Milford Opportunities Project

TE HUAKAUE KNOBS FLAT

PRELIMINARY SITE INVESTIGATION

24 APRIL 2024

CONFIDENTIAL

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PRELIMINARY SITE INVESTIGATION

Milford Opportunities Project

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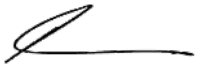
REV	DATE	DETAILS
001	07/02/2024	Internal review by WSP SQEP. Finalise for issue of DRAFT for Client comments.
002	08/03/2024	Amendments after Client review. Finalise for issue to Client.
003	09/04/2024	Amendments after Client comments.
004	19/04/2024	Final for issue.

	NAME	DATE	SIGNATURE
Prepared by:	Tara Verhulst	19/04/2024	
Reviewed by:	Lisa Bond	19/04/2024	
Approved by:	Andrew Bruce	19/04/2024	

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APPENDICES

GLOSSARY

CLMG 1	Contaminated Land Management Guideline No. 1: Reporting on Contaminated Sites in New Zealand
CLMG 5	Contaminated Land Management Guideline No. 5: Site investigation and analysis of soils
CMMP	Contaminated Materials Management Plan
CoC	Chain of Custody
CSM	Conceptual Site Model
CSMP	Contaminated Site Management Plan
DOC	Department of Conservation
DSI	Detailed Site Investigation
ES	Environment Southland
H&S	Health and Safety
HAIL	Hazardous Activities and Industries List
IANZ	International Accreditation New Zealand
ILAC	International Laboratory Accreditation Cooperation
ILAC-MRA	ILAC Mutual Recognition Arrangement
IRB	International Risk Based
LINZ	Land Information New Zealand
LRIS	Land Resource Information Systems
m bgl	meters below ground level
MfE	Ministry for the Environment
MMP	Ongoing Monitoring and Management Plan
MOP	Milford Opportunities Project
MoW	Ministry of Works
N/A	Not applicable
ND	Not derived
NES	National Environmental Standards
NESCS	National Environment Standard for Assessing and Managing Contaminants in Soil to Protect Human Health
NL	No limit - derived value exceeds 10,000mg/kg

NZRB	New Zealand Risk Based
PoL	Piece of Land
PSI	Preliminary Site Investigation
PSSP	Project Site Safety Plan
QA/QC	Quality assurance and Quality Control
RAP	Remedial Action Plan
SCS (health)	Soil Contaminant Standards for Health
SDC	Southland District Council
SGV	Soil Guideline Value
SID	Safety in Design
SQEP	Suitable Qualified and Experienced Practitioner
SSL	Soil Screening Level
SVR	Site Validation Report
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxicity Equivalent – indication of the toxicity of a mixture of compounds
UPSS	Underground Petroleum Storage System

EXECUTIVE SUMMARY

WSP New Zealand Ltd (WSP) were engaged by Milford Opportunities Project (MOP) to develop a Preliminary Site Investigation (PSI) for the proposed redevelopment at Te Huakaue Knobs Flat, Te Rua-o-Te-Moko Fiordland National Park ('the site'). The site is located. along the Te Anau-Milford Highway and is currently operated as a visitor campsite and bus service stop.

The MOP Masterplan incorporates a series of proposals to rethink and redevelop the Milford Corridor for a more sustainable and enjoyable visitor experience. As part of the MOP Masterplan, Te Huakaue Knobs Flat has been earmarked for redevelopment and expansion of the existing accommodation cabins and campsite. The proposal retains use of the site as a campsite with the addition of short stay visitor accommodation in the form of cabins and a 25-bed lodge at the adjacent Kiosk Creek site.

As the project is still in the feasibility and business case stage, the aim of this PSI is to better inform the optioneering assessment for development. As such, definite development plans are not yet available. The site has been assessed as retaining a Recreational end use with additional considerations for a Commercial/Industrial end use during construction or maintenance work, as per NES-CS Regulations (Ministry for the Environment, 2012).

A review of the Environment Southland (ES) Beacon web portal has revealed that the southern half of the site is currently registered as a verified HAIL site and a section in the northern half has been noted as partially investigated. The HAIL categories in question are A17. Storage tanks or drums for fuel, chemicals or liquid waste and F8. Transport depots or yards.

The PSI identified three Pieces of Land (PoL) where HAIL activities were more likely than not considered to have occurred.

A summary of risks associated with both Verified HAIL and Unverified HAIL has been provided on Table 7-3 below, with the locations of the Pieces of Land shown in Figure 7-1.

Table 1-1: Summary of Contaminant Risks

'PIECE OF LAND'	HAIL CATEGORY	VERIFIED/ UNVERIFIED	CONTAMINANTS OF CONCERN	RECEPTOR	RISK
UPSS 1	A17	Verified	Petroleum Hydrocarbons; metals	Human Health	Low
				Ecological	Low
UPSS 2	A17	Verified	Petroleum Hydrocarbons; metals	Human Health	Low
				Ecological	Low
UPSS 3	A17	Verified	Petroleum Hydrocarbons; metals	Human Health	Low
				Ecological	Low
Transport yard	F8	Unverified	Petroleum Hydrocarbons; metals	Human Health	Low
				Ecological	Low

Landfill sites	G3	Unverified	Metals, petroleum hydrocarbons	Human Health	Low
				Ecological	Low
Wastewater Treatment	G6	Verified	Metals, sVOC, biological hazards, nutrients (ammoniacal nitrogen)	Human Health	Low
				Ecological	Low
Generator building	I	Unverified	Lead based paint	Human Health	Low
				Ecological	Low
Other buildings	E1	Unverified	Asbestos	Human Health	Low
				Ecological	Low

An assessment of the risks to human health associated with potential contaminants of concern on the PoL concluded a Low Risk associated with the ongoing use of the premises for commercial accommodation. Risks to human health on the remainder of the site are Low.

Further assessment of the risks to human health and the environment should be completed should ground disturbance and potential mobilisation of contaminants occur within the defined Pieces of Land.

RECOMMENDATIONS

Based on the findings of this investigation, WSP recommends that:

- Should any ground disturbance be planned in the locality of the defined Pieces of Land a Detailed Site Investigation be undertaken prior in order to further assess the risks to human health and the environment;
- An accidental discovery protocol is put in place during ground disturbance on the site and a Contaminated Land Specialist is to be contacted should any unexpected ground conditions be encountered.
- This PSI report is submitted to the regional authority to facilitate updating the HAIL database.

1 INTRODUCTION

1.1 BACKGROUND

A Preliminary Site Investigation (PSI) has been undertaken on behalf of the Milford Opportunities Project (MOP) at Te Huakaue Knobs Flat (herein also referred to as 'the site') in Te Rua-o-Te-Moko Fiordland National Park.

The site is currently used as a bus service stop and campsite, operated by Eglinton Valley Camp, with accommodation cabins, non-powered and powered tent sites and campervan bays.

As part of the MOP Masterplan, the site has been earmarked for possible redevelopment and expansion of the existing accommodation with amenity buildings and simple cabins. These are likely to comprise a commercial end use.

The redevelopment may accommodate a small lodge near the Kiosk Creek clearing with campervan and camping access. However, this PSI will focus on Te Huakaue Knobs Flat only and the Kiosk Creek area has currently been excluded from the scope of this PSI.

It is understood that the aim of the PSI is to inform optioneering assessment for development. As such, definite development plans are not yet available.

The site is located along the Te Anau-Milford Highway (SH 94) and comprises a grassy flat surrounded by native beech trees.

As ground disturbance is proposed and the site may have been subject to activities as described on the Ministry for the Environment's Hazardous Activities and Industries List (MfE's HAIL), the completion of a PSI is required in order to assess the potential risks to human health from contaminants in the soil as per NES-CS Regulations(Ministry for the Environment, 2011c).

1.2 OBJECTIVE

The objective of this PSI is to:

- Identify whether it is more likely than not that an activity or industry described in the Ministry for the Environment (MfE) *Hazardous Activities and Industries List* (HAIL) (MfE, 2011a) is being or has been undertaken on the site.
- Determine the risks to human health should the proposed activity be undertaken and determine likely consenting requirements;
- Inform the nature and extent of further intrusive investigation in the form of a detailed site investigation (DSI), if required.

This PSI has been prepared in general accordance with the MfE *Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand* (CLMG No. 1) (Ministry for the Environment, 2021)

The conclusions of this investigation may be used in support of obtaining consent under the NES-CS and to meet any requirements from Environment Southland (ES) and Southland District Council (SDC).

1.3 SCOPE OF WORK

To achieve the objectives, the following scope was undertaken:

- Site walkover to assess the current site condition and its surrounding environment;
- An assessment of historical information relating to the site and its surroundings including the review of historical aerial photographs and maps, available satellite images and a review of available historical records including the National Library, SDC, ES, Te Ara and any other available sources.
- Review local geological and hydrogeological conditions through publicly available sources;
- Review of previous reports and information pertaining to the site from local authority records or other available sources; and
- Site characterisation indicating the potential human health and environmental risks associated with the site in the form of a conceptual site model (CSM) identifying potential sources of contaminants, exposure pathways and critical receptors.
- Findings of the CSM have informed a qualitative assessment of risks to human health and the environment.
- The findings have then been assessed to determine the status of the proposed development of the site under the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) (MfE, 2011) and the contaminated land provisions of the proposed Southland Water and Land Plan (Operative in Part) (Environment Southland, Court Version October 2023).

This report has been completed in general accordance with Contaminated Land Management Guidelines (CLMG) No.1: Reporting on contaminated sites in New Zealand (MfE, Revised 2021a) and as such has been reviewed by a Suitably Qualified and Experienced Practitioner (SQEP), as per the NESCS Regulations (Ministry for the Environment, 2011c).

1.4 CERTIFYING STATEMENT

WSP confirms that:

- This preliminary site investigation meets the requirements of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (the NESCS) because it has been:
- Reported on in accordance with the current edition of *Contaminated land management guidelines No 1 – Reporting on contaminated sites in New Zealand*, and
- The report has been reviewed and approved by a suitably qualified and experienced practitioner.
- The investigation manager/ author and principal reviewer/ certifier details are provided in Table 1-1 below. Evidence of the qualifications and experience of the suitably qualified and experienced practitioners who have done this investigation and certified this report are available on request from WSP.

Table 1-1: Investigation Management.

ITEM	DETAILS
Author	
Name	Tara Verhulst
Job Title	Environmental Scientist
Years of Industry Experience	3
Reviewer	
Name	Lisa Bond CEnvP
Job Title	Principal Consultant - Environmental
Years of Industry Experience	22

2 SITE DETAILS AND ENVIRONMENTAL SETTING

2.1 SITE IDENTIFICATION

Te Huakaue Knobs Flat is located within Te Rua-o-Te-Moko Fiordland National Park, along the Te Anau-Milford Highway or State Highway 94. Te Huakaue Knobs Flat is currently operated by Eglinton Valley Camp as a camping site for tents and campervans and includes several accommodation blocks and amenities.

The site is situated on the plains, true left of the Eglinton River. Site identification details are provided in Table 2-1 and the site layout is indicated on Figure 1, Appendix A.

Table 2-1: Site Information

DESCRIPTION	SITE INFORMATION
Site Address	Te Anau Milford Highway, Fiordland National Park
Legal Description	Te Rua-o-Te-Moko Fiordland National Park
Site Co-ordinates (Centre of site) obtained from Google Earth	44°58'39.25"S; 168°01'05.32"E
Parcel ID	3243418
Approximate Site Area	4ha / 40,000m^2
Territorial Authority	Southland District Council
Previous Site Use	Sawmilling site, Ministry of Works campsite
Current Site Use	Visitor campsite and accommodation

2.2 GEOLOGY AND TOPOGRAPHY

The Institute of Geological and Nuclear Sciences 1:250,000 geological map for the area describes the geology at the site as Holocene fan deposits (GNS Science, 2023). The deposits comprise loose, commonly angular, boulders, gravel, sand, and silt forming alluvial fans, and grading into scree upslope.

The geology west of the site, along the Eglinton River, comprises Holocene river deposits with unweathered, loose, bouldery gravel, sand and mud in modern floodplains.

An extract of the GNS geology map for the site is included in Figure 2, Appendix A.

The site is generally level, with a slight slope upwards towards the east. The site is situated approximately at 360-370m above mean sea level (amsl). The topographic contours are shown on Figure 3, Appendix A.

A review of the GNS Active Faults Database[1] indicates that the nearest active fault is an unnamed fault approximately 6.5km south-east of the site. Several inactive faults, such as the Skelmorlie Fault, are located in the vicinity of the site, most of which have uncertain locations.

2.3 SURFACE AND GROUNDWATER

The Environment Southland (ES)[2] Beacon public services maps were consulted for information regarding the hydrology and hydrogeology of the site.

Te Huakaue Knobs Flat and the surrounding area is part of the Waiau Catchment and the Waiau Freshwater Management Unit. The nearest surface water body is Kiosk Creek which receives water from the Livingstone Mountains east of the site and flows down to the Eglinton River along the east and northern boundary of site. The Eglinton River, approximately 400m west of the site, flows south-westward to discharge into Lake Te Anau. The general groundwater flow direction across the site is likely to be west towards the river.

Southland has been divided into nine different physiographic zones by ES, based on factors such as soil type, geology and topography. Te Huakaue Knobs Flat is located in the Riverine zone.

The Riverine physiographic zone refers to the area adjacent to the Eglinton River. The zone extends beyond the riparian margin to include floodplains and low elevation alluvial terraces. The area is strongly influenced by runoff from the Alpine zone. The most prominent water sources into the riverine zone are the main rivers fed by Alpine zone water, particularly as snow melts during spring, and soil water drainage from adjacent land. Soil water drains quickly through shallow, stony soils to underlying shallow aquifers.

Surface water bodies within the Riverine zone are generally diluted by pristine water coming from the Alpine zone ensuring potential contamination by sediments and microbes is generally low.

Aquifers can contribute nitrogen to intercepting rivers in which contaminants will flow to coastal estuaries and lagoons. However, due to the location of Te Huakaue Knobs Flat within Te Rua-o-Te-Moko Fiordland National Park, nitrogen and phosphorus concentrations in the area are considered to be low.

The records held by ES reveal two boreholes have been drilled on the site and two new wells are proposed. Details of the wells are provided in Table 2-2 below. A review of the New Zealand Geotechnical Database[3] (NZGD) revealed that no investigation logs are recorded for the site on the database.

The locations of the existing boreholes can be seen on Figure 4, Appendix A

[1] Accessed online at https://data.gns.cri.nz/af/ on 27 November 2023.

[2] Accessed online at https://maps.es.govt.nz/index.aspx?app=water-and-land on 27 November 2023.

[3] Accessed online at https://www.nzgd.org.nz/arcgismapviewer/mapviewer.aspx on 27 November 2023.

Table 2-2: Summary of well details on the site.

WELL ID	REFERENCE RL	DEPTH	DATE DRILLED	PRIMARY USE	INITIAL WATER LEVEL
D41/0009	370.15m	8.5m	7/11/2018	Groundwater Quality Monitoring	0.7m
D41/0011	359.6m	12m	5/04/2019	Geotechnical/Foundation Investigation	-4.8m
CC09/5001 (proposed)	N/A	6m	N/A	Groundwater Quality Monitoring	N/A
CC09/5002 (proposed)	N/A	6m	N/A	Groundwater Quality Monitoring	N/A

2.4 CLIMATE

Te Huakaue Knobs Flat receives 2,269mm of rainfall on average every year with generally 150mm or more occurring each month[4]. Projected climate changes by NIWA indicate that a worst-case scenario (RCP 8.5) would see an annual rainfall increase of up to 20% in winter over the next 15 years with increases in rainfall intensity projected alongside this increase.

Air temperatures at Te Huakaue Knobs Flat range from 3.4°C in July to 14.1°C in January[5] The mean temperature currently sits at 9.0°C and is predicted to increase by 1.4°C over the next 15 years in the area (NIWA Taihoro Nukurangi, 2024).

2.5 ECOLOGY

Due to the location of the site within Te Rua-o-Te-Moko Fiordland National Park, Te Huakaue Knobs Flat is of high ecological significance. The Eglinton Valley comprises an extensive lowland area of mixed southern beech forest. Following intensive pest management from the Department of Conservation (DOC), including a combination of traps, bait stations and aerial 1080, the area is known for homing a variety of endangered native species including mohua, long and short-tailed bats, kākā and kākāriki[6]. Birding NZ organises customised bird watching tours starting from the Te Huakaue Knobs Flat accommodation.

Te Wāhipounamu or the South West of the South Island of New Zealand is recognised as an UNESCO World Heritage Site due to its outstanding universal value (refer to Section 2.6 below).

[4] Accessed online at https://cliflo.niwa.co.nz/pls/niwp/wgenf.genform1 on 29 January 2024.

[5] Over a 10-year monitoring period from Jan 1991 to Dec 2020

[6] Accessed online at https://www.doc.govt.nz/our-work/eglinton-valley/ on 29 January 2024.

2.6 HERITAGE

The Heritage New Zealand Pouhere Taonga Act 2014 makes it unlawful for any person to modify or destroy, or cause to be modified or destroyed, the whole or any part of an archaeological site without the prior authority of Heritage New Zealand.

In order to establish the heritage status of the site the Heritage New Zealand database was consulted. The site was not found on the database.

Te Wāhipounamu or South West of the South Island of New Zealand has been classified as a UNESCO World Heritage Site since 1990[7]. This 2.6-million-hectare site spans across four national parks: Westland Tai Poutini, Aoraki Mount Cook, Tititea Mount Aspiring and Te Rua-o-Te-Moko Fiordland.

The area is considered to be the best modern example of the primitive taxa of Gondwanaland, the ancient super continent of 80 million years ago. Two-thirds of the park is covered with southern beech and podocarps, some of which are 800 years old. Te Wāhipounamu is a stronghold for rare plants and animals such as the kea and the endangered takahē. There are three endemic taxon of kiwi in the World Heritage Area: Rowi, Haast Tokoeka and Fiordland Tokoeka, the first two are the most endangered varieties of kiwi in New Zealand.

To Ngāi Tahu, the great mountains and valleys of Te Wāhipounamu are places of Atua (gods). The whakapapa (genealogies) of ancestors, who stand on the landscape, and the recognition of the deeds of those ancestors, are important cultural identifiers to these places[8].

[7] Accessed online at https://whc.unesco.org/en/list/551 on 30 January 2024.

[8] Accessed online at https://www.doc.govt.nz/te-wahipounamu on 30 January 2024.

3 DESKTOP REVIEW

3.1 SITE HISTORY

The site history has been obtained from multiple sources, including a review of previous investigations, historical aerial photographs, and anecdotal evidence[9]..

3.1.1 HISTORICAL AERIAL PHOTOGRAPHS

WSP undertook a review of relevant historical aerial photographs available on Retrolens[10], Maps Past[11] and Google Earth to assess whether any historical activities likely to result in contamination have been undertaken within 100 m of the site. A summary of the historical aerial photograph review is presented in Table 3-1. Historical aerial photography reviewed during this PSI is presented in Appendix B.

Table 3-1: Summary of observations from historical aerial photography and maps.

YEAR & SOURCE	TYPE	OBSERVATIONS
1967 Retrolens	Aerial Image	The site is situated along the eastern side of the Te Anau Milford Highway (State Highway 94) which appears to be a gravel road, parallel to the Eglinton River. The site comprises a grassy flat in between native trees. Three large residential dwellings and numerous smaller dwellings or sheds are noted in a cluster in the north-western corner of the site. A group of three dwellings is seen south of the main cluster. Some timber has been stored along the southern boundary of Te Huakaue Knobs Flat. A circular structure is seen along the north-eastern boundary of the site, that is possibly a long drop toilet. Some miscellaneous items are noted.
1978 Maps Past	Topo Map	Te Huakaue Knobs Flat has been established on the topographic map and is at approximately 1200ft amsl (365m amsl). Several dwellings are noted on the flat including the Ministry of Works camp.
1983 Retrolens	Aerial Image	Additional dwellings and sheds have been built on the site. A discoloured patch can be seen from the shed along the centre of the northern boundary, extending towards the west. Some timber stockpiles are noted on the eastern part of the site. A rectangular area of cleared vegetation is noted in the centre of the site. A gully can be seen along a row of trees. The stream flowing around eastern boundary of the site seems to have flooded recently and cleared several trees in its path. The highway has been chip sealed.

[9] Information obtained from https://eglintonvalleycamp.nz/about/#history on 13 December 2023.

[10] Accessed online at https://retrolens.co.nz/ on 4 December 2023.

[11] Accessed online at http://www.mapspast.org.nz/ on 4 December 2023.

1988 Retrolens	Aerial Image	Although the aerial is not very clear, it seems like soil disturbance has occurred in the north-western part of the site with possibly some buildings removed. Several dwellings have been removed from the centre of the site with new buildings noted along the tree line.
1995 Maps Past	Topo Map	Compared to the 1978 map, several additional dwellings have been constructed. A visitor centre is noted and works depot. Furthermore, a gravel stockpile is indicated west of the site on the bank of the Eglinton River.
1997 Environment Southland	Aerial Image	The dwellings can now be clearly identified. One large building is noted in the northern part of the site. The visitor centre is located in the middle of the site. A group of four buildings is noted on the western side of the row of trees. An additional three huts and two larger buildings are located in the south-western part of the site. Gravel roads lead to the various buildings. One large shed is located in the eastern part of the site, along the southern boundary, adjacent a large gravel area.
2001 Retrolens	Aerial Image	No notable changes are seen compared to the 1997 aerial.
2003 Google Earth	Aerial Image	A small shed is noted at the southern end of the row of trees. A car park has been constructed on a loop road around the northern property.
2006 Google Earth	Aerial Image	No notable changes are seen compared to the 2003 aerial. The small shed at the end of the tree row has been removed.
2009 Maps Past	Topo Map	No notable changes are seen compared to the 1995 map. The works depot is no longer noted on the site.
2010 Google Earth	Aerial Image	No discerning changes are noted to the site. Some heavy machinery is noted in the eastern part of the site. A gully is seen along the driveway, leading towards the highway. Some vehicle tracks are seen in the centre of the site.
2011 Google Earth	Aerial Image	No discerning changes are noted to the site. Some timber has been stored in the north-eastern part of the site.
2012 Google Earth	Aerial Image	No discerning changes are noted to the site.
2015 Google Earth	Aerial Image	Areas around the dwellings are grassed, while the remainder of the site appears to be dry.
2016 Maps Past/ LINZ	Topo Map	A loop road has been established on the site to accommodate the dwellings.
2019 Google Earth	Aerial Image	The large shed in the south-eastern part of the site has been removed.
2021-2022 Google Earth	Aerial Image	No discerning changes are noted to the site.

3.1.2 CONSTRUCTION OF THE MILFORD ROAD

Prior to approximately 1987, the site was operated by the Ministry of Works (called Public Works Department until 1947) and provided accommodation for staff working on building the Milford Road and the Homer Tunnel. The site comprised extensive workshops and above and underground fuel storage tanks.

Anecdotal evidence supplied by the Milford Sound Lodge[12], reveals that the Milford Road was first proposed in the late 1880s as a gold transportation route between Milford Sound Piopiotahi and Queenstown. Mr Henry Homer suggested blasting a tunnel through the mountainous ridge blocking access to Milford Sound Piopiotahi and early survey work in 1890 concluded its feasibility.

As the Otago gold rush slowed down, the suggestions were put on the back burner. However, in the mid-1920s work on the first stretch of road began along Lake Te Anau.

During the Great Depression in 1929, the unemployment rate was high, and the government decided to employ 200 men to widen the road from Te Anau initially to Te Anau Downs, however the road reached the Divide (past Te Huakaue Knobs Flat) by the end of 1933.

Next, the initial tunnel plans were resurrected and by 1935 construction began on the Homer Tunnel to link the road into Milford Sound Piopiotahi.

Due to the remoteness of the area, the workers would live in temporary accommodation blocks, that would be packed up and moved along as works continued. In 1934, the first worker's family joined him at the camp, soon to be followed by more. Supposedly little gardens were constructed along the road with strawberries and vegetables, and cricket and football pitches were created at Te Huakaue Knobs Flat. It is understood that the site was also operated as a sawmilling site. Trees in the surrounding area were reportedly milled for the construction of bridges along the Milford Rd.

Aerial imagery of the 1930s camp is not available for Te Huakaue Knobs Flat, however a campsite thought to be of a similar nature was pictured at Ōtāpara Cascade Creek in 1939 and available from Retrolens. The aerial image can be found in Figure 5, Appendix A.

The Homer Tunnel was finalised by 1940, however due to the outbreak of World War II, camps were packed up and families moved away to join the war effort. In 1951, the project resumed and in 1954 the road officially opened between Te Anau and Milford Sound Piopiotahi.

Although not much information was found as to what happened to the dwellings used at the MoW camp during Milford Road construction, a thesis was reviewed regarding construction camps for the build of hydro dams in the South Island (Kinsella, 2012). The construction programme for the Waitaki hydro camp by the Public Works Department is said to have been initiated to provide employment in New Zealand during the Depression. This aligns with the start of the Milford Road construction for the same reason. As such, it is reasonable to assume that the temporary camp set-ups of the Waitaki hydro camp and the Milford Road construction were very similar.

[12] Accessed online at https://www.milfordlodge.com/news-stories/history-of-the-milford-road/ on 30 January 2024.

The temporary camp comprised timber huts with malthoid roofs instead of the previously used canvas tents due to harsh climate conditions. The 1921 Public Works and Construction Workers Agreement included the following requirements:

> *"HUT ACCOMMODATION*
>
> *Single men to be provided with 10ft x 8ft hut, suitable bunk and fireplace; married men without family to have hut with room 24ft x 10ft, plus a room 10ft x 9ft for use as kitchen. Married men with a family up to four children to have two rooms 24ft x 10ft; for every additional two children, one 10ft x 8ft hut to be added. Bathing facilities, wash-house and cooking range, also fireplace in living room to be provided. Mattress to be provided, the Union to be responsible for prevention of abuse of mattresses."*

NZ had been one of the largest markets for transportable buildings in the mid-19th century such as Manning's portable cottages. Huts were generally designed to be temporary workers accommodation but often included the addition of chimneys and fencing.

Although unclear, it is considered plausible that the huts were prefabricated timber huts that were moved along during the construction of the Milford Road and eventually, due to the remote nature of the area, buried and disposed of in a landfill site, such as the Little Tahiti landfill near Milford Sound Piopiotahi. No landfill sites were noted in the vicinity of Te Huakaue Knobs Flat

Huts that were placed in the 1970s for workers on the road are thought to be prefabricated transportable buildings that would have been removed when the MoW left the site. An example of prefabricated temporary huts used by MoW workers is shown in Figure 3-1 below for the construction of the Waitaki hydro dam.

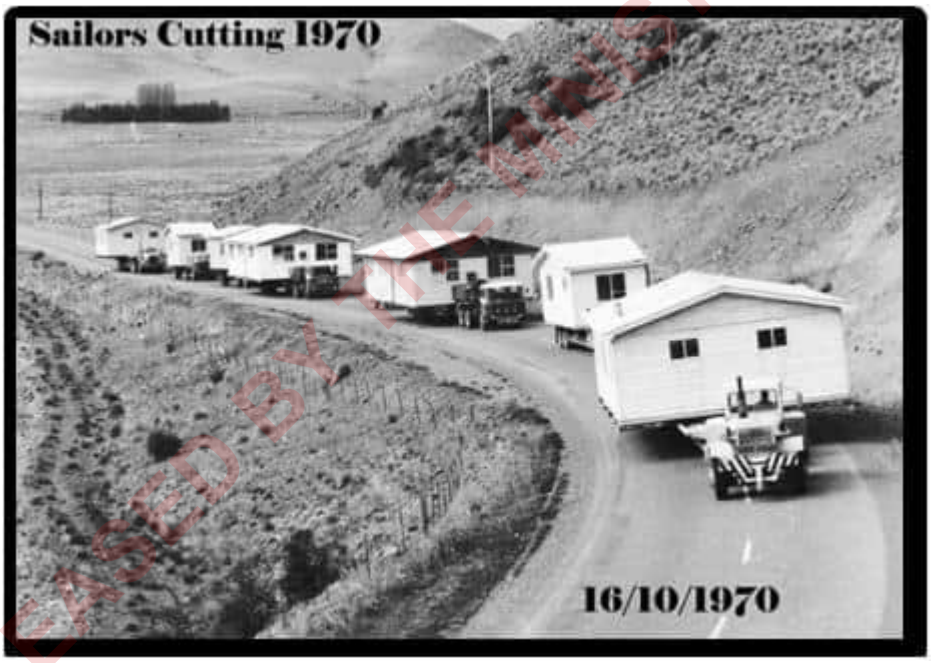


Figure 3-1: Prefabricated houses being moved to Twizel following the construction of the Waitaki hydro dam in 1970.

3.1.3 TE HUAKAUE KNOBS FLAT CAMPSITE

Between approximately 1987 and 1990, the site was occupied by Works Infrastructure Limited/Downer EDI Works. After being abandoned for several years, Land Information New Zealand (LINZ) took over the site in the mid-late 1990's. Several fuel storage facilities were reportedly removed from the site (MWH, 2012).

In the late 1990's, the Milford Sound Development Authority (MSDA) took over operation of the site upon request of Southland District Council (SDC) (MWH, 2012).

A concession was granted to Eglinton Experiences Ltd, commencing the operation of the site as Te Huakaue Knobs Flat Campground. In 2017, the concession was purchased by Milford Sound Tourism. The site is currently operated by Eglinton Valley Camp, a small business consisting of six staff members as an accommodation hub, visitor centre with information panels, bus stop and campsites for tents and self-contained vans[13].

3.2 KNOWN HAIL SITES

The Ministry for the Environment (MfE) created a list of potentially contaminating activities and industries in October 2011. This Hazardous Activities and Industries List (HAIL) is a compilation of the activities and industries likely to cause land contamination resulting from hazardous substance use, storage or disposal (Ministry for the Environment, 2011b)

The ES Beacon web portal is a register of sites ES consider have been, or currently are, the location of activities or industries identified on the HAIL which have the potential to cause contamination.

The southern half of the site is currently registered as a verified HAIL site and a section in the northern half has been noted as partially investigated. Details of the HAIL sites are summarised in Table 3-1 below. An extract of the map is presented in Figure 6, Appendix A.

Table 3-2: Summary of HAIL sites surrounding the site identified by ORC.

SITE NUMBER & NAME	DISTANCE FROM SITE	HAIL STATUS	HAIL CATEGORY & DESCRIPTION	LAND OWNER NOTIFIED
SLUS-00000832	On site	Verified HAIL	A17. Storage tanks or drums for fuel, chemicals or liquid waste. F8. Transport depots or yards.	16/01/2014
SLUS-00000122	On site	Partially investigated	A17. Storage tanks or drums for fuel, chemicals or liquid waste. F8. Transport depots or yards.	1/09/2013

[13] Information obtained from https://eglintonvalleycamp.nz/about/#history on 13 December 2023.

3.3 PREVIOUS INVESTIGATIONS

Further information on the HAIL status of the site was requested from ES. Several reports were found on the database relating to environmental assessments for the removal of three underground petroleum storage systems (UPSS). Site plans extracted from the PDP and MWH reports show the locations of the buildings and former UPSS tanks and can be found in Appendix C.

The investigation findings have been summarised below.

3.3.1 UPSS REMOVAL (FUELQUIP SERVICES LTD, 28 MARCH 2001)

It is understood that on 28 March 2001, Fuelquip services Ltd removed two UPSS tanks (one 9,000L diesel and one 4,500L 96-octane petrol) from the site. Soil samples were taken during a site investigation and found elevated levels of petroleum hydrocarbons in the base and walls of the tank pit. Two of the samples collected showed elevated concentrations of TPHs (C_7-C_9 and C_{10}-C_{14}) above MfE Tier 1 acceptance criteria for a commercial/industrial land use (pathways: protection of maintenance and excavation workers, indoor inhalation, heavy fraction associated with diesel). One of the samples also recorded an elevated benzene concentration exceeding the route specific pathway for the protection of maintenance/excavation workers and indoor inhalation.

It should be noted that this information has been obtained from the Environmental Site Assessment report by PDP in 2005 (summarised below). The report states that PDP did not attend the tank removal and provided an initial environmental assessment of the site conditions based on the analysis of the soil samples and information provided by Fuelquip Services Ltd.

3.3.2 ENVIRONMENTAL SITE ASSESSMENT (PDP, JUNE 2005)

It is understood that Pattle Delamore Partners Ltd (PDP) undertook an environmental site assessment, after elevated petroleum hydrocarbon concentrations were encountered following the removal of two UPSS tanks by Fuelquip Services Ltd (PDP, 2005a).

The environmental investigation included supervision of the installation of three groundwater monitoring wells, groundwater monitoring and sampling.

Two groundwater monitoring wells (BH1 and BH2) were installed in the presumed down hydraulic gradient of the former tank pit and BH3 was installed near the pit. The groundwater monitoring results revealed dissolved TPH and individual BTEX concentrations below the laboratory level of detection (LOD).

An ambient air sample (AA1) was also collected from the workshop located approximately 20m south-west of the former tank pit. Very high levels of toluene and total xylene were measured above the MfE's (1999) Health-based Target Indoor Air Concentrations for a residential land use.

The report concluded that although the ambient air sampling result appeared to be inconsistent with on-site observations, a potential risk exists to any users or occupiers of the workshop via the inhalation exposure pathway.

3.3.3 SOIL AND AIR SAMPLING (PDP, JULY 2005)

Following the June 2005 investigation, an ambient air sample and soil-air sample were collected from the site to assess the presence of petroleum hydrocarbon vapour within/near the workshop near the former UPSS (PDP, 2005b).

The ambient air sample returned individual BTEX concentrations below the laboratory LOD (1.61µg/m^3). The soil-air sample did find BTEX compounds above the LOD, however, these concentrations were below the MfE's soil guideline values for a residential land use at 1m bgl.

The report concluded that based on previous monitoring and current results, the risk to the receiving environment, ecological receptors and to human health associated with residual petroleum hydrocarbon residues is low.

Due to BTEX compounds being detected at low concentrations within the underlying soil-air adjacent to the workshop, it was recommended that additional soil-air surveys are undertaken prior to the construction of any buildings closer to the former tank pit. Additionally, it was recommended that the existing UPSS is tested for leaks on a regular basis and that the groundwater monitoring wells remain for later sampling if required.

3.3.4 KNOBS FLAT – UPSS REMOVAL SOIL VALIDATION (MWH, NOVEMBER 2012)

Following the removal of the remaining UPSS from the site by Alan Poulsen Engineering, MWH undertook a soil validation on 8 August 2012 to determine the presence, if any, of hydrocarbon contamination (MWH, 2012).

A total of 8 soil samples were collected, the results of which revealed the presence of TPHs and PAHs above LOD, likely to be relatively un-aged diesel, in the sediments surrounding the former UPSS tank.

Five samples reported TPH C_{10}-C_{14} concentrations exceeding the Tier 1 MfE Guidelines for Commercial/Industrial and Residential land use for all pathways, and naphthalene concentrations exceeding the Tier 1 MfE Guidelines for Protection of Groundwater Quality (4m). As the groundwater exposure pathway was considered to be closed (no surrounding groundwater use) it has not been examined further by MWH.

3.4 GROUND BASED IMAGES

A review of Google Street View shows the site access from the Te Anau-Milford Highway, a chip sealed road. Three small accommodation units can be seen from the road. The site comprises a generally flat, grassy landscape with several trees and shrubs scattered across the area. The site is surrounded by native trees. Large hills covered in native trees are situated east of the site. An extract is presented in Figure 7, Appendix A.

3.5 RESOURCE CONSENTS

Several resource consents have been issued relating to the site and were available on ES's Beacon database. A summary has been provided in Table 3-3.

Table 3-3: Summary of current resource consents for the site.

TYPE	REFERENCE ID	DETAILS	START & EXPIRY DATE	STATUS
Discharge Permit	AUTH-206019C	To periodically discharge water from a surge chamber to an unnamed tributary of Kiosk Creek and discharge up to 60 litres per second of water to an unnamed tributary of the Eglinton River for hydro-electric power generation scheme at Te Huakaue Knobs Flat – database.	2/06/2009-2/06/2044	Current
	AUTH-20147339	To discharge up to 30 cubic metres per day of treated sewage effluent onto land via soak holes at Te Huakaue Knobs Flat.	11/10/2015-16/04/2030	Current
Water Permit	AUTH-206019	To dam, divert and use water from an unnamed tributary of Kiosk Creek for a hydro-electric power generation scheme at Kiosk Creek.	2/06/2009-2/06/2044	Current
	AUTH-202503	To take up to 30 cubic metres of water per day from a spring to supply to a tourist facility at Te Huakaue Knobs Flat.	11/10/2005-11/10/2030	Current
Land Use Permit	AUTH-20233484	To install a bore for the purpose of monitoring bore/well groundwater monitoring at Te Huakaue Knobs Flat – Bore 1 & Bore 2	20/09/2023-20/09/2024	Current
	AUTH-20146921	To disturb the bed of Kiosk Creek to reconstruct and maintain a flood bank and to stabilise an existing bank with rock.	28/08/2014-28/08/2049	Current

4 SITE WALKOVER

A site walkover was undertaken by a WSP Environmental Scientist on 20 November 2023. Photographs were taken during the site visit, a summary of which can be found in Appendix D. At the time of the walkover the weather was sunny and dry.

The site is accessed via a driveway off the Te Anau-Milford Highway and comprises a clearing surrounded by native trees. The site is currently operated by Eglinton Valley Camp as a campsite for tents and campervans. Several accommodation blocks and a large visitor's centre were noted.

A gully separates the eastern part of the site from the main camping facilities. The eastern part is currently vacant and covered with grass and a gravel driveway. A cell tower is located along the southern boundary. A fence line approximately 1m in height is noted in the easternmost part of the site. Two wells are noted along the fence line.

A blue plastic barrel with a 20L diesel container which seemed to be empty was seen in the south-eastern part of the site in the vicinity of the cell tower. Four concrete panels were stored adjacent to the gravel road. Some cut down tree trunks were stacked along the gully and north-eastern part of the site.

The western part of the site comprises the main camping area. South of the driveway entering the site are several visitor accommodation blocks. The camping sites are located on the grassy flats between the gravel road and the cabins. A fire pit is seen east of the camping ground. The reception kitchen and laundry are seen in the centre of the site. Public toilets and a shower block are seen along the northern boundary.

A workshop was noted with miscellaneous items, such as a fridge and green bin, adjacent to a shed with a Hazchem 2WE (Agrichemicals) sign on the front door. The area was covered with hardpacked gravel.

A new generator shed is located in the centre of the site with a double skin above ground diesel storage tank on hardstand. The old generator shed is currently used as work shed with storage for a ride-on and petroleum lawn mower.

During the site walkover no visual or olfactory evidence of contamination was noted, nor any significant places of vegetation dieback.

5 SUMMARY OF IDENTIFIED HAIL ACTIVITIES

A review of information along with a site walkover have identified several HAIL activities. An assessment of the potential HAIL activities on site has been completed to determine which of these are likely to be present and whether they would therefore warrant further investigation.

- A17. Storage tanks or drums for fuel, chemicals or liquid waste

  A 1,000L above ground diesel tank was noted during the site visit. The tank is located alongside the hydroelectric power generator and is used for backup power generation.

  Furthermore, any residual contamination associated with the former UPSS tanks (refer to Section 3.3) is considered under this HAIL category.

  Anecdotal evidence contained in the MWH report from 2012, suggested that several fuel tanks were removed by LINZ prior to 2000. However, it is unclear where these storage tanks were situated and if they were all located and removed, or some remain buried on site.

  The diesel supply for the backup diesel generator has been incorporated under HAIL A17.

- E1. Asbestos products manufacture or disposal including sites with buildings containing asbestos products known to be in a deteriorated condition.

  Widespread use of asbestos in building materials occurred in New Zealand before it was banned in the mid 1980's. As the MoW huts are thought to originate from before this time and it is unclear if buildings were altered or constructed on the site when Works Infrastructure Limited/Downer EDI operated the site, a cautious approach is recommended to take asbestos use into consideration.

- F8. Transport depots or yards including areas used for refuelling or the bulk storage of hazardous substances.

  Transport depots or yards are defined in the MfE HAIL guidance as sites where heavy vehicles (trucks, trailers or vans) are loaded and/or unloaded with hazardous goods and/or they are refuelled. In the 1990's, the site was operated by Ministry of Works, Works Infrastructure Ltd and Downer EDI Ltd as a machinery yard during construction of the Milford Rd and Homer Tunnel. A large shed, presumably for storage of machinery, was noted in historical aerials along the south-eastern boundary of the site.

- G3. Landfill sites

  Although no explicit evidence has been noted of the presence of a landfill on site, it is considered likely that due to the historic presence of a temporary camp some sort of waste disposal to land has occurred. As such, a cautious approach is recommended to consider the potential discovery of a landfill with uncharacterised fill during any future soil disturbance on site.

- G6. Waste recycling or water or wastewater treatment.

  Milford Sound Tourism Ltd owns and operates the existing wastewater system at Te Huakaue Knobs Flat. The treatment system is located in the northwestern corner of the site, north of the

parking lot. The network consists of a small, reticulated network which serves the DOC buildings, accommodation office and public toilets (WSP, 2024).

It is understood that the current wastewater system has been upgraded in 2023 and consists of septic tanks, media textile biological stage, recirculation system, and UV disinfection with discharge to two soakage trenches. Data presented by Lowe Environmental shows good removal of Biological Oxygen Demand (BOD) and Total Suspended Solids (TSS) through the summer period (WSP, 2024).

The current resource consent issued in 2015 permits a discharge rate of up to 40m^3/day, and effluent limits of:

- Total suspended solids: 30mg/L (in 3 of 4 samples);
- BOD: 30mg/L (in 3 of 4 samples);
- Total suspended solids: 50mg/L upper limit;
- BOD: 50mg/L upper limit;
- E.Coli: 200 (in 3 of 4 samples).

It is noted that effluent quality prior to the upgrades occasionally did not meet the BOD and E.Coli compliance standards. Additionally, elevated concentrations of ammonia were measured in the soakage wells that could negatively impact the surrounding aquatic environment.

As stated above, the performance data from 2023 shows that the upgraded WWTP is performing well for BOD and TSS removal. However, the system's manual shows that the plant was not designed for nutrient removal. As such, high levels of ammonia are expected. As ammonia is currently not monitored on the site, this has been assessed as a data gap requiring further investigation.

More information can be found in the WSP Three Waters Infrastructure Condition and Future State Assessments Report (WSP, 2024).

— I. Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.

The HAIL category for accidental release has been added due to potential lead-based painting used on the old generator shed.

The HAIL activity B4. Power stations, substations or switchyard was also considered for the site. Following review of the MfE's HAIL guidance, the generation component of hydro-electric stations can be excluded as HAIL on the basis that the electricity is generated without fossil fuel combustion.

Although the site was originally operated as a sawmilling site with stockpiles of timber identified on historic aerials, taking into account the timeframe when this occurred, it is considered unlikely that the timber would have been treated on site. As such, HAIL A18. *Wood treatment or preservation including the commercial use of antisapstain chemicals during milling, or bulk storage of treated timber outside*, has been assessed as unlikely and not considered as a HAIL activity identified on the site for the rest of this investigation.

Furthermore, a storage shed/workshop was noted on the site with a hazardous chemicals sign for agrichemicals. However, as no locations of significant dieback were noted indicating a hotspot of contamination and no spray tanks were noted, contamination is expected to be confined

exclusively to locations where an accidental release of an agrichemical has occurred. Accidental releases are noted in the MfE's HAIL guidance as exclusions and as such HAIL category A1 has been disregarded from the assessment.

6 CONCEPTUAL SITE MODEL

Using the identified potential HAIL activities or industries, a site-specific conceptual site model (CSM) was developed.

The CSM is used to support the decision-making process for contaminated land management. The five basic activities associated with developing a conceptual site model are:

- Identification of potential contaminants;
- Identification and characterisation of the source(s) of contamination;
- Delineation of potential migration pathways through environmental media, such as groundwater, surface water, soils sediment, biota, air, service lines;
- Identification and characterisation of potential receptors (human, ecological or building infrastructure);
- Determination of the limits of the study area or system boundaries.

Data gaps and uncertainties are identified during the preparation of the conceptual site model, which assists in designing any detailed investigation that may follow. For there to be an effect on receptors there must be a contamination source and a mechanism (pathway) for contamination to affect human health or the environment (receptor).

A possible pollutant linkage between the contaminant source and receptor is defined as one that has the potential to represent unacceptable risks to human health or the environment. The desk-based information on the site has enabled the development of a CSM as shown in Table 6-1.

Table 6-1: Conceptual Site Model

Likely sources of impact	Potential sources were identified as: — Spillage of fuel from above ground diesel tank and during refuelling or fuel leakage from aged, buried tanks; — Historic landfill sites; — Discharge to land from wastewater treatment plant; — Flaking of lead-based paint; and — ACM use as building material on existing deteriorated buildings.
Potentially impacted media	Impacts are likely to be limited to shallow soils (the upper meter). Deeper soils (1-4m bgl) may be contaminated in locations where UPSS tanks have been or are located.
Contaminants of concern (CoC)	Potential sources of impact associated with historical activities may have given rise to the following potential contaminants being on site: — Heavy metals (particularly lead); — Petroleum Hydrocarbons; — Asbestos; — Ammonia; and — Semi-volatile organic compounds (sVOCs) and biological hazards.
Migration pathways	Potential migration pathways for on-site CoC comprise: — Airborne migration of dust, vapour or fibres; — Surface runoff containing impacted soil or dissolved contaminants; — Infiltration of contaminants in soil; and — Groundwater transport through soil, including in preferential pathways (service trenches, through higher permeability soils and/or high groundwater levels).
Potential exposure pathways	Potential exposure pathways comprise: — Inhalation of dust, vapours or fibres; — Ingestion or dermal contact with impacted soil, including surface soils; and — Ingestion or dermal contact with impacted surface water or groundwater.
Potential sensitive receptors based on potential future land uses	Identified sensitive receptors comprise: — Workers and visitors at the site during the proposed site works; — Workers during future soil disturbance; and — Future visitors.

7 SITE CHARACTERISATION

The purpose of this preliminary site investigation was to provide an assessment of the historical and current land uses to determine whether activities have more likely than not resulted in contamination of the soil that may be hazardous to human health.

Based on a review of information currently available, as well as observations made during the site inspection, a summary of our observations of the site is as follows:

- The site is currently used as a commercial campsite and visitor centre. Limited residential dwellings are located on the site for the campsite operators.
- The site is located within Te Rua-o-Te-Moko Fiordland National Park with an outstanding landscape value and sensitive ecological receptors.
- The site is proposed to be maintained as a commercial campsite with visitor accommodation facilities.
- The underlying geology comprises Holocene river deposits;
- HAIL activities were noted to be or have been occurring on parts of the site; and
- No signs of vegetation dieback or other visual evidence of contamination were noted.

Potential human health risks have been evaluated using the Likelihood and Consequence scales tabulated in Table 7-1, to determine a risk level – low, moderate, high, very high or extreme. The assessed risk level allows prioritisation of investigations and assessment measures.

Table 7-1: Likelihood and consequences scale

	Consequence				
Likelihood	Insignificant	Minor	Medium	Major	Catastrophic
Almost certain	Moderate	Moderate	Very High	Extreme	Extreme
Likely	Low	Moderate	High	Very High	Extreme
Possible	Low	Moderate	Moderate	Very High	Very High
Unlikely	Low	Low	Moderate	High	Very High
Rare	Low	Low	Low	Moderate	High

7.1 PRELIMINARY HUMAN HEALTH AND ENVIRONMENTAL RISK ASSESSMENT

The risks to human health have been assessed based on the historical activities which may have occurred on specific areas on the site. Assessment is based on a recreational end use and a commercial/industrial use to account for expected ground disturbance during construction works or for maintenance of the grounds.

7.1.1 PETROLEUM HYDROCARBON SPILLAGES

Two potential sources of hydrocarbon spillages have been identified: The former UPSS and the historical use of the site as a transport depot.

Previous investigations and anecdotal evidence suggest multiple UPSS have been removed from the site. Soil validation of three of the tanks has been undertaken and reports hereof have been reviewed.

7.1.1.1 FORMER UPSS

HUMAN HEALTH RISK:

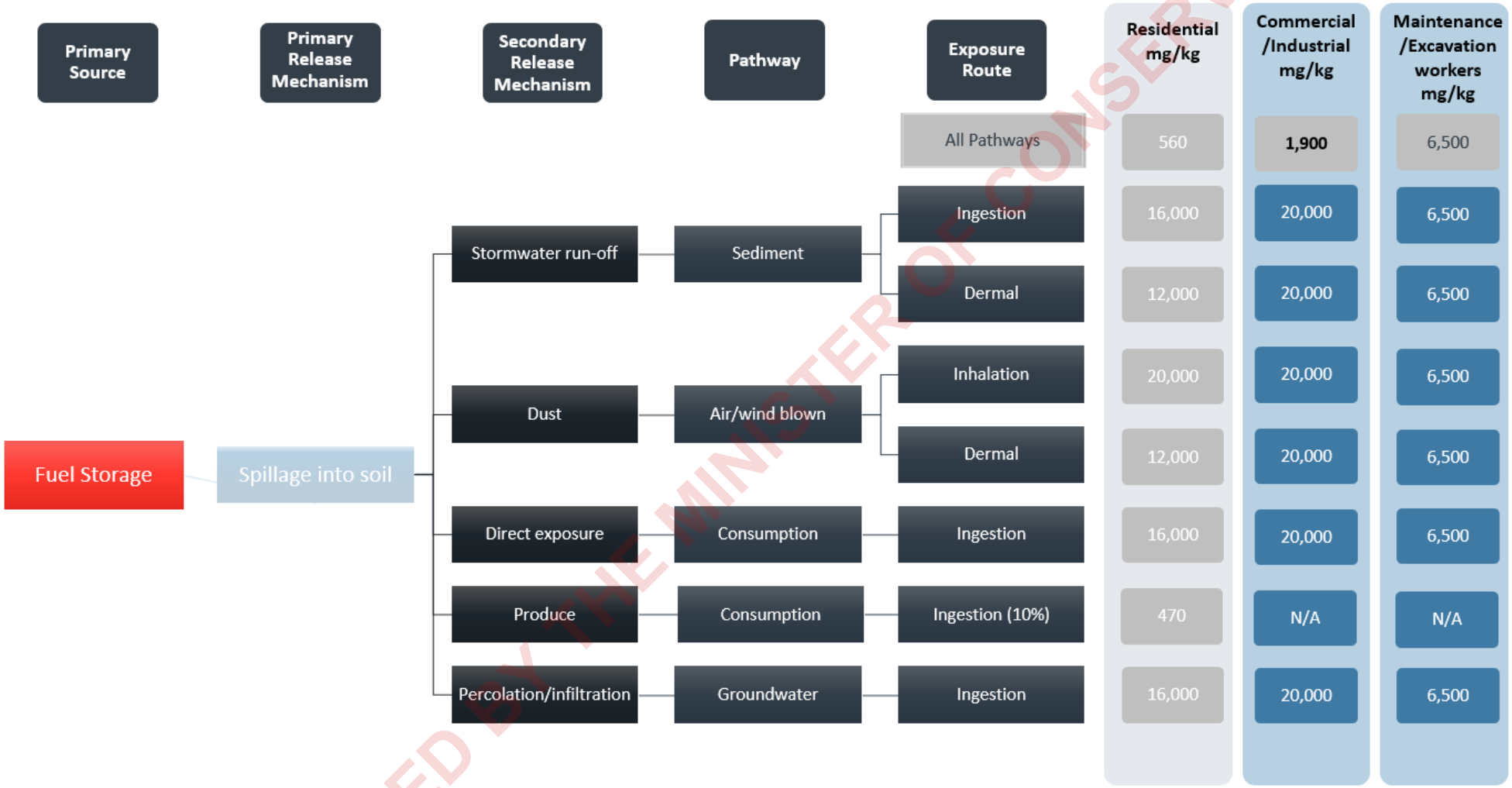
Following removal of UPSS 1&2, elevated concentrations of TPHs (C_7-C_9 and C_{10}-C_{14}) and benzene were reported to have been encountered. The results of these soil tests and therefore exact concentrations present had not been obtained at the time of reporting. However, groundwater monitoring reported concentrations of these analytes below the laboratory LOD.

Very high concentrations of total xylenes and toluene were measured in the ambient air of the workshop adjacent to the removed UPSS. However, follow-up testing the following month found ambient air concentrations for the same analytes below the LOD. Minor elevations in soil-air concentrations of BTEX were encountered.

Soil validation undertaken after the removal of UPSS 3 reported TPH (C_{10}-C_{14}) concentrations above MfE Commercial/Industrial and Residential soil guideline values for all exposure pathways. The concentrations ranged between 880 and 5000mg/kg dry weight. In addition, naphthalene exceeded the criteria for the protection of groundwater quality. Samples showing the exceedances were taken at 1-4m bgl.

The results of the elevated concentrations of TPHs have been further assessed against route-specific criteria by WSP. A specific CSM for petroleum hydrocarbon spillages with guideline criteria for the different exposure scenario's for TPHs (C_{10}-C_{14}) is presented in Table 8-1 below. As can be seen from the table, none of the measured concentrations exceed the relevant route-specific criteria for a commercial/industrial end use of the protection of maintenance and excavation workers, as 5000mg/kg dry weight was the highest measured concentration.

Table 7-2: Conceptual site model showing all exposure routes for fuel spillage and MfE guideline values for TPHs (C_{10}-C_{14}).



Taking into account relevant route-specific guideline values, none of the concentrations reported had exceedances for a commercial/industrial or maintenance/excavation worker. Furthermore, as the concentrations were measured over 10 years ago, further dilution and dispersion of hydrocarbons is expected to have occurred, further lowering the likelihood of hotspots remaining on site. As such, the risk to human health related to historic hydrocarbon contamination is considered to be low.

It is noted however that no evidence of testing for trace elements (heavy metals) was provided for soil validation after removal of any of the UPSS. As heavy metals, especially lead and zinc, are contaminants of concern associated with legacy petroleum hydrocarbons, the absence of testing for these parameters has been identified as a data gap.

As elevated hydrocarbon contaminant concentrations were not found in surface soils but rather at 1-4m bgl, any potential heavy metal contaminants are considered likely to be encapsulated at this stage. If no ground disturbance is proposed in this area, the risks to human health associated with heavy metal contaminants are considered to be Low. Any future ground disturbance could expose these potential contaminants. Should disturbance be proposed further assessment, especially relating to petroleum hydrocarbons and heavy metals, is recommended.

ENVIRONMENTAL RISK:

In terms of risk to the environment and sensitive ecological receptors, it is considered likely that lead and hydrocarbon accumulation may have impacted the soils locally with some migration possibly occurring laterally through the soils. Elevated hydrocarbon concentrations were encountered at 1-4m bgl. If contaminants have migrated into groundwater, it is considered highly likely that they would have been significantly diluted during transportation before discharging into Kiosk Creek, the Eglinton River or other sources of surface water. As per the MfE 1999 guidelines (module 7 revised in 2011), the impact of residual hydrocarbon contamination in groundwater on discharge to a surface water body is likely to be mitigated by dilution in all but the most sensitive receiving environments, e.g. wetlands (Ministry for the Environment, 2011a).

Furthermore, the MfE 1999 guidelines (Section 5.2.3) define a sensitive aquifer as 'an aquifer that might be contaminated by a leak or spill of petroleum hydrocarbons (including leaching from contaminated soil resulting from a leak or spill) and which is subject to current or potential use (including consideration of aquatic ecosystem support)'. A sensitive aquifer is an aquifer that is:

- Not artesian (in practice true artesian or confined aquifers are unlikely to be encountered as part of the shallow groundwater systems normally of interest at petroleum contaminated sites); and
- Less than 10 metres below the source or suspected source of contamination (or greater depth below ground surface where the geology suggests contamination may readily migrate to greater depth, e.g. clean sands or gravels, fractured basalts); and
- Is of a quality appropriate for use, can yield water at a useful rate and is in an area where extraction and use of groundwater may be reasonably foreseen. The definition of a useful rate depends on the potential use of the water.

OR

- Where the source of contamination is less than 100 metres from a sensitive surface water body (i.e. a surface water body where limited dilution is available to mitigate the impact of contaminated groundwater discharging into the surface water body.

The first two criteria for the aquifer underlying Te Huakaue Knobs Flat are met, however due to the location of the site in a national park and the abundance of surface water available for potable use, it is considered unlikely that groundwater will be extracted at significant volumes in the foreseeable future. The existing boreholes on the site are for investigation and groundwater quality monitoring purposes only. In addition, the locations of the former UPSS tanks are more than 100m from Kiosk Creek and the Eglinton River as nearest surface water bodies.

As such, the underlying aquifer has not been assessed as a sensitive aquifer according to the MfE 1999 guidelines (Ministry for the Environment, 2011a).

The environmental risk associated with the encapsulated contaminants is therefore considered to be Low.

Should ground disturbance occur however, these contaminants could be resurfaced or mobilised into surface waterways. Taking into account the ecological significance of the national park and stronghold of native endangered wildlife at Te Huakaue Knobs Flat, the risk to the local environment would be high (Eco-SGV value for an area of ecological significance is 45mg/kg for TPH C10-C14).

Furthermore, the same data gap exists for risks to the environment relating to heavy metal concentrations, and more specifically lead contamination.

As such, the area surrounding the former UPSS tanks has been delineated as a Piece of Land according to the NES-CS guidelines, as elevated concentrations of contaminants have been encountered following investigation. As data gaps exist, should ground disturbance in this area be proposed, then further assessment is required.

7.1.2 EXISTING ABOVE GROUND STORAGE TANK:

It is understood that the existing above ground diesel storage tank was installed as a replacement for UPSS 3 removed in 2012. The double skin tank seemed to be in a good condition, with no visible leaks or evidence of overfilling, and sits on a pre-cast concrete slab. As such, the likelihood of soil contamination as a result of spillages from the new tank is considered to be unlikely and the risk to human health and the environment is considered to be Low.

7.1.3 TRANSPORT DEPOT:

The desktop study indicates that the site historically operated as a transport yard. A former storage shed has been identified as a potential location for the storage of heavy machinery in the south-eastern part of the site, at the current location of the cell tower. As such, this area has been delineated as a Piece of Land as HAIL activities have likely occurred in this area.

As in section 8.1.1 above, the human health risks and environmental risks associated with its current use are considered to be Low due to the high regional rainfall and porous soils contributing to a high dilution effect on potential contaminants.

However, should ground disturbance be proposed at this location, then further investigation is recommended into the risks to human health and the environment associated with the exposure of potential hydrocarbon and heavy metal contamination.

7.1.4 LANDFILL SITES

Although no explicit evidence has been found indicating the presence of a landfill site, it is likely that some sort of waste disposal to land has been undertaken during the use of the site as a MoW

camp. As such, it is recommended that an accidental discovery protocol is put in place during future ground disturbance to ensure the safety of the workers. If a landfill is encountered, a Contaminated Land Specialist is to be consulted.

If no ground disturbance is to occur, the risks to human health and the environment are considered to be Low due to the absence of contamination evidence.

7.1.5 WASTEWATER TREATMENT PLANT

The existing wastewater treatment system (upgraded in 2023) at Te Huakaue Knobs Flat comprises an Innoflow package system of septic tanks, media textile biological stage, recirculation system, and UV disinfection with discharge to two soakage trenches (WSP, 2024).

It is understood that the treatment area is fenced off and underground, restricting public access. As such, the risks to human health associated with the ongoing use of the site as a recreational campground are considered to be Low.

However, as discharge contaminant concentrations, more specifically E.Coli and BOD, have previously exceeded compliance guidance values, should ground disturbance occur in this area, consequences are assessed as medium severity with a Moderate risk to human health. In addition, elevated ammonia concentrations may be impacting the receiving aquatic environment. Further investigation into characterising the risks to human health and the environment in this area is recommended prior to any development.

7.1.6 LEAD-BASED PAINT:

During the site walkover, flaking paint was noted on the old generator shed. Based on the age of the building, this may potentially contain lead-based paint which could have contaminated near surface soils around the halo of the building(s). The amount and extent of the impact from this source is uncertain and as such should be considered as Unverified HAIL.

Consequences of soil contamination due to lead-based paint are considered to be medium to major. Taking into account the proposed end use of the site as a recreational camp site, the exposure risk is considered to be lower than a more sensitive end use such as a residential dwelling. As such, for the ongoing use of the site as a campsite, the risks to human health are considered the be Low.

Should ground disturbance occur, consequences are assessed as medium severity with a Moderate risk to human health.

Localised impacts from lead-based paint may however exceed Eco-SGV for the protection of sensitive ecological receptors and potential consequences to local ecosystems are considered to be major. The risks to the environmental are therefore considered to be very high.

As such, the old generator shed has been delineated as a potential Piece of Land, requiring further investigation of the impacts associated with lead-based paints should ground disturbance occur.

7.1.7 ASBESTOS

Taking into account the timber prefabricated nature of the MoW huts and the likely age of construction, the use of asbestos is considered to be unlikely. In addition, no evidence of asbestos containing materials (ACM) was noted during the site walkover.

However, it is currently not known if the dwellings constructed on the site between 1967 and 1983 contained ACM, with many having been removed by the current day.

As such, it is recommended that an accidental discovery procedure is put in place for the possibility of asbestos containing materials should ground disturbance occur on site.

7.2 SUMMARY OF RISKS

A summary of risks associated with both Verified HAIL and Unverified HAIL has been provided on Table 7-3 below, with the locations of the Pieces of Land shown in Figure 7-1.

Table 7-3: Summary of Contaminant Risks

'PIECE OF LAND'	HAIL CATEGORY	VERIFIED/ UNVERIFIED	CONTAMINANTS OF CONCERN	RECEPTOR	RISK
UPSS 1	A17	Verified	Petroleum Hydrocarbons; metals	Human Health	Low
				Ecological	Low
UPSS 2	A17	Verified	Petroleum Hydrocarbons; metals	Human Health	Low
				Ecological	Low
UPSS 3	A17	Verified	Petroleum Hydrocarbons; metals	Human Health	Low
				Ecological	Low
Transport yard	F8	Unverified	Petroleum Hydrocarbons; metals	Human Health	Low
				Ecological	Low
Landfill sites	G3	Unverified	Metals, petroleum hydrocarbons	Human Health	Low
				Ecological	Low
Wastewater Treatment	G6	Verified	Metals, sVOC, biological hazards, nutrients (ammoniacal nitrogen)	Human Health	Low
				Ecological	Low
Generator building	I	Unverified	Lead based paint	Human Health	Low
				Ecological	Low
Other buildings	E1	Unverified	Asbestos	Human Health	Low
				Ecological	Low

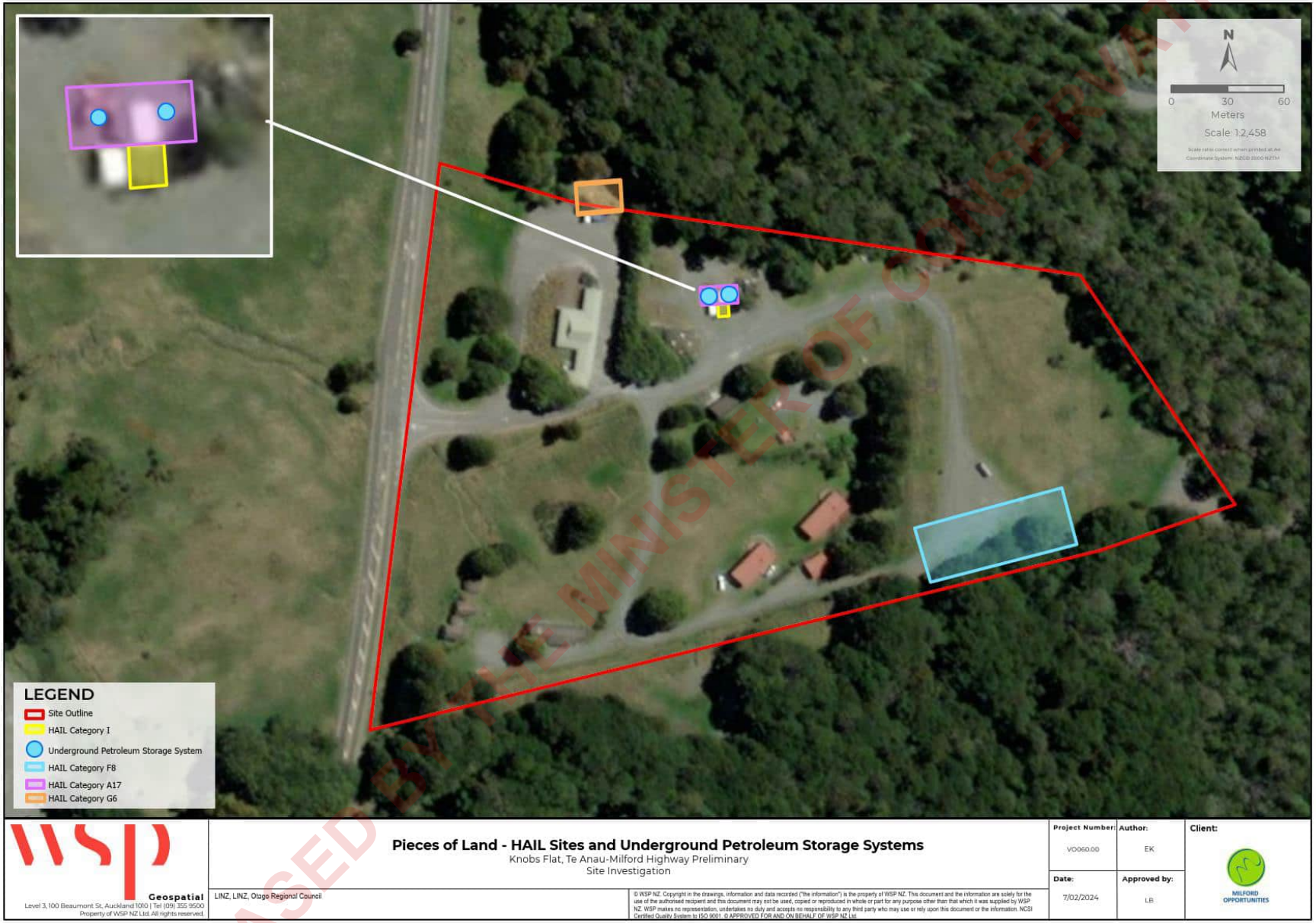


Figure 7-1: Pieces of Land (PoL) requiring further investigation should ground disturbance occur.

8 CONCLUSION AND RECOMMENDATIONS

A PSI was undertaken for Te Huakaue Knobs Flat along the Te Anau-Milford Highway in Te Rua-o-Te-Moko Fiordland National Park. The PSI identified three Pieces of Land where HAIL activities were more likely than not considered to have occurred.

An assessment of the risks to human health associated with potential contaminants of concern on the PoL concluded a Low Risk associated with the ongoing use of the premises for commercial accommodation. Risks to human health on the remainder of the site are Low.

Further assessment of the risks to human health and the environment should be completed should ground disturbance and potential mobilisation of contaminants occur within the defined Pieces of Land.

8.1 REGULATORY IMPLICATIONS

8.1.1 NESCS ASSESSMENTS

Investigation results revealed that HAIL activities are occurring or have occurred on the site. As such, the NES-CS regulations apply to the site.

LAND USE CHANGE AND SUBDIVISION

Regulation 8(4) of the NES-CS states that subdividing or changing the use of a piece of land is a permitted activity while the following requirements are met:

a A preliminary site investigation of the land or piece of land must exist.

b The report on the preliminary site investigation must state that it is highly unlikely that there will be a risk to human health if the activity is done to the piece of land.

c The report must be accompanied by a relevant site plan to which the report is referenced.

d The consent authority must have the report and the plan.

To be a permitted activity, a change in use or future subdivision involving the pieces of HAIL land identified as probable or certain would require an assessment of risk associated with the proposed change in the form of a PSI. The PSI needs to confirm that it is highly unlikely that there will be a risk to human health if the activity is done to the piece of land.

This PSI has concluded that it is highly unlikely for there to be a risk to human health associated with the ongoing use of the site for commercial accommodation or campsite. Should a more sensitive land use be proposed, based on the findings there are potential risks associated with soil contaminants and as such a Detailed Site Investigation (DSI) would be necessary to further quantify these risks. In the absence of a DSI, future subdivision or land use changes would be a discretionary activity under Regulation 11 of the NES-CS.

SOIL DISTURBANCE

Regulation 8(3) states that disturbing the soil of the piece of land is a permitted activity while the following requirements are met:

a Controls to minimise the exposure of humans to mobilised contaminants must:
  i be in place when the activity begins.
  ii be effective while the activity is done.
  iii be effective until the soil is reinstated to an erosion-resistant state.

b The soil must be reinstated to an erosion-resistant state within 1 month after the serving of the purpose for which the activity was done.

c The volume of the disturbance of the soil of the piece of land must be no more than 25 m^3 per 500 m^2.

d Soil must not be taken away in the course of the activity, except that,—
  i For the purpose of laboratory analysis, any amount of soil may be taken away as samples.
  ii For all other purposes combined, a maximum of 5 m^3 per 500 m^2 of soil may be taken away per year.

e Soil taken away in the course of the activity must be disposed of at a facility authorised to receive soil of that kind:

f The duration of the activity must be no longer than 2 months:

g The integrity of a structure designed to contain contaminated soil or other contaminated materials must not be compromised.

Any soil disturbance or removal that does not meet the permitted activity criteria outlined in Regulation 8(3) would be a discretionary activity under Regulation 11 unless a Detailed Site Investigation (DSI) to quantify contaminant concentrations is completed.

As HAIL activities have been identified on three PoL on the site, should any ground disturbance be proposed in excess of permitted activity volumes, the works would be considered a Discretionary Activity under Regulation 11 of the NES-CS (Ministry for the Environment, 2011c).

Likely conditions associated with the activity status would include the requirement for a Detailed Site Investigation for the PoL outlined in Figure 7-1, prior to any ground disturbance on site in excess of permitted activity volumes.

8.1.2 PROPOSED SOUTHLAND WATER AND LAND PLAN

In October 2023, the new Proposed Southland Water and Land Plan (pSWLP) was released (Environment Southland Regional Council Te Taiao Tonga, 2023). The rules relating to passive discharge from landfilling and contaminated sites are operative within this plan.

The piece of land considered likely to be generating a passive discharge are contaminated soils which may remain following removal of the UPSS. The rule relating to this discharge is outlined below.

Rule 46 – Land contaminated by a hazardous substance

a) *The discharge of contaminants from land contaminated by a hazardous substance onto or into land in circumstances which may result in contaminants entering water is a permitted activity provided:*

   i. *the hazardous substance in the discharge results from an activity authorised by a rule in this Plan or a resource consent granted by the Southland Regional Council; or*

   ii. *the discharge does not result in a breach of the trigger values for toxicants presented in Table 3.4.1 in the Australia and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC) 2000 at the level of protection set in those guidelines for 80% of species, except for benzene where the level of protection is 90% of species (i.e. 1 milligram per litre), at the nearest of:*

      1. *50 metres from the discharge; or*
      2. *or the landholding boundary; or*
      3. *any point immediately adjacent to a lake, river, artificial watercourse, modified watercourse, natural wetland, the coastal marine area, or water abstraction bore (excluding monitoring bores); and*

   iii. *the discharge does not result in a breach of the Drinking Water Standards for New Zealand 2005 (Revised 2008) in any bore utilised for potable supply, except where the ambient water quality naturally breaches those Standards, and the discharge does not result in any further degradation of the water quality.*

b) *The discharge of soil from land contaminated by a hazardous substance onto or into land in circumstances which may result in those contaminants entering water is a permitted activity provided:*

   i. *the hazardous substance in the soil results from the application of a fertiliser or agrichemical to the land authorised by a rule in this Plan or a resource consent granted by the Southland Regional Council; or*

   ii. *the soil is being returned to the excavation or site from which it was taken.*

c) *The discharge of contaminants or soil from land contaminated by a hazardous substance onto or into land in circumstances which may result in those contaminants entering water that does not meet one or more of the conditions of Rule 46(a) or (b) is a discretionary activity.*

Further assessment of results pertaining to soil and groundwater contamination should be completed to assess the activity status of any discharge.

8.2 ENVIRONMENTAL AND ECOLOGICAL RISKS

Based on the findings of the PSI, the current ongoing risk to the environment including sensitive ecological receptors on or near to the site is considered to be Low. Although the UPSS tanks were removed several years ago a confirmatory validation report was not available for one of the tanks removed and therefore residual contamination may still be present in soils around the locality of the tank. A DSI would be required on the Piece of Land (PoL) to characterise the risks to the environment should ground disturbance of this area be planned.

8.3 SAFETY IN DESIGN

Safety in Design (SID) considers the safety of those who are involved in the construction of, maintenance of, cleaning of, repair of and demolition of a structure, or anything that has been constructed.

As part of the assessment of this site we have taken reasonably practicable steps to assess the potential for hazards associated with potentially contaminated land to exist. We have, through the development of a CSM, assessed the qualitative level of risk posed to human health and have made various recommendations to address the plausible risks.

Where identified, this report indicates hazards and risks to health and safety associated with contaminated land which must be communicated to the design team, the client and associated stakeholders as required by the Health and Safety at Work Act 2015 (Ministry of Business, 2015). Risks include potential exposure to contaminated soils through ingestion or dermal contact. Further assessment of these risks should be completed prior to any ground disturbance on the PoL.

8.4 RECOMMENDATIONS

Based on the findings of this investigation, WSP recommends that:

- Should any ground disturbance be planned in the locality of the defined Pieces of Land a Detailed Site Investigation be undertaken prior in order to further assess the risks to human health and the environment;
- An accidental discovery protocol is put in place during any ground disturbance on the site area outside of the Pieces of Land and a Contaminated Land Specialist is to be contacted should any unexpected ground conditions be encountered.
- This PSI report is submitted to the regional authority to facilitate updating the HAIL database.

9 REFERENCES

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Kinsella, F. A. J. (2012). *50 Years of Construction Camps and Single Purpose Towns in the South*. Victoria University of Wellington.

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WSP. (2024). *Three Waters Infrastructure Condition and Future State Assessments*.

10 LIMITATIONS

This report ('Report') has been prepared by WSP New Zealand Limited ('WSP') exclusively for Milford Opportunities Project ('Client') in accordance with the Milford Opportunities Project - Transport & Infrastructure Stream - Engineering Feasibility Assessment Contract Number SSI-O-406 ('Agreement').

Permitted Purpose

This Report has been prepared expressly for the purpose of a combined Preliminary Site Investigation ('Permitted Purpose'). WSP accepts no liability whatsoever for the use of the Report, in whole or in part, for any purpose other than the Permitted Purpose. Unless expressly stated otherwise, this Report has been prepared without regard to any special interest of any party other than the Client.

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The data reported and Conclusions drawn by WSP in this Report are based solely on information made available to WSP at the time of preparing the Report. The passage of time; unexpected variations in ground conditions; manifestations of latent conditions; or the impact of future events (including (without limitation) changes in policy, legislation, guidelines, scientific knowledge; and changes in interpretation of policy by statutory authorities); may require further investigation or subsequent re-evaluation of the Conclusions.

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Appendix A

Figures

Figure 1 - Site Location and Layout

Knobs Flat, Te Anau-Milford Highway
Preliminary Site Investigation

Project Number:	**Author:**
6-VO060.00	DB
Date:	**Approved by:**
5/12/2023	LB

Client: MILFORD OPPORTUNITIES

Geospatial
Level 3, 100 Beaumont St, Auckland 1010 | Tel (09) 355 9500

Earthstar Geographics, Stats NZ, Esri, HERE, Garmin, Foursquare, FAO, METI/NASA, USGS, LINZ, Stats NZ, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, Maxar

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Figure 2 - Geology Map

Knobs Flat, Te Anau-Milford Highway
Preliminary Site Investigation

Earthstar Geographics, Stats NZ, Esri, HERE, Garmin, Foursquare, FAO, METI/NASA, USGS, Maxar

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Figure 3 - Topographic Map
Knobs Flat, Te Anau-Milford Highway
Preliminary Site Investigation

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Date: 5/12/2023	Approved by: LB
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Figure 4 - Wells within 100 m

Knobs Flat, Te Anau-Milford Highway Preliminary Site Investigation

Maxar

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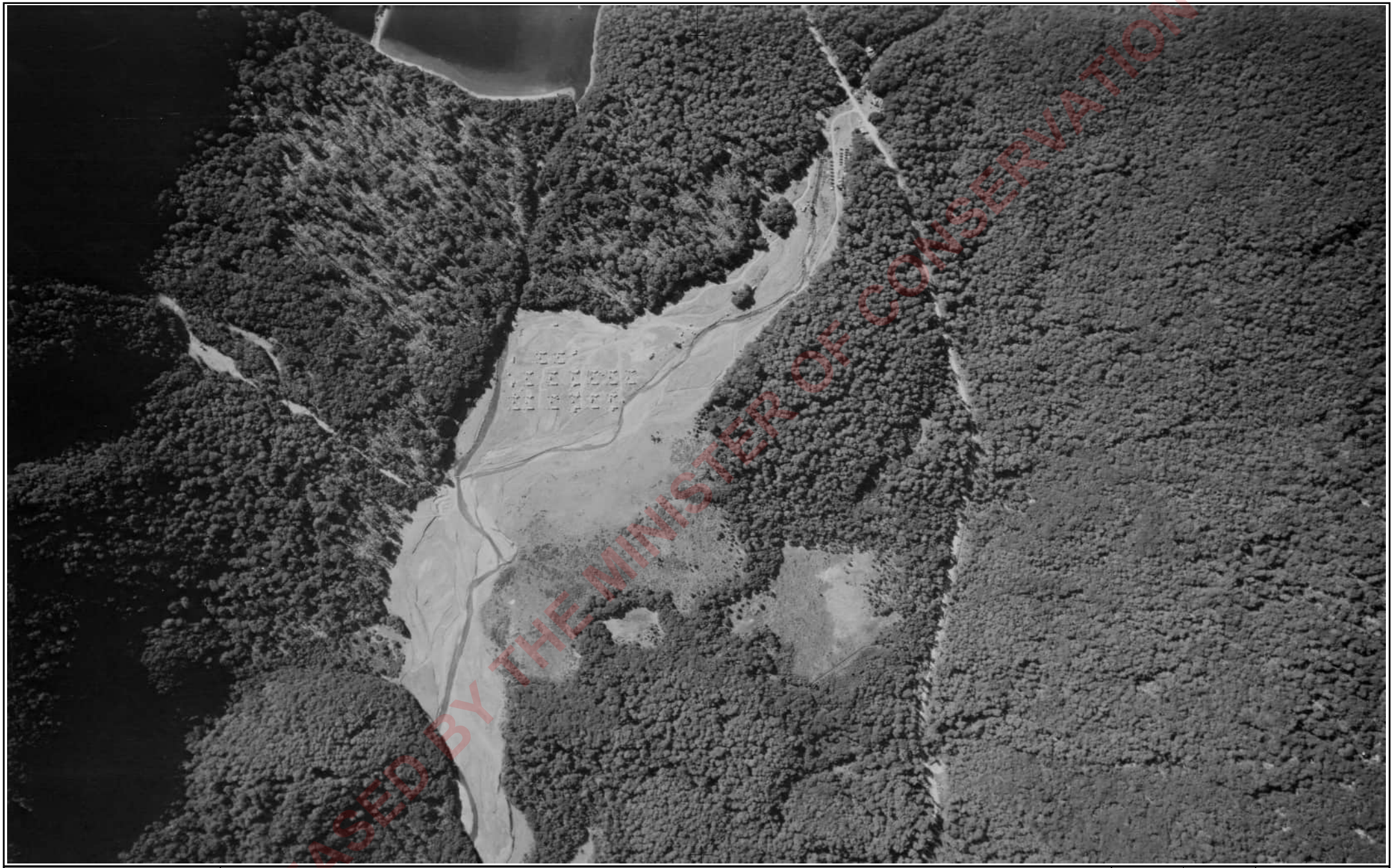

Figure 5 - Cascade Creek 1939 Imagery

Knobs Flat, Te Anau-Milford Highway
Preliminary Site Investigation

Earthstar Geographics, Stats NZ, Esri, HERE, Garmin, Foursquare, FAO, METI/NASA, USGS, Maxar

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Figure 6 - HAIL Sites

Knobs Flat, Te Anau-Milford Highway
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5/12/2023	LB	

Figure 7 - Google Street View
Knobs Flat, Te Anau-Milford Highway
Preliminary Site Investigation

Earthstar Geographics, Stats NZ, Esri, HERE, Garmin, Foursquare, FAO, METI/NASA, USGS, Maxar

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Appendix B

Historical Information

Historical Aerial Imagery 1967

Knobs Flat, Te Anau-Milford Highway
Preliminary Site Investigation

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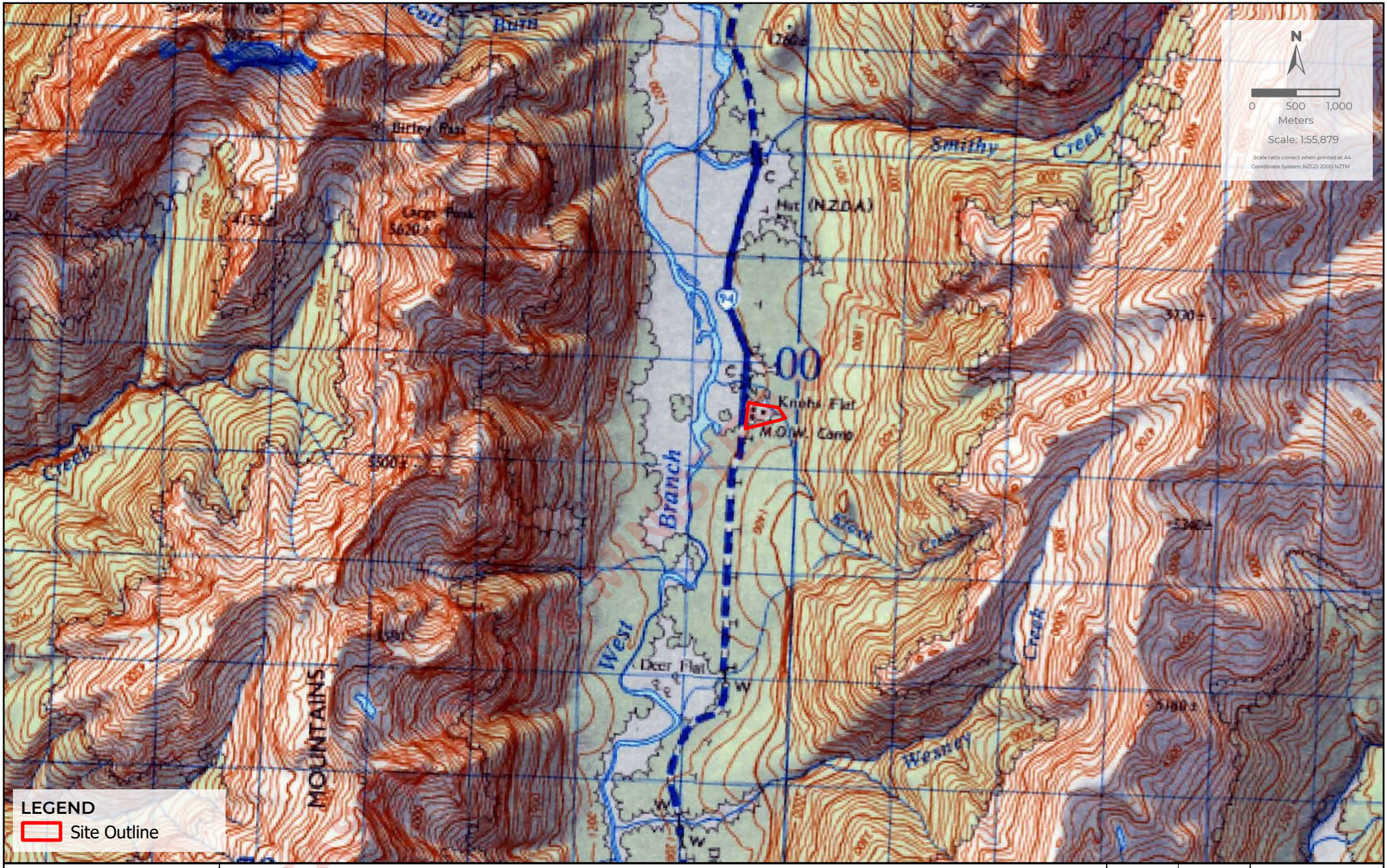
Earthstar Geographics, Stats NZ, Esri, HERE, Garmin, Foursquare, FAO, METI/NASA, USGS



Historical Aerial Imagery 1978

Knobs Flat, Te Anau-Milford Highway Preliminary Site Investigation

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Earthstar Geographics

wsp

Geospatial

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Historical Aerial Imagery 1983

Knobs Flat, Te Anau-Milford Highway
Preliminary Site Investigation

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Project Number:	Author:
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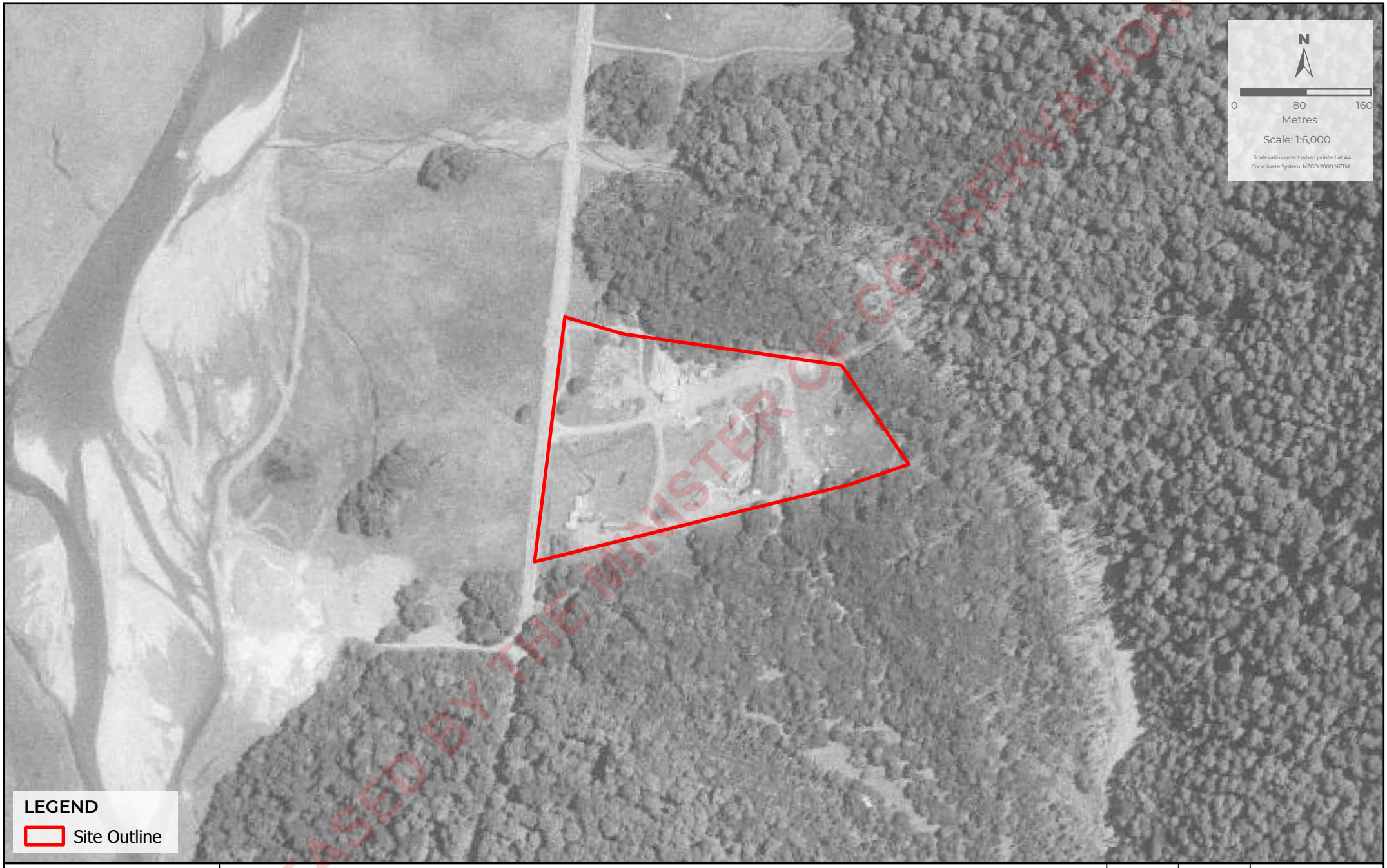

Historical Aerial Imagery 1988

Knobs Flat, Te Anau-Milford Highway
Preliminary Site Investigation

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Historical Aerial Imagery 1995 Topographic

Knobs Flat, Te Anau-Milford Highway Preliminary Site Investigation

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Historical Aerial Imagery 1997

Knobs Flat, Te Anau-Milford Highway Preliminary Site Investigation

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Maxar

Project Number:	Author:
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Historical Aerial Imagery 2001

Knobs Flat, Te Anau-Milford Highway
Preliminary Site Investigation

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Historical Aerial Imagery 2003

Knobs Flat, Te Anau-Milford Highway
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Historical Aerial Imagery 2006

Knobs Flat, Te Anau-Milford Highway
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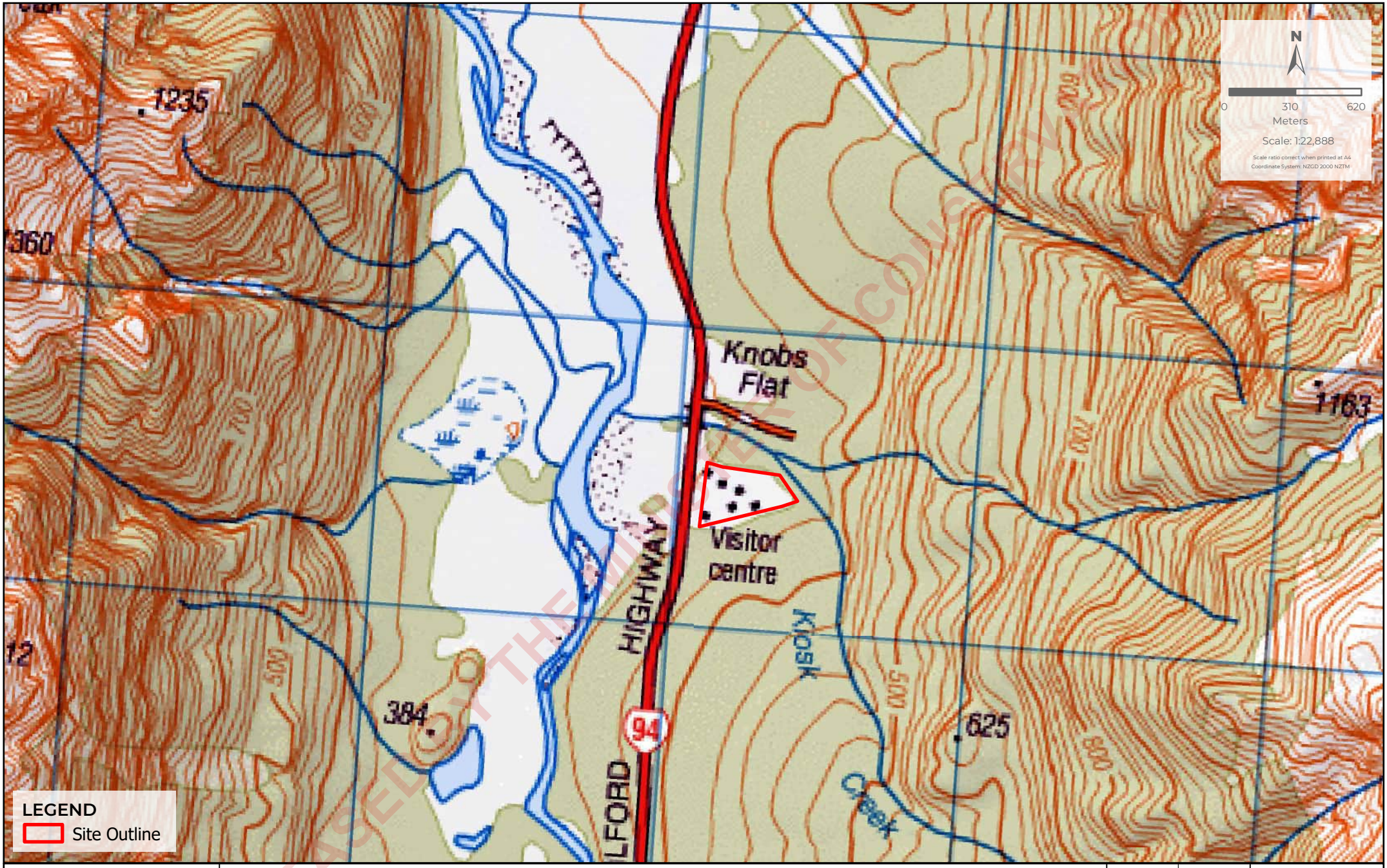

Historical Aerial Imagery 2009 Topographic

Knobs Flat, Te Anau-Milford Highway Preliminary Site Investigation

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Historical Aerial Imagery 2010

Knobs Flat, Te Anau-Milford Highway
Preliminary Site Investigation

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5/12/2023	LB	

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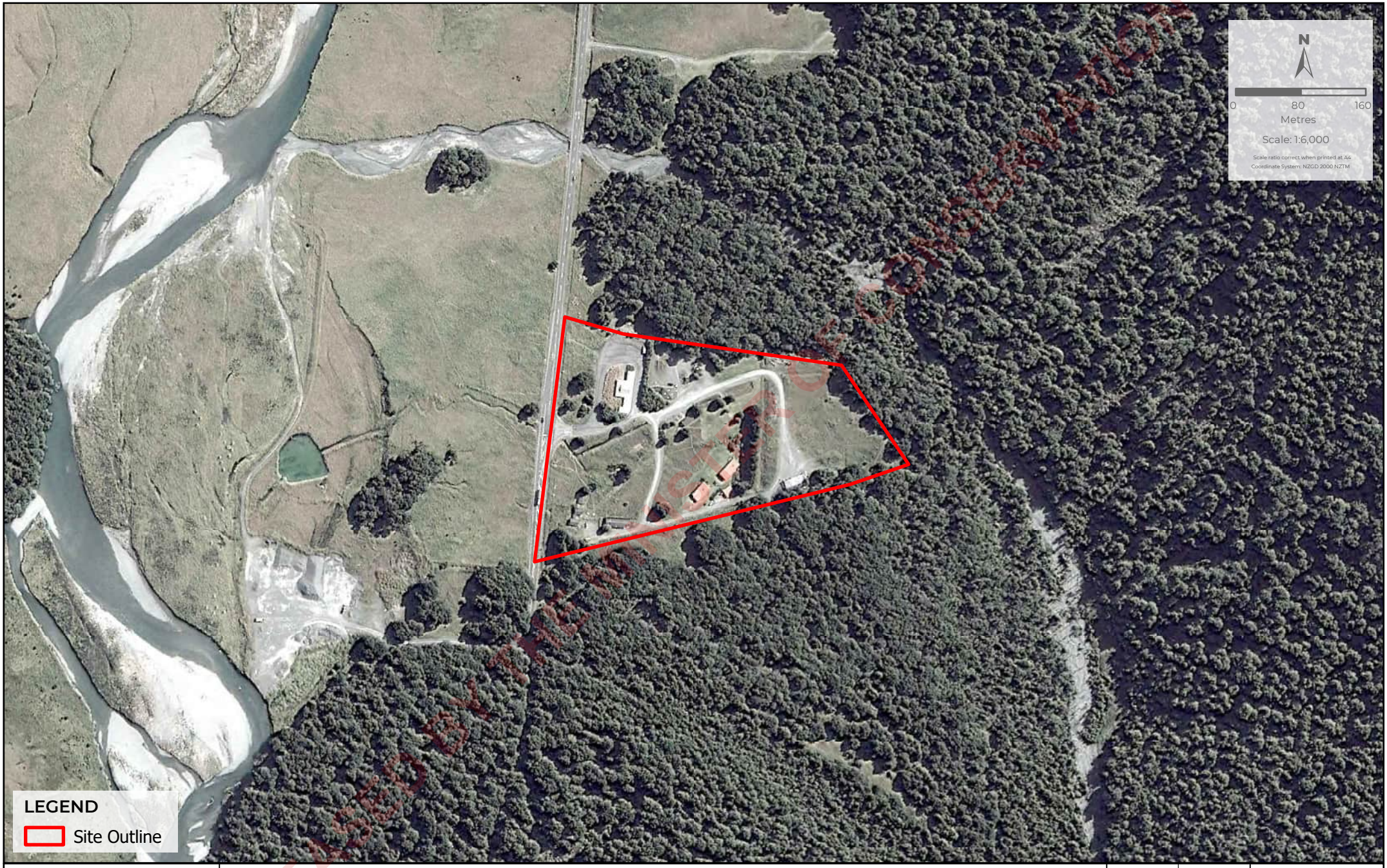

Historical Aerial Imagery 2011

Knobs Flat, Te Anau-Milford Highway
Preliminary Site Investigation

Project Number:	Author:	Client:
6-VO060.00	DB	MILFORD OPPORTUNITIES
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Historical Aerial Imagery 2012

Knobs Flat, Te Anau-Milford Highway
Preliminary Site Investigation

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Historical Aerial Imagery 2015

Knobs Flat, Te Anau-Milford Highway
Preliminary Site Investigation

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wsp

Geospatial

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Historical Aerial Imagery 2016 Topographic

Knobs Flat, Te Anau-Milford Highway Preliminary Site Investigation

Earthstar Geographics

Project Number:	Author:
VO060.00	EK
Date:	**Approved by:**
1/02/2024	LB

Client:

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Historical Aerial Imagery 2019

Knobs Flat, Te Anau-Milford Highway
Preliminary Site Investigation

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Project Number:	Author:	Client:
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Date:	**Approved by:**	
5/12/2023	LB	

Historical Aerial Imagery 2021

Knobs Flat, Te Anau-Milford Highway
Preliminary Site Investigation

Project Number:	Author:	Client:
6-VO060.00	DB	MILFORD OPPORTUNITIES
Date:	**Approved by:**	
5/12/2023	LB	

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Earthstar Geographics, Stats NZ, Esri, HERE, Garmin, Foursquare, FAO, METI/NASA, USGS

Historical Aerial Imagery 2022

Knobs Flat, Te Anau-Milford Highway
Preliminary Site Investigation

Project Number:	6-VO060.00
Author:	DB
Date:	5/12/2023
Approved by:	LB
Client:	MILFORD OPPORTUNITIES

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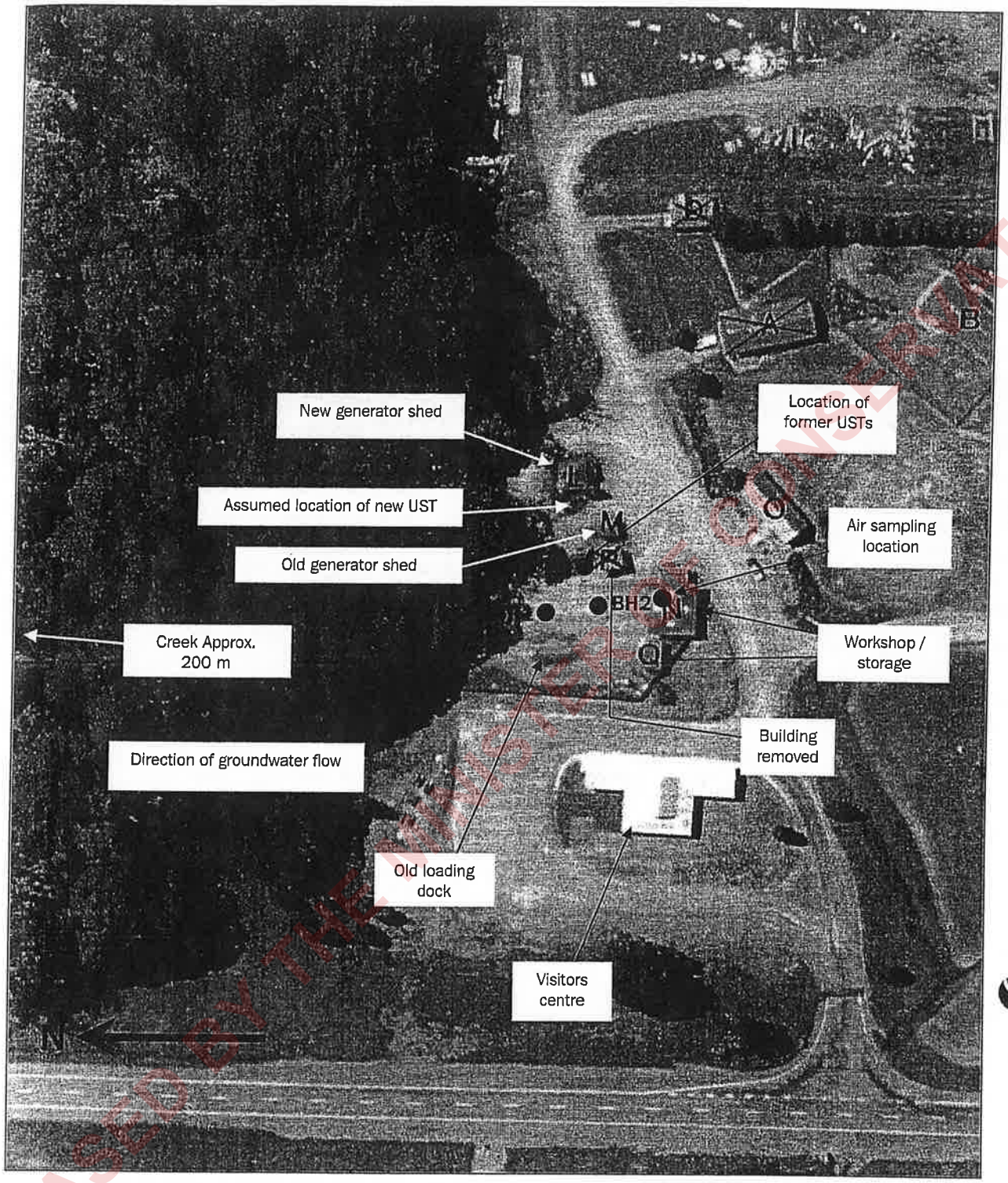
Earthstar Geographics, Stats NZ, Esri, HERE, Garmin, Foursquare, FAO, METI/NASA, USGS, Maxar

Appendix C

Site Plans with Buildings and Former UPSS (extracted from the PDP and MWH reports)



Approx scale 1:1400

Key:

● **BH2** Monitoring well

Figure 2: Site Plan

Figure 2-2 Aerial photograph showing the location of the UPSS site

Appendix D

Site Photographs

PHOTOGRAPHIC LOG

Client Name	Site Location	Project No.
Milford Opportunities Project	Te Huakaue Knobs Flat	6-VO060.00

Photo No.	Date
1	20/11/2023

Description

The site investigation took place on 20 November 2023 by a WSP Environmental Engineer.

The site is accessed via a gravel driveway off Te Anau-Milford Highway and leads to the grassy flats. The site is currently operated as a campsite.

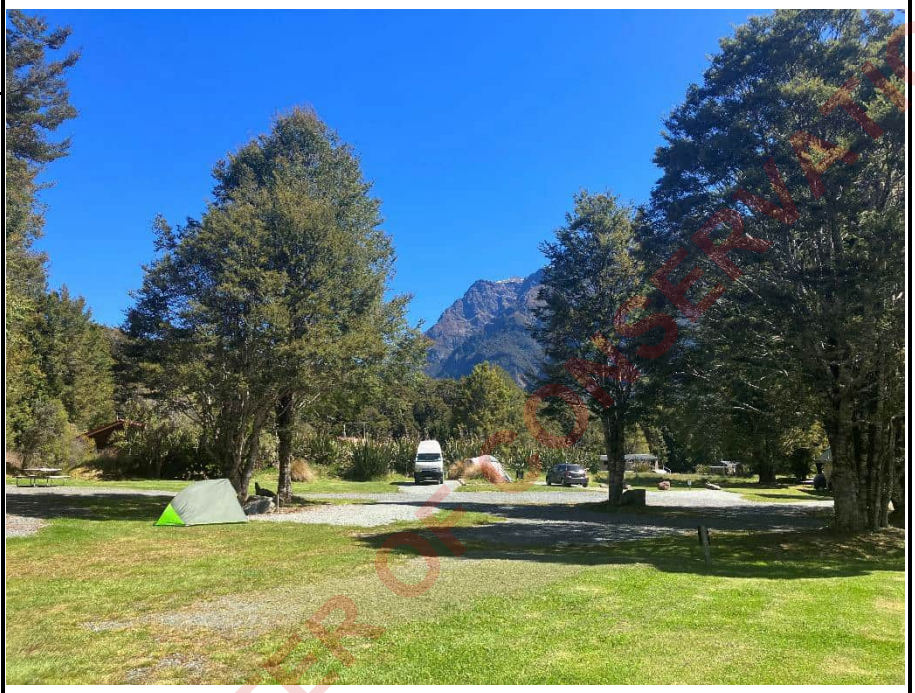
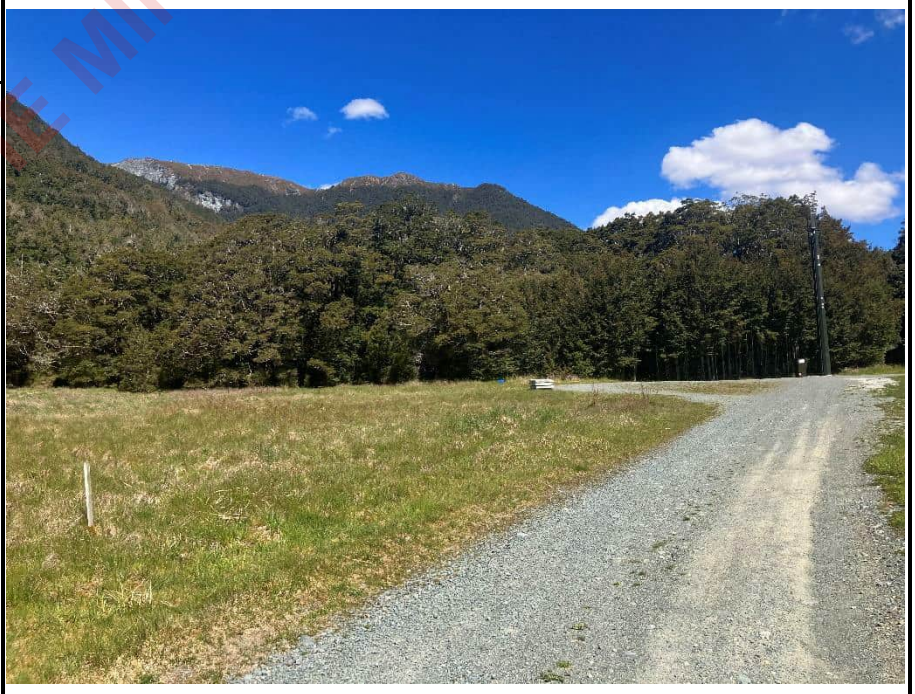


Photo No.	Date
2	20/11/2023

Description

The eastern part of the site comprises a vacant grassed area. A cell tower can be seen along the south-eastern boundary of the site.



	PHOTOGRAPHIC LOG

Client Name	**Site Location**	**Project No.**
Milford Opportunities Project	Te Huakaue Knobs Flat	6-VO060.00

Photo No.	**Date**
3	20/11/2023

Description

The site is surrounded by beech trees. The eastern part of the site is covered with grass and a gravel driveway. Several concrete panels are stored on the site.

Photo No.	**Date**
4	20/11/2023

Description

A cell tower is located along the south-eastern boundary of the site.

	PHOTOGRAPHIC LOG	
Client Name Milford Opportunities Project	**Site Location** Te Huakaue Knobs Flat	**Project No.** 6-VO060.00

Photo No.	Date
5	20/11/2023

Description

An empty barrel with empty diesel container was found near the cell tower.

Photo No.	Date
6	20/11/2023

Description

Overview of the northern part of the site, looking west towards the Te Anau-Milford Highway. The green powerhouse can be seen with an old shed behind and storage shed/workshop in the background.

	PHOTOGRAPHIC LOG

Client Name	**Site Location**	**Project No.**
Milford Opportunities Project	Te Huakaue Knobs Flat	6-VO060.00

Photo No.	**Date**
7	20/11/2023

Description

An above ground diesel storage tank was noted on a concrete slab outside the powerhouse.

Photo No.	**Date**
8	20/11/2023

Description

An old shed is noted, currently used for storage of miscellaneous items.

	PHOTOGRAPHIC LOG	
Client Name Milford Opportunities Project	**Site Location** Te Huakaue Knobs Flat	**Project No.** 6-VO060.00

Photo No.	Date
9	20/11/2023

Description

A large storage shed is seen on the site. No olfactory evidence of contamination was noted.

Photo No.	Date
10	20/11/2023

Description

A large shed was seen with a HAZCHEM sign for agrichemicals.

	PHOTOGRAPHIC LOG	
Client Name Milford Opportunities Project	**Site Location** Te Huakaue Knobs Flat	**Project No.** 6-VO060.00

Photo No.	Date
11	20/11/2023

Description

The storage sheds are located in the north-eastern corner of the site on a hardpacked gravel area.

Photo No.	Date
12	20/11/2023

Description

A reception building is located in the center of the site with amenities for the campground visitors.

	PHOTOGRAPHIC LOG	
Client Name Milford Opportunities Project	**Site Location** Te Huakaue Knobs Flat	**Project No.** 6-VO060.00

Photo No.	Date
13	20/11/2023

Description

The majority of the site is grassed. Visitor accommodation cabins are located in the southern part of the site.

Photo No.	Date
14	20/11/2023

Description

An overgrown gully separates the eastern part of the site from the main campsite area.