 acres 2 roods 30.3 perches more or less situate in the City of Gisborne being Lots 1 and 3 Deposited Plan 5159.

Gisborne District Land Registrar  
REGISTRAR  
Assistant Land Registrar

(a) Subject to ~~existing~~ Covenants in Transfer 87514, 87243.  
(b) Subject as to Lot 1 D.P. 5159 herein to Right of Way, underground telephone cable rights and right to erect and support V.H.F. station aerials appurtenant to the part Lots 2 and Lot 2A D.P. 1998 (C.T. 1D/1381) created in Procl. 8236.

Appurtenant to Lot 1 D.P. 5159 herein are water rights over Lot 2 D.P. 1759 (C.T. 49/192) and part Lot 3 D.P. 1759 (C.T. 1A/1440) created by Transfers 19262 and 19263.

101054 Gazette Notice proclaiming as a limited access street part 3 D.P. 5159 (2 acres, 1 rood 16.7 perches) entered 31.8.1971 at 9.32 o'clock A.L.R.

156688.1 Certificate of Title by Minister of Lands and Survey - Development - 16/10/1984 at 10.50 o'clock A.L.R.

Total Area GN. 101054 15 . 2 . 30 . 3  
13 . 1 . 16 . 7  
12 . 1 . 34 . 4  
OVER

Scale: 1 inch = 6 Chains  
Balance METRIC AREA IS 5.3964 ha  
GN 159404-1 22 m<sup>2</sup>  
5.3942 ha

No. 1D/1379

**Identifier**

**GS1D/1379**

C.T. 1D/1379

159404.1 Gazette Notice declaring part of the  
within land containing 22m<sup>2</sup> is hereby acquired  
for post office purposes (VHF Station) -  
6.8.1985 at 11.15 o'clock

A.L.R.





**COMPUTER FREEHOLD REGISTER  
UNDER LAND TRANSFER ACT 1952**

**Historical Search Copy**



R.W. Muir  
Registrar-General  
of Land

**Identifier** GS5D/112  
**Land Registration District** Gisborne  
**Date Issued** 25 January 1993

**Prior References**  
GN 190590.1 GS3C/81

**Estate** Fee Simple  
**Area** 16.6289 hectares more or less  
**Legal Description** Lot 211 Deposited Plan 4889 and Part Lot 2 Deposited Plan 5159

**Original Proprietors**  
The Gisborne District Council

**Interests**

Subject to a right of way, underground telephone cable rights and rights to erect and support V.H.F. station aerials over part created by Gazette Notice 82386 (affects Part Lot 2 DP 5159)  
6866075.1 Gazette Notice ( 2006 pg 789) decalring the within land to be a recreation reserve - 16.5.2006 at 9:00 am  
Subject to the Reserves Act 1977  
9083324.1 Notice pursuant to Section 195(2) Climate Change Response Act 2002 -- 31.5.2012 at 10:03 am (affects Part Lot 2 DP 5159)

## Identifier

GS5D/112

### *References*

— 1 —

Transfer No.  
N/C. Order No.  
Gazette Notice 190590.1

Land and Deeds 69

No. \_\_\_\_\_



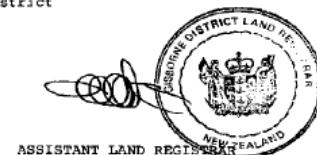
## REGISTER

**CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT**

This Certificate dated the 25th day of January one thousand nine hundred and ninety three  
under the seal of the District Land Registrar of the Land Registration District of Gisborne

**WITNESSETH** that THE GISBORNE REFRIGERATING COMPANY LIMITED a duly incorporated company having its registered office at Gisborne

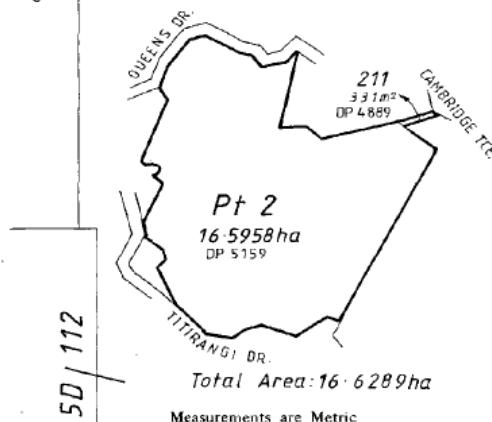
is seized of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial underwritten or endorsed herein) in the land hereinafter described, delineated with bold black lines on the plan herein, be the several ad-measurements a little more or less, that is to say: All that parcel of land containing 16.6289 hectares more or less being Lot 211 on Deposited Plan 4889 and Part Lot 2 on Deposited Plan 5159 situated in Block VII Turangani Survey District



Subject to a right of way, underground telephone cable rights and rights to erect and support V.H.F. station aerials over part of Lot 2 DP 5159 herein appurtenant to Part Lot 2A DP 1998 (Pt 5D/126) - created by Gazette Notice 82386

203593.1 Transfer to The Gisborne District Council - 26.5.1995 at 9.05 o'clock

A<sub>2</sub>L<sub>2</sub>R<sub>2</sub>

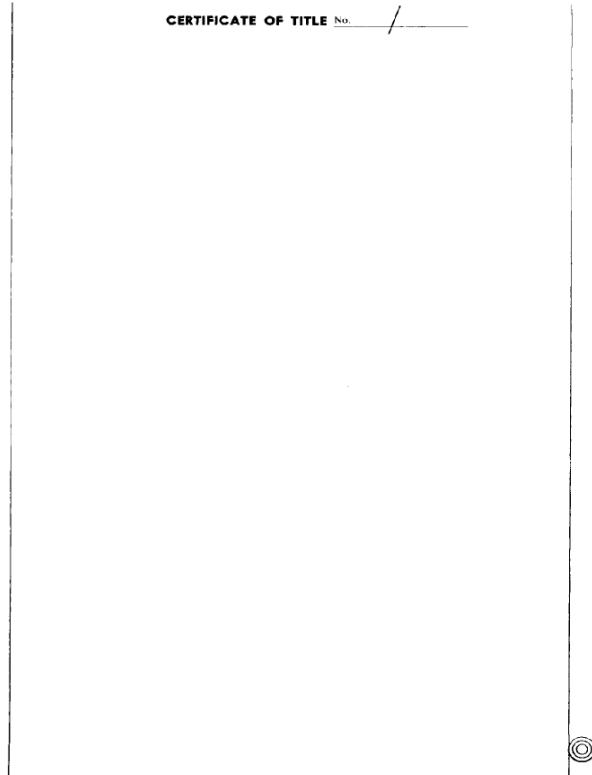


No.

*Transaction Id*  
*Client Reference* mbradford001

*Historical Search Copy Dated 17/10/18 9:55 am, Page 2 of 3*

Identifier **GS5D/112**



## APPENDIX E: CHAIN OF CUSTODY RECORD

ENVIRONMENTAL TESTING:

# CHAIN OF CUSTODY



**ANALYTICA**  
 LABORATORIES

CLIENT INFORMATION		Page #	1	of	1	
Client	LDE	Customer Comments / Instructions				
Address	32 Grey Street	H. M = Heavy metals & elements Asbestos = presence / Absence PCP				
Project Leader	JD					
Project ID	13364	PO #				
Site	Titirangi Hill Observatory					
Sampler	Sarah Robinson					
Phone	06 8673035					
Email	S.Robinson@lde.co.nz					
Invoice Email	Admin@lde.co.nz					

LABORATORY USE ONLY					
Laboratory Job #	18-37126	Seal Status	/	Priority (mark with X)	
Date Received	01/12/18	Received By	OM	Sample Temp Status	
Routine		Urgent			

TESTS REQUESTED										
Lab ID	Sample ID	Depth	Date	Time	Matrix	# Cont.	Analysis Requests/Suites			
1	S1	0-0.2	3/11/18	12pm	S or W		HM, Asbestos, PCP	Topsol	1	
2	S2	0-0.2	3/11	1045	S or W		HM, Asbestos	Silt fill-brick		
	S2.1	0.5-0.7	11/1		S or W			Unstable to Anger		
2	S3	0-0.2m	11/1	0.55	S or W		HM, Asbestos, PCP	Silt fill-Silt		
4	S3.1	1-1.2m	10/11	10:05	S or W		HM, Asbestos	clay (reworked)		
5	S3.2	2-2.2m	10/11	10:05	S or W		HM, Asbestos	clay (reworked)		
6	S4	0-0.2	11/1	12:20	S or W		HM, Asbestos	silt fill		
7	S4.1	0.5-0.7	11/1	12:10	S or W		HM, Asbestos	reworked clay		
8	S5	0-0.2m	11/1	10:50	S or W		HM, Asbestos	topsoil		
7	S5.1	0.5-0.7	11/1	11:00	S or W		HM, Asbestos	clay		
10	S6	0-0.2m	11/1	11:20	S or W		HM, Asbestos	topsoil		
11	S7	0-0.2m	11/1	11:30	S or W		HM, Asbestos	topsoil		
12	S7.1	0.5-0.7	11/1	11:40	S or W		HM, Asbestos	clay & silt fill-brick		
13	S8	0-0.2m	11/1	11:50	S or W		HM, Asbestos	topsoil		
14	S9	0-0.2m	11/1	12:20	S or W		HM, Asbestos	topsoil		
15	S10	0-0.2m	11/1	12:40	S or W		HM, Asbestos, PCP	topsoil		
	S11	0-0.2m	11/1		S or W					
					S or W					

Relinquished by		Received by	OM	Courier	NZC
Date	11	Time			
Date	01/12/18	Time	8am	Courier #	JDQ00002614



## LAB003 Chain of Custody

Laboratory Locations						
Christchurch <input type="checkbox"/>	Dunedin <input type="checkbox"/> 186 Macandrew Road South Dunedin, 9012	Wellington <input type="checkbox"/> Level 2, 10 Hutt Road Petone, 5012	Auckland <input type="checkbox"/> 1/30 Greenpark Road Penrose P:0800 002 712			
E: admin@preciseconsulting.co.nz						
Company Name: Analytica Laboratories		Email: enviro.reception@analytica.co.nz				
Contact Person: Karla Chapman		Phone/Mobile: (07) 444 5574				
Office Address: Ruakura Research Centre, 10 Bisley Road, Hamilton						
Site Address:		Purchase Order Number:				
Client Reference: 18- 37126						
PCL Job Number:						
Date Results Requested (Bulk ID): (Bulk ID) 24hr <input type="checkbox"/> URGENT (<24hr) <input checked="" type="checkbox"/>	Date Results Requested (Soil Analysis): Semi-Quant. (5 days) Qual. (3days) URGENT Semi-Quant (3 Days) URGENT Qual (2 Days)					
Relinquished By:	Date:	Received By:	Date:			
Client Sample ID / Sample #	Asbestos Tests Required			Sample Details		
	Qualitative (P/A) Semi-Quantitative - BRANZ (Solt Only)	Semi Quantitative - WA (Solt Only)	Semi-Quantitative If Qualitative is POSITIVE	Quantitative WA	Bulk Sample	Tape / Swab
Sample Location and Sample Description and Notes						
S1	<input checked="" type="checkbox"/>					
S2	<input checked="" type="checkbox"/>					
S3	<input checked="" type="checkbox"/>					
S3.1	<input checked="" type="checkbox"/>					
S3.2	<input checked="" type="checkbox"/>					
S4.	<input checked="" type="checkbox"/>					
S4.1	<input checked="" type="checkbox"/>					
SS	<input checked="" type="checkbox"/>					
S5.1	<input checked="" type="checkbox"/>					
S6	<input checked="" type="checkbox"/>					
S7	<input checked="" type="checkbox"/>					
S7.1	<input checked="" type="checkbox"/>					
S8	<input checked="" type="checkbox"/>					
S9	<input checked="" type="checkbox"/>					
S10	<input checked="" type="checkbox"/>					
Lab Only:	Report Checked by (Initials):			Report sent by (Initials): Date:		
Payment Received: Yes <input type="checkbox"/> No <input type="checkbox"/>						

Version 7.0 Dated 29 June2016

CONTROLLED DOCUMENT

1 of 1

## APPENDIX F: LABORATORY TEST RESULTS



Analytica Laboratories Limited  
Ruakura Research Centre  
10 Bisley Road  
Hamilton 3214, New Zealand  
Ph +64 (07) 974 4740  
sales@analytica.co.nz  
www.analytica.co.nz

### Certificate of Analysis

Land Development & Exploration  
32 Grey Street  
Gisborne 4010  
Attention: Sarah Robinson  
Phone: 06 8673035  
Email: s.robinson@lde.co.nz

Lab Reference: 18-37126  
Submitted by: Sarah Robinson  
Date Received: 1/12/2018  
Date Completed: 6/12/2018  
Order Number:  
Reference: 13363

Sampling Site: Titirangi Hill/Observatory

#### Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.

#### Heavy Metals in Soil

Client Sample ID		S1 0-0.2m	S2 0-0.2m	S3 0-0.2m	S3.1 1-1.2m	S3.2 2-2.2m
Date Sampled		30/11/2018	30/11/2018	30/11/2018	30/11/2018	30/11/2018
Analyte	Unit	Reporting Limit				
Arsenic	mg/kg dry wt	0.125	4.95	38.3	6.24	4.48
Cadmium	mg/kg dry wt	0.005	0.046	0.19	0.17	0.018
Chromium	mg/kg dry wt	0.125	14.4	62.4	10.9	19.6
Copper	mg/kg dry wt	0.075	8.56	40.4	7.49	16.4
Lead	mg/kg dry wt	0.05	12.0	35.3	9.25	12.5
Mercury	mg/kg dry wt	0.025	0.065	0.065	0.029	0.077
Nickel	mg/kg dry wt	0.05	11.7	15.0	11.5	25.3
Zinc	mg/kg dry wt	0.05	50.9	109	67.4	63.4

#### Heavy Metals in Soil

Client Sample ID		S4 0-0.2m	S4.1 0.5-0.7m	S5 0-0.2m	S5.1 0.5-0.7m	S6 0-0.2m
Date Sampled		30/11/2018	30/11/2018	30/11/2018	30/11/2018	30/11/2018
Analyte	Unit	Reporting Limit				
Arsenic	mg/kg dry wt	0.125	3.82	5.61	5.10	5.29
Cadmium	mg/kg dry wt	0.005	0.16	0.013	0.095	<0.005
Chromium	mg/kg dry wt	0.125	7.66	21.8	10.6	18.7
Copper	mg/kg dry wt	0.075	7.63	11.5	10.5	13.3
Lead	mg/kg dry wt	0.05	31.8	10.4	11.9	9.24
Mercury	mg/kg dry wt	0.025	0.056	0.042	0.042	0.063
Nickel	mg/kg dry wt	0.05	9.79	17.8	11.6	12.3
Zinc	mg/kg dry wt	0.05	97.1	54.4	61.2	40.3



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation, with the exception of tests marked \*, which are not accredited.

#### Heavy Metals in Soil

Client Sample ID		S7 0-0.2m	S7.1 0.5-0.7m	S8 0-0.2m	S9 0-0.2m	S10 0-0.2m		
Analyte	Date Sampled	Unit	Reporting Limit	18-37126-11	18-37126-12	18-37126-13	18-37126-14	18-37126-15
Arsenic	mg/kg dry wt	0.125	6.73	9.90	3.66	5.25	3.36	
Cadmium	mg/kg dry wt	0.005	0.21	1.50	0.14	0.020	0.090	
Chromium	mg/kg dry wt	0.125	19.2	18.5	10.8	15.9	10.3	
Copper	mg/kg dry wt	0.075	21.4	30.0	10.9	10.0	11.3	
Lead	mg/kg dry wt	0.05	31.7	35.8	26.3	10.1	11.4	
Mercury	mg/kg dry wt	0.025	0.056	0.065	0.036	0.025	0.035	
Nickel	mg/kg dry wt	0.05	18.7	21.2	11.5	12.8	10.3	
Zinc	mg/kg dry wt	0.05	156	934	91.7	47.7	63.7	

#### PCP and TCP in Soil

Client Sample ID		S1 0-0.2m	S3 0-0.2m	S10 0-0.2m		
Analyte	Date Sampled	Unit	Reporting Limit	18-37126-1	18-37126-3	18-37126-15
Pentachlorophenol	mg/kg dry wt	0.05	<0.05	<0.05	<0.05	<0.05
2,3,4,6-Tetrachlorophenol	mg/kg dry wt	0.05	<0.05	<0.05	<0.05	<0.05
2,4,6-Tribromophenol (Surrogate)	%	1	87.4	101.3	92.3	

#### Method Summary

Elements in Soil Acid digestion followed by ICP-MS analysis. (US EPA method 200.8).

Acid Herbicides in Soil A portion of dried and sieved (<2mm) soil sample is extracted with acidified methanol and diluted with acetic acid followed by LC-MS/MS analysis. Final results in mg/kg are based on dry sieved material <2mm.

Sharelle Frank, B.Sc. (Tech)  
 Technologist

Terry Cooney, Ph.D.  
 Signatory

Report Date: 06 Dec 2018

Certificate Number: P1812051212



Analytica Laboratories  
Ruakura Research Centre, 10 Bisley Road, Private Bag 3123

Client Reference: 18-37126

Dear Karla Chapman,

**Re: Asbestos Soil Identification Analysis – 18-37126**

15 sample(s) received on 05 Dec 2018 by Jesse Bryant.

The results of fibre analysis were performed by Gabby Buchanan of Precise Consulting and Laboratory Ltd on 06 Dec 2018.

The sample(s) were stated to be from 18-37126.

Sample analysis was performed using polarised light microscopy with dispersion staining in accordance with AS4964-2004  
*Method for the qualitative identification of asbestos in soil samples.*

The results of the fibre analysis are presented in the appended table.

Should you require further information please contact Gabby Buchanan.

Yours sincerely

A handwritten signature in blue ink, appearing to read "Buchanan".

Gabby Buchanan  
PRECISE LABORATORY IDENTIFIER

Issue Date: Jun 2017 | Version 10  
Precise Consulting & Laboratory Limited  
Level 2, 10 Hutt Road, Petone, Lower Hutt Wellington 5012  
P: 04 974 8356 W: [www.preciseconsulting.co.nz](http://www.preciseconsulting.co.nz)

P1812051212 - 1 of 5

**IANZ**  
ACCREDITED LABORATORY

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

## Sample Analysis Results

Certificate Number: P1812051212  
Report Date: 06 Dec 2018  
Site Location: 18-37126



**Note 1:** The reporting limit for this analysis is 0.1g/kg (0.01%) by application of polarised light microscopy, dispersion staining and trace analysis techniques.

**Note 2:** If mineral fibres of unknown type are detected (UMF), by PLM and dispersion staining, these may or may not be asbestos fibres. To confirm the identity of this fibre, another independent analytical technique such as XRD analysis is advised.

**Note 3:** The samples in this report are "As Received". The laboratory does not take responsibility for the sampling procedure or accuracy of sample location description. This document may not be reproduced except in full.

Identified by:

A handwritten signature in blue ink that reads "Buchanan".

Approved Identifier: Gabby Buchanan

Reviewed by:

A handwritten signature in blue ink that reads "Alice Knowles".

Key Technical Person: Alice Knowles

Sample ID	Client Sample ID	Sample Location/Description/Dimensions	Analysis Results
S001	S1 0-0.2	- Non-Homogeneous Soil 85.71g	No Asbestos Detected Organic Fibres
S002	S2 0-0.2	- Non-Homogeneous Soil 101.46g	No Asbestos Detected Organic Fibres Synthetic Mineral Fibres
S003	S3 0-0.2	- Non-Homogeneous Soil 121.36g	No Asbestos Detected Organic Fibres
S004	S3.1	- Non-Homogeneous Soil 91.44g	No Asbestos Detected Organic Fibres
S005	S3.2	- Non-Homogeneous Soil 90.26g	No Asbestos Detected Organic Fibres
S006	S4 0-0.2	- Non-Homogeneous Soil 115.46g	No Asbestos Detected Organic Fibres
S007	S4.1	- Non-Homogeneous Soil 119.36g	No Asbestos Detected Organic Fibres
S008	S5 0-0.2	- Non-Homogeneous Soil 93.86g	No Asbestos Detected Organic Fibres

## Sample Analysis Results

Certificate Number: P1812051212  
Report Date: 06 Dec 2018  
Site Location: 18-37126



Sample ID	Client Sample ID	Sample Location/Description/Dimensions	Analysis Results
S009	S5.1	Non-Homogeneous Soil 97.70g	No Asbestos Detected Organic Fibres
S010	S6 0-0.2	Non-Homogeneous Soil 108.23g	No Asbestos Detected Organic Fibres Synthetic Mineral Fibres
S011	S7 0-0.2	Non-Homogeneous Soil 91.46g	No Asbestos Detected Organic Fibres Synthetic Mineral Fibres
S012	S7.1	Non-Homogeneous Soil 130.85g	No Asbestos Detected Organic Fibres
S013	S8 0-0.2	Non-Homogeneous Soil 68.60g	No Asbestos Detected Organic Fibres
S014	S9 0-0.2	Non-Homogeneous Soil 95.93g	No Asbestos Detected Organic Fibres
S015	S10 0-0.2	Non-Homogeneous Soil 86.58g	No Asbestos Detected Organic Fibres



## Appendix 1: Soil Analysis Raw Data

Certificate Number: P1812051212  
 Report Date: 06 Dec 2018  
 Site Location: 18-37126

Sample ID	Client Sample ID	Total Sample Weight (g)	ACM Approximate Dimensions (g)*	Form	Trace Asbestos Detected**
S001	S1 0-0.2	85.71	-	-	N
S002	S2 0-0.2	101.46	-	-	N
S003	S3 0-0.2	121.36	-	-	N
S004	S3.1	91.44	-	-	N
S005	S3.2	90.26	-	-	N
S006	S4 0-0.2	115.46	-	-	N
S007	S4.1	119.36	-	-	N
S008	S5 0-0.2	93.86	-	-	N
S009	S5.1	97.70	-	-	N
S010	S6 0-0.2	108.23	-	-	N
S011	S7 0-0.2	91.46	-	-	N
S012	S7.1	130.85	-	-	N
S013	S8 0-0.2	68.60	-	-	N
S014	S9 0-0.2	95.93	-	-	N
S015	S10 0-0.2	86.58	-	-	N

\* The reporting limit for this standard is 0.1g/kg

Issue Date: Jun 2017 | Version 10  
 Precise Consulting & Laboratory Limited  
 Level 2, 10 Hutt Road, Petone, Lower Hutt Wellington 5012  
 P: 04 974 8356 W: [www.preciseconsulting.co.nz](http://www.preciseconsulting.co.nz)

P1812051212 - 4 of 5



## Appendix 1: Soil Analysis Raw Data

Certificate Number: P1812051212

Report Date: 06 Dec 2018

Site Location: 18-37126

\*\* Trace asbestos present is indicative that freely liberated respirable fibres are present and dust control measures should be implemented or increased.  
\*\*\* Asbestos weights listed in this table are indicative only and are outside of IANZ accreditation and is therefore not endorsed by IANZ.

Issue Date: Jun 2017 | Version 10  
Precise Consulting & Laboratory Limited  
Level 2, 10 Hutt Road, Petone, Lower Hutt Wellington 5012  
P: 04 974 8356 W: [www.preciseconsulting.co.nz](http://www.preciseconsulting.co.nz)

P1812051212 - 5 of 5



## **GISBORNE DISTRICT COUNCIL**

### **CLASSIFICATION OF SOIL AT TITIRANGI, GISBORNE**

Project Reference: 13364  
6 August 2019

---

LDE LTD

AUCKLAND | GIBSON | NAPIER | TAURANGA | WARKWORTH | WHANGANUI | WHANGAREI

[www.lde.co.nz](http://www.lde.co.nz)

## 1 INTRODUCTION

LDE Ltd has been engaged by Ranell Nikora of the Gisborne District Council (GDC) to undertake a soil classification investigation of the soil located from beneath the Titirangi Observatory as part of the resource consent conditions for the proposed site development.

## 2 SITE DESCRIPTION AND BACKGROUND INFORMATION

The site is located at Titirangi, where the modified hilltop site is currently being cut down to the approximate level of the summit carpark in order to create a new flat area and likely future building platform. Refer to Figure 1 showing the site location.

LDE have completed a combined preliminary and detailed site investigation for the proposed development at the site (report reference 13364 PSI/DSI, dated 11 December 2018). The investigation identified that there were areas of fill and re-worked clay material present at the site. Site testing results showed that soil at the site was within recreational and commercial/industrial land use but exceeded a residential land use in some locations where fill was identified.

The GDC consent conditions for the proposed development included (but weren't limited to) the requirement to collect soil samples for contamination analysis from beneath the observatory building (upon its removal) where fill material was likely.



Figure 1: Site location. Source Tairawhiti Maps.

### 3 SOIL SAMPLING

Soil samples have been tested for contaminants typically associated with uncontrolled filling and building waste, this includes heavy metals (suite of eight), mercury, and asbestos (presence/absence and bulk). Refer to Table 1 which provides a description of the material found at each test location and the requested lab's analysis

Table 1: Soil sample descriptions.

Date	Name	Depth	Descriptions	Lab Analysis
31.07.19	S11	0-10mm	Thin layer of imported blinding sand located beneath concrete slab	Heavy metals, asbestos in soil
31.07.19	S11.1	10-150mm	Clay fill below blinding sand	Heavy metals, asbestos in soil
31.07.19	S12	0-150mm	Soil beneath building slab appears to be natural	Heavy metals, asbestos in soil
31.07.19	S13	-	Fibrous, black paper located (stuck) between concrete floor slab and under-slab.	Asbestos bulk.
31.07.19	S14	-	Building waste (sheet) found on surface of site. Fibre glass like in appearance.	Asbestos bulk
31.07.19	S15	0-150mm	Fill (obvious pieces of brick) located outside the building footprint. Request lab testing only if the contractors intend on removing this fill off site due to lack of space on site.	Hold cold.
31.07.19	S16	0-150mm	Material below building, some remnant building materials present on ground surface, however, majority of soil beneath former building appears to be natural.	Heavy metals, asbestos in soil
31.07.19	S17	0-150mm	Material below building, some remnant building materials present on ground surface, however, majority of soil beneath former building appears to be natural.	Heavy metals, asbestos in soil
31.07.19	S18	0-150mm	Material below building, some remnant building materials present on ground surface, however, majority of soil beneath former building appears to be natural.	Heavy metals, asbestos in soil
01.08.19	S19	0-150mm below scraped back site	Fill from trench	Heavy metals, asbestos in soil
01.08.19	S19.1	200-450mm below scraped back site	Fill from trench	Heavy metals, asbestos in soil
01.08.19	S20	0-150mm below scraped back site	Fill from trench	Heavy metals, asbestos in soil
01.08.19	S20.1	150-400mm below scraped back site	Fill from trench	Heavy metals, asbestos in soil
01.08.19	S21	Stockpiled	Collected from excavated/scraped fill material in location of suspected tank and within the alignment of the trench.	Heavy metals, asbestos in soil

The soil encountered during our testing was generally silty clay, reworked silty clay and silty clay fill. Visual observations did not note any hydrocarbon staining or odours suggesting contamination, however, black, slightly fibrous building paper was identified between the floor slab and underfloor slab of the observatory building (not found in the soil). Remnant building

waste, such as concrete, bricks, timber was also present on the ground surface in places and within the identified backfilled trench. Refer to Figure 1 showing the soil sampling locations and Figures 2 to 5 showing the site photographs.

At each sample location, sampling apparatus were cleaned using water and a plant based cleaner and they were also dried between samples to prevent cross contamination. Following collection, the samples were placed immediately into a chilly bin. The chilly bin was sent with chain of custody documentation to Analytica Laboratories Limited located in Hamilton for analysis. The chain of custody documentation is attached in Appendix A.



Figure 2: Approximate soil sample locations. The samples shown in red were undertaken in 2018, whilst the more recent soils samples taken in 2019 are shown in yellow.

## 4 SITE PHOTOGRAPHS

Site inspections were undertaken during the demolition of the observatory building and upon discover of the backfilled trench on 31 July 2019 and 1 August 2019 (during the time of soil sampling). Refer to Figures 2 to 5.



Figure 3: Photo taken during demolition of the observatory building on 31 July 2019 (AM).



Figure 4: The observatory building has been demolished by 31 July 2019 (PM) with the suspected asbestos (black material) identified between the concrete floor and subfloor kept separate from the other building waste.



Figure 5: The area where the observatory was located was fully cleared by 1 August 2019 (AM) and soil samples were collected.



Figure 6: The back filled trench is evident in this image taken on 1 August 2019 (AM). Filling material including brick, concrete and a steel drum lid was identified within the backfilled trench fill.

## 5 TEST RESULT SUMMARY

Table 2 summarises the laboratory results for heavy metals and, mercury and whether asbestos was detected within the soil or within the building waste material (bulk testing) identified on site.

Table 2: Laboratory tests results for Heavy Metals, mercury and asbestos compared against residential, recreation and commercial/industrial land use scenarios, as well as the screen limits for Class A and B landfills.

Name	Depth (mm)	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Asbestos Detected?
S11	0-10	17.5	0.032	4.6	2.1	7.95	<0.025	3.5	23.9	No
S11.1	10-150	7	0.02	23.3	15.4	13.7	0.06	19.9	59.3	No
S12	0-150	7.1	0.0088	23.4	17.6	11.1	0.061	29	60.8	No
S13	Suspected asbestos material	-	-	-	-	-	-	-	-	No
S14	Suspected asbestos material	-	-	-	-	-	-	-	-	Yes
S15	Held cold with lab	-	-	-	-	-	-	-	-	-
S16	0-150	8.7	0.014	20.4	14.7	74.9	0.07	21.3	50.4	No
S17	0-150	6.4	<0.005	24.5	19.9	17.3	0.067	23	58.5	No
S18	0-150	7.5	0.074	23.5	21.1	17.5	0.081	56.3	77.6	No
S19	0-150	8.3	0.09	20.5	17.5	12.7	0.068	23.6	298	No
S19.1	200-450	7.5	0.097	19.6	17	12.6	0.061	22.6	369	No
S20	0-150	7.3	0.093	20.3	17.2	21.9	0.085	23.2	72	No
S20.1	150-400	7.7	0.072	21.5	17.5	13.8	0.077	25.3	71.5	No
S21	Stockpiled	5.1	0.14	8.2	11.1	10.9	0.051	12.3	87.2	No
<b>NES<sup>3</sup> 'Residential'</b>	20	3	460	NL <sup>6</sup>	210	310	600 <sup>7</sup>	8000 <sup>7</sup>	-	
<b>NES<sup>4</sup> 'Recreation'</b>	80	400	2,700	NL <sup>6</sup>	880	1,800	800 <sup>8</sup>	NL <sup>6, 8</sup>		
<b>NES<sup>5</sup> Commercial / Industrial</b>	70	1,300	6,300	NL <sup>6</sup>	3,300	4,200	3,000 <sup>9</sup>	NL <sup>6, 9</sup>	-	
<b>Screen limits<sup>10</sup> waste criteria (Class A)</b>	100	20	100	100	100	4	200	200	-	
<b>Screen limits<sup>10</sup> waste criteria (Class B)</b>	10	2	10	10	10	0.4	20	20	-	

1. All results and standard values are presented in mg/kg.
2. All metals tested for 'Total Recoverable' at screen level.
3. NES SCS from National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES, 2011), '*Residential 10% produce*' land use scenario.
4. NES SCS from National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES, 2011), '*Recreation*' land use scenario.
5. NES SCS from National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES, 2011), '*Commercial/industrial outdoor worker (unpaved)*'.
6. NL – 'No Limit'. Derived value exceeds 10,000 mg/kg.
7. '*Residential A*' values - Guideline on the Investigation Levels for Soil and Groundwater (NEPC, 2013).
8. '*Recreational C*' values - Guideline on the Investigation Levels for Soil and Groundwater (NEPC, 2013).

9. 'Commercial/industrial values' - Guideline on the Investigation Levels for Soil and Groundwater (NEPC, 2013).
10. Screen limits waste criteria sourced from Module 2: Hazardous Waste Guidelines, Landfill Waste Acceptance Criteria and Landfill Classification (MfE 2004)

The heavy metal results were elevated compared with assumed natural soil concentrations but were all below the soil contaminant standards for residential (10% produce), recreational and commercial land use scenarios, and therefore can be safely handled and reused onsite.

In the event of soil disposal to landfill, refer to the screening limits for waste criteria which permits disposal to a Class A landfill only.

There was no detection of asbestos within the soil, however, a piece of material found on site which had the appearance of fibres glass tested positive for chrysotile (white asbestos) fibres. The lab confirmed that one bundle of asbestos fibres was stuck onto the bitumastic layer (black material) of the sheet material. Refer to Figure 7 showing a photograph of the material containing the asbestos (after lab analysis).

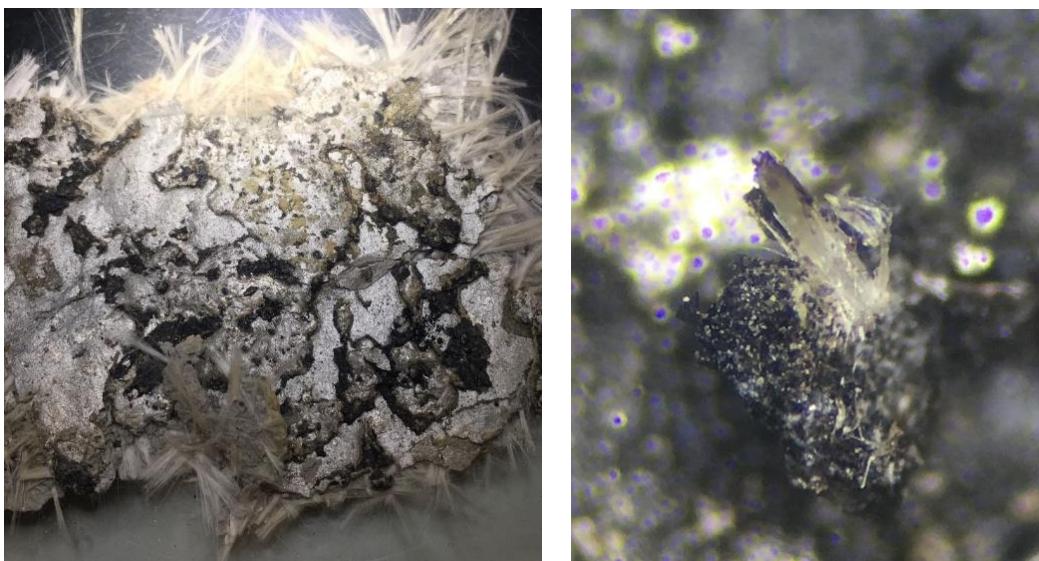


Figure 7: Photograph of Sample 14. The image on the left shows the material mostly intact with the asbestos detected within the bitumastic material (black material), whilst the image on the right shows the chrysotile bundle.

## 6 CONCLUSION AND RECOMMENDATIONS

Soil sampling showed that no heavy metals or mercury exceeded a residential (10% produce), recreation or industrial/commercial land use under the NES and can therefore remain on site or be disposed off at a Class A landfill.

No asbestos fibres were detected in the soil samples.

The suspected asbestos containing material identified between the concrete floor and subfloor of the observatory did not contain asbestos fibres. The concrete floor and subfloor which was kept separate from the general concrete waste on site as a precaution can be removed/taken off site as per the other handling of the concrete (building walls).

Remnant building waste found on the ground surface in small quantities which appeared to be fibreglass did contain asbestos fibres within the bitumastic layer of the material. The asbestos fibres were bound within the sheets of the material. We consider this finding a relatively low risk to human health due to the fact that it was found in small quantities on site and bound within the sheeting material.

At this stage we have not confirmed with the contractor where this sheeting has come from, however, we suspect it is from the observatory building (and not from within the fill). We understand that the material wasn't listed on the asbestos survey and that all demolition building materials were taken to Jukes Transport (who reportedly can accept asbestos containing material).

Any other material found on site similar in appearance (to what was confirmed as asbestos) also needs to be disposed of to a licenced landfill approved to accept asbestos containing material.

## **7 REPORT LIMITATIONS**

This investigation presents a soil contamination classification of soil located beneath the recently demolished Titirangi Observatory, prepared exclusively for Ranell Nikora of the Gisborne District Council with respect to the particular brief given to us.

Information, opinions and recommendations contained in it cannot be used for any other purpose or by any other entity without our review and written consent.

Land Development & Exploration Ltd accepts no liability or responsibility whatsoever for or in respect of any use or reliance upon this report by any third party. Opinions given in this report are based on specific soil sampling at discrete locations.

There is still some possibility that contaminating activities have taken place or contamination at the site is in excess of that described in this report and we should be contacted immediately if the conditions are suspected to differ from that described.

For and on behalf of LDE Ltd

Report prepared by:



Sarah Robinson

*Environmental Scientist*

Report reviewed by:



Jeff Davenport

Senior Environmental Scientist (SQEP)

## APPENDIX A: CHAIN OF CUSTODY

ENVIRONMENTAL TESTING:

### CHAIN OF CUSTODY

**URGENT**

**ANALYTICA**  
LABORATORIES



CLIENT INFORMATION		Page #	of
Client	LDE	Customer Comments / Instructions	
Address	32 Grey Street, Gisborne	(Removal of building foundations at site)	
Project Leader	Sarah Robinson		
Project ID	13364	PO #	
Site	Titirangi Observatory	HM = Heavy metals & Elements	
Sampler	Sarah Robinson	Asbestos soil = presence/Absence	
Phone	06 8673035 Ext 216	★URGENT Please	
Email	S.Robinson@lde.co.nz		
Invoice Email	Admin@lde.co.nz		

LABORATORY USE ONLY					
Laboratory Job #	19-25824	Seal Status	✓	Priority (mark with X)	
Date Received	18/19	Received By	GINNY	Sample Temp Status	Routine
					Urgent

TESTS REQUESTED						Analysis Requests/Suites		19-25824
Lab ID	Sample ID	Depth	Date	Time	Matrix	# Cont.	Sample Comments	
S11	0-10mm	31/7/19	9:30am	S or W			HM, Asbestos soil	Sand - beneath slab
S11.1	10-150mm	11/1	9:40	S or W			HM, Asbestos soil	clay fill under blinding sand
S12	0-150mm	10/1	9:50	S or W			HM, Asbestos soil	soil beneath building slab - natural.
S13		10/1	10:00	S or W			Asbestos Bulk	Black paper located between floor slab & underslab.
S14	Surface	10/1	10:10	S or W			Asbestos Bulk	build waste - fibreglass?
S15	0-150mm	10/1	10:20	S or W			Hold cold.	All
S16	0-150mm	11/1	1:45	S or W			HM, Asbestos soil	Below building - appears to be natural
S17	"	11/1	2:10	S or W			HM, Asbestos soil	" " "
S18	"	11/1	2:35	S or W			HM, Asbestos soil	" " "
								However, some remnant building materials present on surface

Relinquished by	Received by	Courier			
Date	18/19	Time	6pm	Courier	NZC
Date	18/19	Time	7:	Courier #	JD600004870

## ENVIRONMENTAL TESTING:

# CHAIN OF CUSTODY



19-25940

NALYTICA  
LABORATORIES



Analytica Laboratories Ltd  
Ruakura Research Centre

10 Bisley Road, Private Bag 3123  
Hamilton 3240, New Zealand

Phone +64 7 974 4740  
Email enviro.reception@

## Courier

NZS

www.babylonians.com

Analytica Laboratories Ltd  
Ruakura Research Centre

10 Bisley Road, Private Bag 3123  
Hamilton 3240, New Zealand

Phone +64 7 974 4740

1

— 1 —

## APPENDIX B: LABORATORY RESULTS



Analytica Laboratories Limited  
Ruakura Research Centre  
10 Bisley Road  
Hamilton 3214, New Zealand  
Ph +64 (0) 974 4740  
sales@analytica.co.nz  
www.analytica.co.nz

### Certificate of Analysis

Land Development & Exploration  
32 Grey Street  
Gisborne 4010  
Attention: Sarah Robinson  
Phone: 06 867 3035  
Email: s.robinson@lde.co.nz

Lab Reference: 19-25824  
Submitted by: Sarah Robinson  
Date Received: 1/08/2019  
Date Completed: 5/08/2019  
Order Number:  
Reference: 13364

Sampling Site: Titirangi Observatory

#### Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.

#### Heavy Metals in Soil

		Client Sample ID	S11 0-10mm	S11.1 10-150mm	S12 0-150mm	S16 0-150mm	S17 0-150mm
		Date Sampled	31/07/2019	31/07/2019	31/07/2019	31/07/2019	31/07/2019
Analyte	Unit	Reporting Limit	19-25824-1	19-25824-2	19-25824-3	19-25824-7	19-25824-8
Arsenic	mg/kg dry wt	0.125	17.5	7.0	7.1	8.7	6.4
Cadmium	mg/kg dry wt	0.005	0.032	0.020	0.0088	0.014	<0.0050
Chromium	mg/kg dry wt	0.125	4.6	23.3	23.4	20.4	24.5
Copper	mg/kg dry wt	0.075	2.1	15.4	17.6	14.7	19.9
Lead	mg/kg dry wt	0.05	7.95	13.7	11.1	74.9	17.3
Mercury	mg/kg dry wt	0.025	<0.025	0.060	0.061	0.070	0.067
Nickel	mg/kg dry wt	0.05	3.5	19.9	29.0	21.3	23.0
Zinc	mg/kg dry wt	0.05	23.9	59.3	60.8	50.4	58.5

#### Heavy Metals in Soil

		Client Sample ID	S18 0-150mm
		Date Sampled	31/07/2019
Analyte	Unit	Reporting Limit	19-25824-9
Arsenic	mg/kg dry wt	0.125	7.5
Cadmium	mg/kg dry wt	0.005	0.074
Chromium	mg/kg dry wt	0.125	23.5
Copper	mg/kg dry wt	0.075	21.1
Lead	mg/kg dry wt	0.05	17.5
Mercury	mg/kg dry wt	0.025	0.081
Nickel	mg/kg dry wt	0.05	56.3
Zinc	mg/kg dry wt	0.05	77.6



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation, with the exception of tests marked \*, which are not accredited.

**Method Summary**

**Elements in Soil** Acid digestion followed by ICP-MS analysis. (US EPA method 200.8).  
Results are based on a dried sample passed through a 2 mm sieve.



Sharelle Frank, B.Sc. (Tech)  
Technologist



Matthew Counsell, B.Sc.  
Inorganics Team Leader



**Report Date:** 02 Aug 2019

**Certificate Number:** P1908020844

LDE Ltd

-

**Client Reference:** 13364

Dear LDE,

**Re: Asbestos Soil Identification Analysis – Titirangi Observatory**

6 sample(s) received on 02 Aug 2019 by Thomas Tardi-Zuch.

The results of fibre analysis were performed by Jenny Nichols of Analytica Laboratories Limited on 02 Aug 2019.

The sample(s) were stated to be from Titirangi Observatory.

Sample analysis was performed using polarised light microscopy with dispersion staining in accordance with AS4964-2004 *Method for the qualitative identification of asbestos in soil samples*.

The results of the fibre analysis are presented in the appended table.

Should you require further information please contact Jenny Nichols.

Yours sincerely

A handwritten signature in black ink, appearing to read "Jenny Nichols".

Jenny Nichols  
**LABORATORY IDENTIFIER**

**Issue Date:** Feb 2019 | **Version:** 11  
Analytica Laboratories Limited  
Unit 4, 91 Byron Street, Sydenham, Christchurch 8023

P: +64 7 974 4740  
W: [www.analytica.co.nz](http://www.analytica.co.nz)

P1908020844 - 1 of 3



## Sample Analysis Results

Certificate Number: P1908020844

Report Date: 02 Aug 2019

Site Location: Titirangi Observatory



**Note 1:** The reporting limit for this analysis is 0.1g/kg (0.01%) by application of polarised light microscopy, dispersion staining and trace analysis techniques.

**Note 2:** If mineral fibres of unknown type are detected (UMF), by PLM and dispersion staining, these may or may not be asbestos fibres. To confirm the identity of this fibre, another independent analytical technique such as XRD analysis is advised.

**Note 3:** The samples in this report are "As Received". The laboratory does not take responsibility for the sampling procedure or accuracy of sample location description. This document may not be reproduced except in full.

Identified by:

A handwritten signature in black ink that appears to read "J. Nichols".

Approved Identifier: Jenny Nichols

Reviewed by:

A handwritten signature in black ink that appears to read "T. Watson".

Key Technical Person: Tamiko Watson

Sample ID	Client Sample ID	Sample Location/Description/Dimensions	Analysis Results
S001	S11	- Non-Homogeneous Soil 92.26g	No Asbestos Detected Organic Fibres Synthetic Mineral Fibres
S002	S11.1	- Non-Homogeneous Soil 653.03g	No Asbestos Detected Organic Fibres
S003	S12	- Non-Homogeneous Soil 89.93g	No Asbestos Detected Organic Fibres
S004	S16	- Non-Homogeneous Soil 79.51g	No Asbestos Detected Organic Fibres
S005	S17	- Non-Homogeneous Soil 84.46g	No Asbestos Detected Organic Fibres
S006	S18	- Non-Homogeneous Soil 77.28g	No Asbestos Detected Organic Fibres



**ANALYTICA**  
LABORATORIES

## Appendix 1: Soil Analysis Raw Data

Certificate Number: P1908020844  
Report Date: 02 Aug 2019  
Site Location: Titirangi Observatory

Sample ID	Client Sample ID	Total Sample Weight (g)	ACM Approximate Dimensions (E)*	Form	Trace Asbestos Detected**
S001	S11	92.26	0	N/A	N
S002	S111	633.03	0	N/A	N
S003	S12	89.93	0	N/A	N
S004	S16	79.51	0	N/A	N
S005	S17	84.46	0	N/A	N
S006	S18	77.28	0	N/A	N

\* The reporting limit for this standard is 0.1g/kg

\*\* Trace asbestos present is indicative that freely liberated respirable fibres are present and dust control measures should be implemented or increased

\*\*\* Asbestos weights listed in this table are indicative only and are outside of IANZ accreditation and is therefore not endorsed by IANZ.

Issue Date: Feb 2019 | Version 11  
Analytica Laboratories Limited  
Unit 4, 91 Byron Street, Sydenham, Christchurch 8023  
P: +64 7 874 4740  
W: [www.analytica.co.nz](http://www.analytica.co.nz)

P1908020844 - 3 of 3



**Report Date:** 02 Aug 2019

**Certificate Number:** B1908020900

LDE Ltd

-

**Client Reference:** 13364

Dear LDE,

**Re: Asbestos Identification Analysis – Titirangi Observatory**

2 sample(s) received on 02 Aug 2019 by Thomas Tardi-Zuch.

The results of fibre analysis were performed by Jenny Nichols of Analytica Laboratories Limited on 02 Aug 2019.

The sample(s) were stated to be from Titirangi Observatory.

Sample analysis was performed using polarised light microscopy with dispersion staining in accordance with the guidelines of *AS4964-2004 Method for the qualitative identification of asbestos in bulk samples*.

The results of the fibre analysis are presented in the appended table.

Should you require further information please contact Jenny Nichols.

Yours sincerely

A handwritten signature in black ink, appearing to read "Jenny Nichols".

Jenny Nichols  
**LABORATORY IDENTIFIER**

Issue Date: Feb 2019 | Version 11  
Analytica Laboratories Limited  
Unit 4, 91 Byron Street, Sydenham, Christchurch 8023

P: +64 7 974 4740  
W: [www.analytica.co.nz](http://www.analytica.co.nz)

B1908020900 - 1 of 2



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

## Sample Analysis Results



Certificate Number: B1908020900

Report Date: 02 Aug 2019

Site Location: Titirangi Observatory

**Note 1:** The reporting limit for this analysis is 0.1g/kg (0.01%) by application of polarised light microscopy, dispersion staining and trace analysis techniques.

**Note 2:** If mineral fibres of unknown type are detected (UMF), by PLM and dispersion staining, these may or may not be asbestos fibres. To confirm the identity of this fibre, another independent analytical technique such as XRD analysis is advised.

**Note 3:** The samples in this report are "As Received". The laboratory does not take responsibility for the sampling procedure or accuracy of sample location description. This document may not be reproduced except in full.

Identified by:

A handwritten signature in black ink that appears to read "Jenny Nichols".

Approved Identifier: Jenny Nichols

Reviewed by:

A handwritten signature in black ink that appears to read "Tamiko Watson".

Key Technical Person: Tamiko Watson

Sample ID	Client Sample ID	Sample Location/Description/Dimensions	Analysis Results
S001	S13	- Bitumastic material L1 - Bitumastic material 75 x 50 x 20 mm	No Asbestos Detected Organic Fibres Synthetic Mineral Fibres
S002	S14	- Bitumastic material L1 - Fibrous backing material L2 - Bitumastic material 180 x 90 x 2 mm	Chrysotile (white asbestos) Fibres Organic Fibres Synthetic Mineral Fibres



## Certificate of Analysis

Land Development & Exploration  
32 Grey Street  
Gisborne 4010  
Attention: Sarah Robinson  
Phone: 06 867 3035 ext 216  
Email: s.robinson@lde.co.nz

Lab Reference: 19-25940  
Submitted by: Sarah Robinson  
Date Received: 2/08/2019  
Date Completed: 6/08/2019  
Order Number:  
Reference: 13364

Sampling Site: Titirangi Observatory

### Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.

### Heavy Metals in Soil

		Client Sample ID	S19 0-150mm	S19.1 200-450mm	S20 0-150mm	S20.1 150-400mm	S21 Stockpile
		Date Sampled	1/08/2019	1/08/2019	1/08/2019	1/08/2019	1/08/2019
Analyte	Unit	Reporting Limit	19-25940-1	19-25940-2	19-25940-3	19-25940-4	19-25940-5
Arsenic	mg/kg dry wt	0.125	8.3	7.5	7.3	7.7	5.1
Cadmium	mg/kg dry wt	0.005	0.090	0.097	0.093	0.072	0.14
Chromium	mg/kg dry wt	0.125	20.5	19.6	20.3	21.5	8.2
Copper	mg/kg dry wt	0.075	17.5	17.0	17.2	17.5	11.1
Lead	mg/kg dry wt	0.05	12.7	12.6	21.9	13.8	10.9
Mercury	mg/kg dry wt	0.025	0.068	0.061	0.085	0.077	0.051
Nickel	mg/kg dry wt	0.05	23.6	22.6	23.2	25.3	12.3
Zinc	mg/kg dry wt	0.05	298	369	72.0	71.5	87.2

### Method Summary

#### Elements in Soil

Acid digestion followed by ICP-MS analysis. (US EPA method 200.8).  
Results are based on a dried sample passed through a 2 mm sieve.

  
Elizabeth Fitzgerald, B.Sc.  
Senior Technician

  
Karam Wadi, B.E. (Hons)  
Technologist

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation, with the exception of tests marked \*, which are not accredited.





**Report Date:** 06 Aug 2019

**Certificate Number:** P1908050741

LDE Ltd  
96 Station St, Napier/LDE Ltd, PO box 461, Napier 4140

**Client Reference:** 13364 (19-25940)

Dear LDE Ltd,

**Re: Asbestos Soil Identification Analysis – Titirangi Observatory**

5 sample(s) received on 05 Aug 2019 by Caitlin Hendry.

The results of fibre analysis were performed by Caitlin Hendry of Analytica Laboratories Limited on 06 Aug 2019.

The sample(s) were stated to be from Titirangi Observatory.

Sample analysis was performed using polarised light microscopy with dispersion staining in accordance with *AS4964-2004 Method for the qualitative identification of asbestos in soil samples*.

The results of the fibre analysis are presented in the appended table.

Should you require further information please contact Caitlin Hendry.

Yours sincerely

A handwritten signature in black ink, appearing to read "Caitlin Hendry".

Caitlin Hendry  
**LABORATORY IDENTIFIER**

Issue Date: Feb 2019 | Version 11  
Analytica Laboratories Limited  
Level 2, 10 Hutt Road, Petone, Lower Hutt Wellington 5012  
P: +64 7 974 4740  
W: [www.analytica.co.nz](http://www.analytica.co.nz)

P1908050741 - 1 of 3



## Sample Analysis Results

Certificate Number: P1908050741

Report Date: 06 Aug 2019

Site Location: Titirangi Observatory



**Note 1:** The reporting limit for this analysis is 0.1g/kg (0.01%) by application of polarised light microscopy, dispersion staining and trace analysis techniques.

**Note 2:** If mineral fibres of unknown type are detected (UMF), by PLM and dispersion staining, these may or may not be asbestos fibres. To confirm the identity of this fibre, another independent analytical technique such as XRD analysis is advised.

**Note 3:** The samples in this report are "As Received". The laboratory does not take responsibility for the sampling procedure or accuracy of sample location description. This document may not be reproduced except in full.

Identified by:

A handwritten signature in blue ink, appearing to read "Caitlin Hendry".

Approved Identifier: Caitlin Hendry

Reviewed by:

A handwritten signature in blue ink, appearing to read "Gabby Buchanan".

Key Technical Person: Gabby Buchanan

Sample ID	Client Sample ID	Sample Location/Description/Dimensions	Analysis Results
S001	S19	- Non-Homogeneous Soil 77.63g	No Asbestos Detected Organic Fibres
S002	S19.1	- Non-Homogeneous Soil 75.22g	No Asbestos Detected Organic Fibres
S003	S20	- Non-Homogeneous Soil 88.76g	No Asbestos Detected Organic Fibres
S004	S20.1	- Non-Homogeneous Soil 86.65g	No Asbestos Detected Organic Fibres
S005	S21	- Non-Homogeneous Soil 78.38g	No Asbestos Detected Organic Fibres Synthetic Mineral Fibres



## Appendix 1: Soil Analysis Raw Data

Certificate Number: P1908050741

Report Date: 06 Aug 2019

Site Location: Titirangi Observatory

Sample ID	Client Sample ID	Total Sample Weight (g)*	ACM Approximate Dimensions (g)*	Form	Trace Asbestos Detected**
S001	S19	77.63	-	No Asbestos Detected	N
S002	S19.1	75.22	-	No Asbestos Detected	N
S003	S20	88.76	-	No Asbestos Detected	N
S004	S20.1	86.65	-	No Asbestos Detected	N
S005	S21	78.38	-	No Asbestos Detected	N

\* The reporting limit for this standard is 0.1g/kg

\*\* Trace asbestos present is indicative that freely liberated respirable fibres are present and dust control measures should be implemented or increased

\*\*\* Asbestos weights listed in this table are indicative only and are outside of IANZ accreditation and is therefore not endorsed by IANZ.



Project Reference: 13364 SVR  
7 October 2019

Ranell Nikora  
Gisborne District Council  
[Ranell.Nikora@gdc.govt.nz](mailto:Ranell.Nikora@gdc.govt.nz)

Dear Ranell

## SITE VALIDATION REPORT FOR TITIRANGI SUMMIT, GISBORNE

As contaminated soil has been removed off the site located at Titirangi Observatory, a site validation report (SVR) is required under condition 16 of the condition of the resource consent in relation to '*Stage 1 of the Titirangi Summit redevelopment – bulk earthworks to remove unstable land and infrastructure to facilitate a future building platform*' Reference: LU-2019-108839-00, LL-2019-109004-00 and NC-2019-109005-00

This report shall be submitted to the Gisborne District Council (GDC) for their consideration and approval.

### 1 PREVIOUS INVESTIGATIONS

LDE have previously undertaken the following investigations at the Titirangi Summit:

- A 'Soil Contamination Preliminary and Detailed Site Investigation' report, reference 13364 PSI/DSI and dated 11 December 2018,
- A 'Classification of Soil at Titirangi, Gisborne' report, dated 6 August 2019, and
- Numerous site visits/inspections undertaken throughout June and September (when required) with a summary of each site inspection emailed to the GDC and site contractor.

The above reports and summary site inspection emails form the bases of the site validation and therefore should be read in conjunction with this report. These are included in Appendix A.

### 2 EXCAVATION OF SOIL AND ASBESTOS CONTAINING MATERIAL

Siteworx Civil Ltd were subcontracted by the client to manage and oversee the removal of the Titirangi Summit. LDE were engaged by the GDC to monitor the earthworks as there was the potential for landfill/imported fill to be encountered during the earthworks phase. A condition of the resource consent was that no uncontrolled fill was to be taken off site to the known disposal site.

During our site inspections, potential asbestos sheeting material was identified within the building demolition material. Testing confirmed that asbestos was present within the black bitumastic layer of the sheeting (refer to Figure 1). It appeared that this material was adhered to the concrete roof of the observatory building which had been mostly demolished. Given that asbestos was bound to the bitumastic layer, the potential for free fibre release was considered low however precautions were taken to ensure the health and safety of site workers and future site users.



Figure 1: Sheeting material identified to contain asbestos within the black bitumastic layer within the material.

The concrete waste was stockpiled at the 'skid site' located at the bottom of the east side of the slope (Figure 2) and at the top of the slope near the building platform (Figure 3). We also identified the same asbestos sheeting within a mixed soil/fill pile (containing smaller pieces of concrete) which was also located near to the building platform (Figure 4).



Figure 2: Skid site containing concrete with asbestos sheeting.



Figure 3: Concrete stockpile containing asbestos sheeting



Figure 4: Mixed fill/concrete stockpile containing asbestos sheeting.

Due to the discovery of the asbestos containing material LDE recommended that the concrete/asbestos/fill stockpiles be removed off site and taken to a licenced landfill, with validation soil sampling to be undertaken in the areas of the identified asbestos stockpiles.

We note that the soil tested across the site to date found that no samples contained asbestos fibres, or heavy metal contaminants which exceeded a recreational land use applicable to the site. Therefore, only the areas where asbestos containing materials were identified or stockpiled, required validation sampling on completion of the removal of the asbestos.

### 3 OFF-SITE DISPOSAL

Our site inspections undertaken after the discovery of the asbestos material noted that that the concrete had been removed off site and the soil where the stockpiles were located (including the face of the slope) were also scraped back with the turf/upper soil layer removed. Refer to Figures 5 and 6.



Figure 5: Top of slope now cleared of asbestos containing concrete. Photograph taken on 9 August 2019.



Figure 6: Scraped back face of skid site. Photograph taken on 14 August 2019.

Correspondence from M. E. Jukes & Sons Ltd (C/- Site Works Civil) landfill show that 340 tons of asbestos contaminated demolition waste was received by Tonlyn Landfill between the 9<sup>th</sup> and 12<sup>th</sup> of August 2019.

Refer to Appendix D for the waste disposal letter and receipts from the landfill.

#### **4 SITE VALIDATION SAMPLING**

After the removal of the asbestos contaminated demolition waste and underlying soil, LDE collected soil samples in the three stockpile areas described in Section 2.

Soil sampling was undertaken to validate that the soil directly beneath the stockpiles (and nearby) did not contain asbestos. Soil grab samples were collected from within each validation area between 0-100mm below ground level. The grab samples were composited in the field, with one sample per validation area tested by the lab (three in total). Figure 1 shows the location of the soil samples collected as part of the site validation.

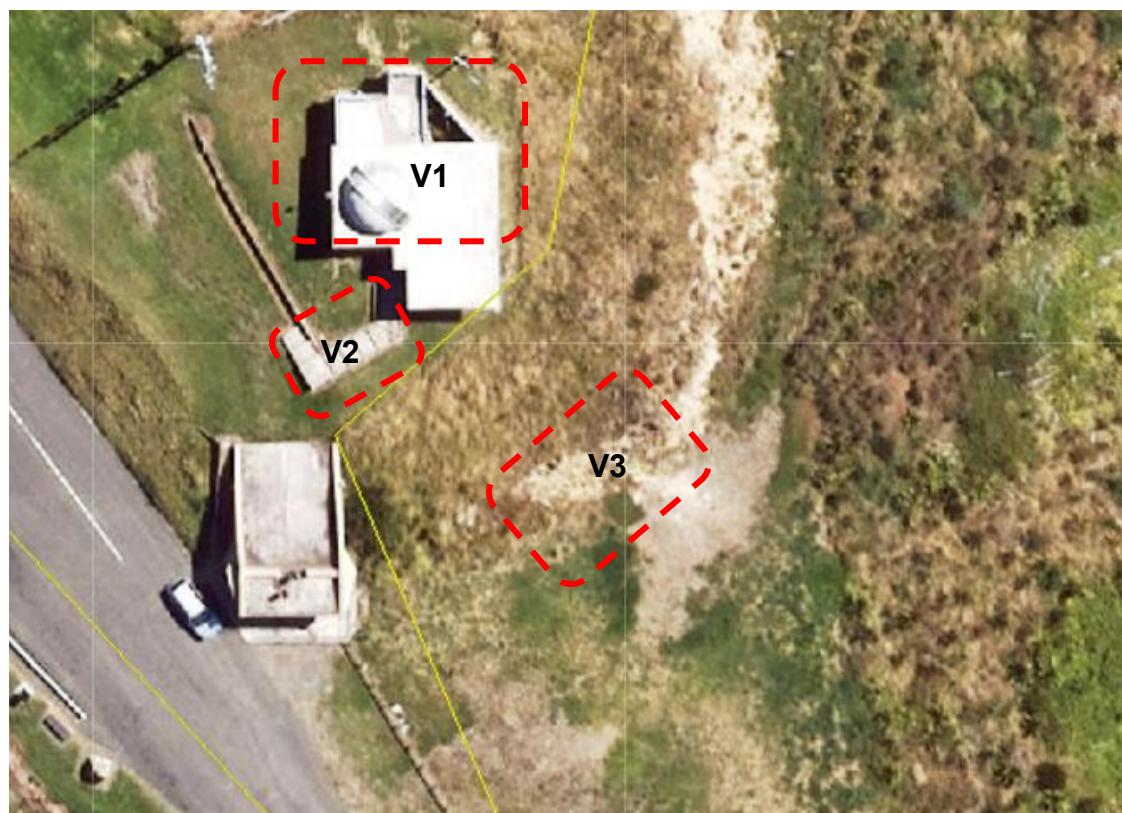


Figure 7: Surface soil grabs were collected from within the validation areas shown within the red boundaries and composited in the field prior to lab testing.

The results showed that no asbestos was detected within the validation soil samples. Refer to Table 1 for the summarised results, and Appendix B and C for the chain of custody and full lab results record.

Table 1: Validation soil sample results for Titirangi Summit.

Sample	Date	Depth	Sample Description	Asbestos detected
V1	09/08/2019	0-0.1m	Verification samples taken from beneath the former concrete stockpile and near building platform.	No
V2	09/08/2019	0-0.1m	Verification samples taken from beneath former soil/fill stockpile.	No
V3	14/08/2019	0-0.1m	Verification samples collected from across skid site.	No

## 5 IMPORTED SOIL

LDE regularly monitored the earthworks undertaken on the site (for both a soil contamination and geotechnical aspect) and during this time, did not witness any soil being imported onto the site.

Additionally, Siteworks Civil Ltd advised on 1 October 2019 that the project has now been completed and only ‘ready lawn’ was imported onto the site. Refer to the email coms in Appendix A.

## 6 CONCLUSIONS AND RECOMMENDATIONS

Asbestos containing building waste material was identified on the site during our site monitoring and inspections. This material and the soil located beneath the stockpiled material was removed off site and taken to the Tonlyn Landfill.

Validation soil sampling (undertaken after the removal of asbestos contaminated waste) did not detect any asbestos in the soil. We therefore consider that the works have been managed appropriately and that soils remain contaminant free. Accordingly, LDE considers that the site is suitable for its intended recreation land use in accordance with the NES (2011).

We understand that there will likely be areas of fill (non-natural soils) remaining at the site (particularly around the embankment area). The presence of this fill shall be taken into consideration during the time of any further site development (such as earthworks for new buildings etc), however, no further development plans have been provided to us at this time.

We recommended that any HAIL register the council holds for the Titirangi Summit is updated to reflect the findings of our report.

## 7 OTHER CONSIDERATIONS

This investigation presents the site validation report prepared for submittal to the Gisborne District Council as part of their resource consent requirements. Information, opinions and recommendations contained in it cannot be used for any other purpose or by any other entity without our review and written consent.

Land Development & Exploration Ltd accepts no liability or responsibility whatsoever for or in respect of any use or reliance upon this report by any third party.

Opinions given in this report are based on data summarised within the combined 'PSI/DSI', the '*Classification of Soils at Titirangi, Gisborne*', from specific validation sampling and ongoing site inspections, and from information provided by the site contractor.

There is still some possibility that the degree of contamination at the site is in excess of that described in this report and we should be contacted immediately if the conditions are suspected to differ from that presented.

For and on behalf of LDE Ltd

Report prepared by:



Sarah Robinson  
Environmental Scientist

Report reviewed by:



Jeff Davenport  
Senior Environmental Scientist  
(SQEP)

### Attached:

Appendix A: Previous LDE Soil Contamination Investigations and Correspondence

Appendix B: Chain of Custody Record

Appendix C: Lab Results

Appendix D: Waste Disposal Letter & Receipts