



Preliminary and Detailed Environmental Site Investigation at 707 Wanaka-Luggate Highway, Wanaka

Prepared for: SIO NO12 Limited

Date: 7/07/2026

Our Reference Number: 25020

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Record of Distribution

Sent to	Date	Report Status	No. of Copies
Morgan Shepherd	9/02/2026	Draft for comment	1 (electronic)
Morgan Shepherd	3/03/2026	Updated draft for comment	1 (electronic)
Morgan Shepherd	7/07/2026	Final	1 (electronic)

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1 Introduction

Morgan Shepherd of Brown & Company Planning Group, on behalf of SIO NO12 Ltd, requested that JKCM Ltd, trading as Insight Engineering (IE), undertake a preliminary and detailed environmental site investigation (PSI / DSI) of a portion of 707 Wanaka-Luggate Highway, Wanaka (herein referred to as “the site”) as outlined in our Short Form Agreement (reference P25020, fully executed on 11 December 2025).

Figure 1 (under Appendix 1) indicates the location of the site, which we understand is the subject of a Private Plan Change application. IE further understands that the site proposed to be developed for rural residential use, commercial use and recreational use in different parts of the site. The proposed development plans are provided in Appendix 2.

The purpose of this PSI / DSI was to assess the suitability of the site for development and use for rural residential, commercial and recreational purposes, as required by the Resource Management (*National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*) Regulations¹ (herein referred to as the NES CS). This investigation was undertaken in general accordance with the Ministry for the Environment (MfE) *Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand*².

Potential risks to ecological receptors were assessed according to the methodology provided in the *Updated Development of Soil Guideline Values for the protection of Ecological Receptors*³.

2 Objectives of the Investigation

The objective was to determine if potentially contaminating historical activities pose an unacceptable risk to human health during and post site development.

2.1 Approach

IE completed the following scope of work to satisfy the investigation objectives:

2.1.1 Review of Site Information

Several sources were contacted for information relating to the sites past and present uses and to identify any other environmental issues which may be on record. This consisted of:

- Undertaking a site walkover to describe current site conditions and assess whether any visual or olfactory evidence of contamination is present at the site;
- Interviewing a company director responsible for managing the property, to obtain information relating to potentially contaminating activities that may have been undertaken at the site;
- Review of publicly available data describing the local geology and hydrogeology;
- Review of the Otago Regional Council Hazardous Activities, Industries and Bore Search database in terms of any property specific records of hazardous activities or industries that are held in their database of potentially contaminated sites;
- Reviewing the Queenstown Lakes District Council online property files to determine whether any records of contamination, or potentially contaminating activities, at the site are held in their database; and
- Reviewing publicly available historical aerial photographs and maps of the site and surrounding area;

2.1.2 Intrusive Investigation

The following scope of work was undertaken upon completion of the review of site information:

- Collect 7 soil samples from 7 locations where potential contamination impacts were identified during the review of site information;
- Visual and olfactory inspection of soil samples in the field;
- Submit 7 soil samples to Hill Labs for analysis of a suite of common heavy metals (As, Cd, Cr, Cu, Pb, Ni and Zn). One sample (BS1) was also submitted for analysis of polycyclic aromatic hydrocarbons (PAHs);
- Assess laboratory results for the soil samples against the adopted human health criteria for the relevant land use category associated with the sample location, as well as commercial / industrial land use, which serves as surrogate values for land development / excavation activities / maintenance of underground services;
- Assess laboratory results for the soil samples against the relevant ecological health criteria and ambient / naturally occurring concentrations; and
- Present a PSI and DSI report outlining the suitability of the site for land development earthworks and ongoing maintenance of underground services, as well as the post-development commercial, residential and recreational land use.

3 Site Description

Site information is summarised in Table 1.

Table 1: Site Information

Location	707 Wanaka-Luggate Highway, Wanaka
Legal Description	Sections 64, 65, 66 and 67 Block IV Lower Wanaka SD and Section 1 Block II Lower Wanaka SD
Property Ownership	SIO NO12 Limited
Current Site Use	Agricultural (feed crops)
Proposed Site Use	Commercial (golf course and hotel), recreational and rural residential.
Site Area	Approximately 3,220,250 m ² (322 ha)
Territorial Authorities	Queenstown Lakes District Council (QLDC) Otago Regional Council (ORC)
Zoning	Rural

The site setting is summarised in Table 2.

Table 2: Site Setting

Topography	Given the large area of the site, the topography varies significantly. The central portion of the site slopes down gently to steeply towards a local low area, which is relatively flat. The northern and southern portions of the site are relatively flat, with only minor to moderate slopes.
Local Setting	The site is located approximately 2.7 km east of the outskirts of Wanaka. The site is surrounded by agricultural / lifestyle block properties with low density residential dwellings towards the west, south and east.
Nearest Surface Water & Use	The Clutha River / <i>Mata Au</i> , used for recreational purposes and as a source of water for hydro-power generation as well as private irrigation schemes, is located just beyond the northern site boundary.
Geology	The GNS New Zealand Geology Webmap⁴ indicates that the vast majority of the site is located within the “Late Pleistocene glacier deposits” geological unit of the Albert Town Advance described as ‘<i>Unweathered to slightly weathered, loose, poorly sorted, bouldery gravel, sand, and silt (till); often with contorted bedding</i>’. The north eastern corner of the site is located within “Late Pleistocene river deposits” geological unit of the Hawea Formation described as ‘<i>Unweathered to slightly weathered, well sorted, sandy gravel forming large outwash terraces in Clutha catchment</i>.’ The surface material observed over the majority of the site during the walkover is broadly described as light brown gravelly sand.
Hydrogeology	According to a report completed by ORC ⁵ , the site is located within the unconfined Wanaka-Cardrona Aquifer. Groundwater is considered likely to flow generally towards the Clutha River / <i>Mata Au</i> , north of the site.
Groundwater Abstractions ⁶	The following current or historical groundwater abstraction consents were issued for properties located at, or within 250 m of, the site: - Consent number 2003.271 was issued in 2003 for Brian Lewis Hore to take and use groundwater for the purpose of irrigation until 21 May 2028. The Consent was transferred to SIO No12 Limited and the expiry date changed to 14 May 2028. The location of the consent is recorded in the southern portion of the site, approximately 280 metres north east of the intersection of Wanaka-Luggate Highway (State Highway 6) and Ballantyne Road, Wanaka. - Consent number RM10.388.01.V2 was issued in 2010 for Corbridge Park Limited as Partner of the Corbridge Estates Limited to take and use groundwater for the purpose of irrigation for a fixed term expiring 1 December 2035. The Consent has since been transferred to SIO No12 Limited. The location of the consent is recorded east of the central portion of the site, approximately 1.09 kilometres north northeast from the intersection of Ballantyne Road and Wanaka-Luggate Highway.

Table 2 (cont.): Site Setting

Groundwater Abstractions (cont.) ⁶	Consent number RM11.177.01 was issued on an unknown date for Queenstown Lakes District Council to take and use groundwater from the Wanaka Basin Cardrona Gravel Aquifer for the purpose of communal domestic supply, commercial and industrial use until the 30th of August 2036. The location of the consent is recorded at the western site boundary, adjacent to Wanaka-Luggate Highway / State Highway 6.
Discharge Consents ⁶	There are no discharge consents issued for properties located at, or within 250 m of the site.

3.1 Current Site Conditions

Claude Midgley of IE completed a site walkover inspection on 18 December 2025. Observations made at that time are summarised in Table 3 and photographs are presented in Appendix 3.

Table 3: Current Site Conditions

Site description and visible signs of contamination	The majority of the site consisted of fenced paddocks that had been sown with barley at the time of our inspection.
	The area surrounding the dwelling and ancillary buildings in the south eastern portion of the site contained a few shipping containers, an aviary and a raised vegetable garden. Some light construction equipment (cement mixer, timber saw, ladders, etc.), as well as several empty 5L and 10L fuel containers and a lawn mower, were stored in a rectangular lean-to shed north east of the dwelling. Two vertical steel pipes, resembling pipes associated with an underground fuel storage tank, were found protruding from the ground in the area adjacent to the northern side of the lean-to.
	An open-sided shed was located north of the lean-to. A relatively small area, measuring approximately 4 m ² , at the southern side of the shed was stained black.
	A former shearing shed, which was converted to an events venue, was located north of the open-sided shed. Concrete and timber structures resembling a spray race and stock yards were located directly north of the former shearing shed. A large pond was located east of the former shearing shed.
	An agrichemical storage area was present in the central portion of the site. Only three empty agrichemical (Othello OD herbicide) containers were present in the area during our inspection.
	A stand of willow trees, on the eastern side of the central portion of the site, had been used as an area to dispose of small amounts of waste material including fence posts, fencing wire, old hay bales and scrap metal, as well as soil stockpiles containing cobbles and large boulders.

Table 3 (cont.): Current Site Conditions

Surface water appearance	The water in the pond north of the dwelling appeared clear, showed no evidence of discolouration or hydrocarbon sheen and did not emit a chemical odour.
Current surrounding land use	Mixed agricultural and low density rural residential land is located towards the east, west and south. The Clutha River / <i>Mata Au</i> is located directly north of the site.
Local sensitive environments	The Clutha River / <i>Mata Au</i> and the surrounding riparian zone are considered sensitive environments.
Visible signs of plant stress	Bare ground was observed in the area directly north of the footrot bath, suggesting that plants were unable to grow in that location.

3.2 Historical Environmental Reports

IE completed a Preliminary Environmental Site Investigation (PSI) report⁷ covering the central portion of the site in 2021. The report is included as Appendix 4 for completeness.

Significant changes at the site since that report was completed are limited to the removal of agrichemical storage containers from the area north of the dwelling and pond, as well as the removal of the pond that had been located in the central portion of the site. Water was no longer diverted to that area, so the pond dried up and crops were planted across the former pond footprint.

3.3 Interview with Site Operator

IE contacted Jason Watkins (*pers. comm.*), who had provided site management information in 2021, but Mr Watkins was no longer involved at the site.

IE therefore contacted Fergus Macdonald, Director at Green to Gold Agricultural Contractors, to obtain information about the farm management practices that occurred at the site between 2021 and 2025. Mr Macdonald (*pers. comm.*) provided the following information:

- The site has been used to produce triticale and barley during the time that Green to Gold have managed it;
- Fertilisers (CropZeal 16N, ASN, Sustain 16N and Sustain 15k) have been applied at rates ranging between 100 kg/ha and 200 kg/ha.
- Fungicides and herbicides are applied at the following rates Pyrax 300 to 600 ml/ha, Vitalis 300 to 700 ml/ha, Varicur 450EW 300 ml/ha, Sodio 50WG 200 g/ha, Koil Adjuvant 1 L/ha, Diffan 500SC 150 ml/ha, Valeo 500SC 1.5 L/ha, Accuro 125SC 300 to 500 ml/ha and Othello OD 1 L/ha.
- No other potentially contaminating activities were undertaken at the site while Green to Gold were involved.

3.4 ORC Property Database

IE reviewed the ORC Hazardous Activities, Industries and Bore Search database⁸ on 17 December 2025. The search confirmed that site contains four HAIL records.

Site number "HAIL.00432.01" is located near to the farm buildings in the southern portion of the site. The area is named "Corbridge Downs Sheep Dip" and is recorded as being a verified Hazardous Activities and Industries⁷ (HAIL) site for a Category A8 activity (Livestock dip or spray race operations). The area has not been investigated, but it was identified as a sheep dip in a subdivision application.

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Site number "HAIL.02090.01" is located across the central portion of the site. The area is named "707 Wanaka-Luggate Highway (Silverlight Studios)" and is recorded as being a verified HAIL site for a Category A1 activity (Agrichemical use). The area has not been investigated, but it was identified in the 2021 PSI⁷ as an area that had been used as pastoral grazing for livestock prior to 2015/16 when it was sown with animal feed crops and top dressing fertiliser applied once per season.

Site number "HAIL.02090.02" is located on the eastern side of the central portion of the site. The area is named "Agrichemical Storage Area - 707 Wanaka-Luggate" and is recorded as being a verified HAIL site for a Category A1 activity (Agrichemical use). Notes associated with the area state "*Evidence of mixing and minor spills was observed, therefore it is considered likely that significant soil contamination impacts have occurred within a localised area (approximately 50 m²).*"

Site number "HAIL.02090.03" is located on the eastern side of the central portion of the site. The area is named "Minor Waste Disposal - 707 Wanaka-Luggate" and is recorded as being an unverified HAIL site for a Category G5 activity (Waste disposal to land). Notes associated with the area state "*IE PSI 2021 identified small amounts of timber and metal waste disposed of in the north eastern portion of the site. Minor impacts are considered likely to have occurred in very localised areas e.g. in the immediate surroundings of treated timber fence posts.*"

3.5 QLDC Property File

The property file⁹ contained documents relating to applications for various activities associated with a temporary film set (EX0936, DE220616 and RM220580). Furthermore, extensions to the Fast Track Consent (ET210157FT and ET210028FT) obtained to develop an extensive movie studio and associated buildings were also contained within the property file.

Of particular interest was a document relating to the extension of a 2013 subdivision Consent (ET120572 and ET120572.01), which had not been given effect to. The application to extend that Consent was also approved, because it was not clear whether the movie studio development would proceed and the land owner sought to protect the potential to subdivide the property for residential purposes.

An application to dispose of excess excavation spoil, generated during construction of a roundabout near Wanaka, was withdrawn. However, the plans provided with that application indicate that it was proposed to cover the existing farm tip with the excavation spoil.

The PSI report⁷, prepared by IE in 2021, was the only soil contamination assessment associated with the site.

3.6 Review of Historical Aerial Photographs and Maps

Photographs in the Crown Collection¹⁰ and Google Earth¹¹, as well as topomaps on the MapsPast¹² website, have been reviewed to obtain information on the past uses of the site. Aerial photographs taken between 1955 and 2024, as well as maps created between 1939 and 2019, have been reviewed. Table 4 summarises the features visible in each image.

Table 4: Historical Aerial Photographs

	The eastern portion of the site covers three properties labelled as follows: '21' and '256, 0, 00'; '22' and '249, 0, 00'; and '1' and '177, 3, 29'
1939 ¹²	The remainder of the site is part of two properties, labelled as follows: '17A' and '129, 2, 35' and '20' and '48, 1, 16'. No other significant features are visible on the map.

Table 4 (cont.): Historical Aerial Photographs

1949 ¹²	The block that had previously been labelled '17A' and '129, 2, 35' is now labelled '17' and '300, 0, 00' due to the block being amalgamated with a neighbouring block towards the north. Additionally, the block that had previously been labelled '1' and '177, 3, 29' is now labelled '1' and '317, 3, 26' due to that block being combined with a neighbouring block towards the south. No other significant changes are visible, compared with the 1939 map.
1955 ¹⁰	The majority of the site appears to be used for pastoral grazing. A complex of buildings, with shelter belts on the southern and eastern sides, is visible near to Wanaka – Luggate Highway. The complex consists of a dwelling, a small shed and a rectangular building are visible south and west of a small orchard consisting of approximately 12 trees. Other larger trees are visible in the area south east of the dwelling. Water races are visible east and north of the complex of buildings. A building resembling a shearing shed, with livestock yards on the western and southern sides, is visible north of the complex of buildings and west of the water races. An unidentifiable object, potentially a stack of hay bales, is visible just north east of the possible shearing shed. A small forestry block is visible east of the possible shearing shed and north east of the dwelling. The eastern of the two water races extends north westwards and branches into three races that extend towards the north, north west and west, respectively. A track extends to the northern portion of the site from SH6, along a roughly north / south orientation in the eastern portion of the site. In the surrounding land, a few small stands of trees are visible east, north west and south west of the site. No other significant features are visible at the site or in the surrounding land.
1958 ¹⁰	A new rectangular building is visible in the area between the complex of buildings and the potential shearing shed. A few additional trees are visible in the orchard north east of the dwelling and a few of the original trees are no longer visible. A rectangular area resembling a tennis court is visible south west of the dwelling. There are no other significant changes, compared with the 1955 photograph.
1966 ¹⁰	A shelter belt has been planted along the northern site boundary. A small stand of trees has become established along the track in the south eastern portion of the site, north of the possible shearing shed. The potential stack of hay bales is no longer visible near to the possible shearing shed. No other significant changes are apparent at the site or in the surrounding area.
1969 ¹²	The site is visible with a track on the eastern side and a water race, originating from the southern corner of the site, traversing towards the west through the central part of the site. No other significant features are visible, compared with the 1949 map.
1974 ¹⁰	New shelter belts have been planted in the central portion of the site, along the north western boundary and along the eastern boundary. Another new shelter belt has been planted south of the central shelter belt, north west of the complex of buildings in the southern portion of the site. A new track enters the south western portion of the site from SH6 and extends northward to the northern portion of the site. A rectangular object, resembling a shed or a small stack of hay bales, is visible near to the southern part of the new track. Another new track connects to the complex of buildings in the southern portion of the site from the area north east of the new building. Rectangular objects resembling stacks of hay bales are visible in the northern and western portions of the site. No other significant changes are apparent at the site or in the surrounding area

Table 4 (cont.): Historical Aerial Photographs

1979 ¹²	With the exception of symbols indicating the presence of trees along the northern site boundary, no significant changes are apparent compared with the 1969 map.
1982 ¹⁰	A new rectangular building, which appears to be under construction, is visible south of the possible shearing shed and livestock yards. The possible new building / stack of hay bales near to the south western site boundary is no longer visible. Some trees have been removed from along the eastern boundary. No other significant changes are apparent at the site or in the surrounding area.
1983 ¹⁰	Construction of the new building is complete, and the former possible shearing shed is no longer visible. No other significant changes are apparent at the site or in the surrounding area.
1984 ¹⁰	Apart from evidence of a pond forming in the centre of the site, no significant changes are apparent at the site or in the surrounding area.
1989 ¹²	There are no significant changes compared with the 1979 map.
1999 ¹²	Shelter belts are marked with green lines along the northern site boundary, as well as portions of the western and eastern boundaries. Additional shelter belts are marked in the area west and north west of the dwelling as well as in the central portion of the site. Several individual trees are marked with green dots in the southern and western portions of the site. A pond is marked as a blue polygon in the central portion of the site. A series of water races are marked as blue lines in the area surrounding the pond. The lines all connect to a single source that enters the site from the southern boundary and splits into two new water races. The race leading towards the east leaves the site along the eastern boundary. A small pond is marked with a blue polygon between the two races. The southern portion of the site contains four black squares representing buildings, as well as two individual sets of parallel lines extending north from SH6, indicating tracks or driveways had been constructed. The area is labelled 'Carbridge Downs'. No other significant changes are visible, compared with the 1989 map.
2003 ¹⁰	The turf appears to have been removed from a rectangular area east of the dwelling and south east of the rectangular building. A new building with a green roof is visible north west of the rectangular building. The orchard in the area north east of the dwelling is no longer visible. Rows of wrapped silage and a possible shipping container are visible in the northern portion of the site. New shelter belts are visible in the northern, western, south western and eastern parts of the site. In the surrounding land, new dwellings are visible on neighbouring properties towards the west, south west and east. No other significant changes are apparent at the site or in the surrounding area.
2005 ¹¹	Extensive livestock yards are visible north of the rectangular building constructed in 1982. Additional rows of wrapped silage are visible north of the livestock yards. A few trees have been removed from the area east of the dwelling. No other significant changes are apparent at the site or in the surrounding area.
2009 ¹²	Apart from some additional shelter belts in the northern and southern parts of the site, and the absence of the small pond in the south eastern portion of the site, no significant changes were apparent compared with the 1999 map.
2011 ¹¹	A small area of soil disturbance is visible near to the centre of the site, as well as in the area north east of the livestock yards. A new pond has been established on the eastern

Table 4 (cont.): Historical Aerial Photographs

	side of the track in the eastern portion of the site. No other significant changes are apparent at the site or in the surrounding land.
2012 ¹¹	No significant changes are apparent at the site or in the surrounding area.
2015 to 2019 ¹¹	The new pond along the track on the eastern portion of the site is no longer present, but a new larger pond is formed in the area east of the livestock yards. The size of the pond in the centre of the site increases steadily. A new track is constructed from SH6 to the area north of the livestock yards. A track with extends north east from the area north of the livestock yards to the area of soil disturbance visible in the 2011 photograph. The track encircles the area and a stack of wrapped silage is visible north west of the encircled area. Another new area of soil disturbance is visible approximately 200 m south of the encircled area, directly east of the new pond. No other significant changes are apparent at the site or in the surrounding land.
2019 ¹²	There are no significant changes compared with the 2009 map.
2021 ¹¹	No significant changes are apparent at the site or in the surrounding area.
2023 ¹¹	Apart from a few cars visible around the shed south of the livestock yards, no significant changes are apparent at the site or in the surrounding area.
2024 ¹¹	The cars are no longer visible around the shed. New rectangular objects resembling shipping containers are visible in the area north west of the dwelling. No other significant changes are apparent at the site or in the surrounding area.

3.7 Summary of Identified Hazardous Activities and Industries

The following activities noted on the MfE Hazardous Activities and Industries List¹³ (HAIL) have been identified during review of the site history:

Category A1 – Agrichemicals including commercial premises used by spray contractors for filling, storing or washing out tanks for agrichemical application.

- This category is represented by the use of agrichemicals across the site, as well as storage in the area north of the shearing shed. Evidence of mixing and minor spills was observed, however the types of agrichemicals observed at the site are not considered likely to result in persistent contamination impacts. Contamination impacts within the agrichemical storage area (if any) will have undergone natural attenuation during the time after the PSI⁷ was drafted, to the point where the impacts are no longer likely to be detectable.

Category A8 – Livestock dip or spray race operations.

- This category is represented by the footrot bath / spray race in the area north of the former shearing shed. The significance of contamination impacts in that area is unknown.

Categories A13 - Petroleum or petrochemical industries including a petroleum depot, terminal, blending plant or refinery, or facilities for recovery, reprocessing or recycling petroleum-based materials, or bulk storage of petroleum or petrochemicals above or below ground and A17 - Storage tanks or drums for fuel, chemicals or liquid waste.

- These categories are represented by the potential underground fuel storage tank located near to the lean-to north west of the dwelling.

Category G5 - Waste disposal to land (excluding where biosolids have been used as soil conditioners).

- This category is represented by the black-stained soil at the open-sided shed, as well as small amounts of timber and metal waste disposed of in the north eastern portion of the site and stacks of treated timber beneath the shelter belt in the area near to the open-sided shed. Arsenic impacts are considered likely to have occurred in very localised areas e.g. in the immediate surroundings, or directly beneath treated timber fence posts.

According to Regulation 5 of the NES CS, the Regulations apply if a HAIL activity has been undertaken, or currently is being undertaken on the property.

4 Intrusive Investigation

Potential contamination impacts were identified during the site history assessment and walkover inspection. Therefore, a detailed environmental investigation was undertaken to assess whether the identified hazardous activities have resulted in an unacceptable risk to human or ecological health.

Seven discrete surface soil surface samples were collected from parts of the site where contamination impacts were considered possible. The samples were submitted to Hill Labs for analysis of a suite of common heavy metals at each location, as well as PAHs in one location where the soil was stained black. Sample locations are displayed in Figure 2.

4.1 Data Quality Objectives

The data quality objectives (DQO) of this assessment were:

- To assess the presence and concentrations of naturally occurring contaminants; and
- To assess the risks to human health posed by contamination at the site.

4.2 Methodology

The following was undertaken during the soil sampling works:

- Samples were given individual names that corresponded to specific locations recorded on a site plan (refer to Figure 2);
- 7 soil samples were collected from 7 locations where potential contamination impacts were identified during the review of site information (refer to Table 5);
- Samples were inspected for visual and olfactory indicators of contamination impacts in the field;
- Placement of samples into a chilly bin and transportation, under standard IE chain of custody procedures, to Hill Labs; and
- Request that Hill Labs analyse the samples for a suite of common heavy metals (As, Cd, Cr, Cu, Pu, Ni and Zn), or a suite of common heavy metals and PAHs.

Table 5: Sample Names, Locations and Analytes

Sample Name	Location	Analytes
FRB1	From bare earth at the northern side of the footrot bath / spray race	Heavy metals suite
FRB2	From bare earth at the north western side of the footrot bath / spray race, near to the outlet.	
FRB3	From the southern side of the footrot bath / spray race.	
FRB4	From the southern side of the former livestock yards area.	
SW1	Beneath the walkway at the southern side of the shearing shed.	
SW2	South of the walkway at the southern side of the shearing shed.	Heavy metals suite and PAHs
BS1	From the black-stained soil at the southern side of the open-sided shed.	

4.2.1 Quality Assurance / Quality Control

The quality assurance / quality control (QA / QC) procedures employed during the works included:

- Standard sample registers and chain of custody records have been kept for all samples;
- The use of Hill Labs, accredited by International Accreditation New Zealand (IANZ), to conduct laboratory analyses; and
- During the site investigation every attempt was made to ensure that cross contamination did not occur through the use of the procedures outlined within this document.

4.3 Investigation Criteria

4.3.1 Soil Criteria

The investigation criteria referenced in this report have been selected from the NES CS to assess risks to human health. Where a soil contaminant standard (SCS) was not available, the hierarchy detailed in the *MfE Contaminated Land Management Guidelines No. 2: Hierarchy and Application in New Zealand of Environmental Guideline Values*¹⁴ was used to select applicable criteria.

Human Health

SCSs¹, or other appropriate criteria for residential land use and commercial / industrial use have been presented to assess the risks to human health during the disturbance of soil associated with construction works required as part of the site development, as well as to assess the health risks during residential activities.

In New Zealand acceptance criteria are typically derived based on an incremental lifetime risk of cancer of 1 in 100,000 (or 10⁻⁵). Other jurisdictions, for example in the United States, derive acceptance based on an incremental lifetime risk of cancer of one in 1,000,000 (or 10⁻⁶). Therefore, where acceptance criteria from other jurisdictions are cited and this difference occurs (i.e. USEPA¹⁵) the criteria have been adjusted to an incremental lifetime risk of cancer of 1 in 100,000.

Ambient Concentrations of Contaminants

The New Zealand Institute for Bioeconomy Science Limited produced a report³ for ORC and Environment Southland titled *Determination and use of background concentrations of trace elements in soil in Otago and Southland*.

The report provides new criteria that are proposed to be adopted as standardised background / ambient concentrations for Otago and Southland, because the current national database of predicted background concentrations is too variable and has resulted in an unnecessarily complex situation when determining whether soil can be reused at other sites.

Therefore, based on advice received from Joon van der Linde, Principal Compliance Specialist at ORC, laboratory results below the proposed '*risk-based background concentrations or soil re-use criteria for the management of contaminated land and soil relocation*' can be considered to qualify as 'cleanfill' according to the MfE definition¹⁶.

Ecological Health

Due to the standardisation of the background concentrations for heavy metals within Otago and Southland, criteria for the protection of ecological receptors (Eco-SVGs) are now standardised as well. For ease of use, the recently published report³ includes Eco-SVGs that were calculated using the new background criteria.

Laboratory results below the Eco-SVGs provided in the report³ are considered acceptable for the protection of ecological receptors at the site. The 95% protection level was selected for residential and recreational land use, while the 80% protection level was selected for commercial / industrial land use.

Eco-SVGs for PAHs were selected from the Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health¹⁷ (herein referred to as the PAH Guidelines). However, specific values for naphthalene and phenanthrene were selected from older Canadian documents^{18,19} because the impact soil is not located in an area where potential impacts to nearby surface waters are a concern, as specified in the notes associated with those criteria in the PAH Guidelines.

4.4 Results

4.4.1 Soil Encountered

Near surface soil encountered across the majority of the site was described as light brown gravelly sand.

4.4.2 Laboratory Test Results

Table 6 compares soil contaminant concentrations in the samples with the adopted investigation criteria described in Section 4.3. The full analytical results are included in Appendix 5.

Table 6: Laboratory Results Compared with Human Health Criteria, Ecological Health Criteria and Background Concentrations

Analyte	Investigation Criteria						Investigation Results						
	Predicted Background Concentrations ^A	Ecological Soil Guideline ^B		Soil Contaminant Standards (SCS) ^B			FRB1	FRB2	FRB3	FRB4	SW1	SW2	BS1
		Residential and Recreation (95% Protection)	Commercial / Industrial (80% Protection)	Residential	Recreation	Commercial / Industrial (Excavation Activities)							
Land Use													
Heavy Metals													
Arsenic	12	20	60	20	80	70	10	7	8	8	19	8	8
Cadmium	0.6	5	17	3	400	1,300	0.42	0.16	< 0.10	0.12	< 0.10	0.1	0.15
Chromium	120	200	400	460 ^C	2,700	6,300	12	12	11	9	16	10	10
Copper	80	95	190	>10,000	>10,000	>10,000	15	13	15	17	24	14	26
Lead	150	290	1290	210	880	3,300	15	12	13	65	13	59	22
Nickel	30	200 ^D	320 ^D	400 ^E	1,200 ^E	6,000 ^E	10	10	11	9	11	10	9
Zinc	180	180	285	7,400 ^E	30,000 ^E	400,000 ^E	10,000	3,700	52	121	76	80	272
Polycyclic Aromatic Hydrocarbons													
Total of Reported PAHs in Soil	NE	NE	NE	300 ^E	300 ^E	4,000 ^E	-	-	-	-	-	-	3.8
1-Methylnaphthalene	NE	NE	NE	0.18 ^J	NE	0.77 ^J	-	-	-	-	-	-	< 0.014
2-Methylnaphthalene	NE	NE	NE	240 ^J	NE	3,000 ^J	-	-	-	-	-	-	< 0.014
Acenaphthylene	NE	NE	NE	NE	NE	NE	-	-	-	-	-	-	< 0.014
Acenaphthene	NE	NE	NE	3,600 ^J	NE	46,000 ^J	-	-	-	-	-	-	< 0.014
Anthracene	NE	2.5 ^G	32 ^G	18,000 ^J	NE	230,000 ^J	-	-	-	-	-	-	0.038
Benzo[a]anthracene	NE	1 ^G	10 ^G	11 ^J	NE	210 ^J	-	-	-	-	-	-	0.31
Benzo[a]pyrene (BaP)	1	22	47	10	40	35	-	-	-	-	-	-	0.36
Benzo[a]pyrene Potency Equivalency Factor (PEF) ^F	1	NE	NE	10	40	35	-	-	-	-	-	-	0.58
Benzo[a]pyrene Toxic Equivalence (TEF)	1	NE	NE	10	40	35	-	-	-	-	-	-	0.57
Benzo[b]fluoranthene + Benzo[k]fluoranthene	NE	NE	NE	NE	NE	NE	-	-	-	-	-	-	0.56
Benzo[e]pyrene	NE	NE	NE	5.7 ^J	NE	73 ^J	-	-	-	-	-	-	0.3
Benzo[g,h,i]perylene	NE	NE	NE	NE	NE	NE	-	-	-	-	-	-	0.36
Benzo[k]fluoranthene	NE	1 ^G	10 ^G	110 ^J	NE	2,100 ^J	-	-	-	-	-	-	0.198
Chrysene	NE	NE	NE	1,100 ^J	NE	21,000 ^J	-	-	-	-	-	-	0.31
Dibenzo[a,h]anthracene	NE	NE	NE	1.1 ^J	NE	21 ^J	-	-	-	-	-	-	0.068
Fluoranthene	NE	89	190	2,400 ^J	NE	30,000 ^J	-	-	-	-	-	-	0.39
Fluorene	NE	NE	NE	2,400 ^J	NE	31,000 ^J	-	-	-	-	-	-	< 0.014
Indeno[1,2,3-c,d]pyrene	NE	NE	NE	11 ^J	NE	210 ^J	-	-	-	-	-	-	0.35
Naphthalene	NE	0.6 ^H	22 ^H	130 ^J	NE	590 ^J	-	-	-	-	-	-	< 0.07
Perylene	NE	NE	NE	5.4 ^J	NE	67 ^J	-	-	-	-	-	-	0.113
Phenanthrene	NE	5 ^I	50 ^I	NE	NE	NE	-	-	-	-	-	-	0.086
Pyrene	NE	10 ^G	100 ^G	1800 ^J	NE	23,000 ^J	-	-	-	-	-	-	0.36

Notes:

All values in mg/kg. Only detected analytes are presented. Full laboratory certificates are included in Appendix 5.

ND indicates that the analyte is not present within the laboratory limits of detection.

Underlined text indicates concentration exceeds the background concentration.

Italics text indicates that the concentration exceeds the Ecological SGV for Residential, recreational or commercial / Industrial Land Use.

Bold text indicates that the concentration exceeds the SCS for Residential land use.

Highlighted cell indicates that the concentration exceeds the SCS for Recreational Land Use.

Highlighted cell indicates that the concentration exceeds the SCS for Commercial / Industrial Land Use which serves as a surrogate for excavation activities and maintenance of underground services.

The New Zealand Institute for Bioeconomy Limited: Determination and use of background concentrations of trace elements in soil in Otago and Southland.

A

B The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health

C Criteria for Cr6 presented as criteria for Cr3 are non limiting

D Australian National Environmental Protection Council (NEPC) National Environmental Protection (Assessment of Site Contamination) Measure Schedule B(1): Guideline on the investigation levels for soil and groundwater. Calculation: Added Contaminant Limited (ACL) for urban residential and public open space (CEC = 10) + background concentration.

E Australian National Environmental Protection Council (NEPC) National Environmental Protection (Assessment of Site Contamination) Measure Schedule B(1): Guideline on the investigation levels for soil and groundwater

F Benzo[a]pyrene (BaP) Potency Equivalency Factor (PEF) expresses the carcinogenic risk of PAHs relative to benzo[a]pyrene. The total BaP-equivalent concentration is calculated according to the NES CS Methodology

G CCME (Canadian Council of Ministers of the Environment). 2010. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health: Polycyclic Aromatic Hydrocarbons (PAHs) for the Protection of Environmental and Human Health

H CCME (Canadian Council of Ministers of the Environment). 1997. Recommended Canadian Soil Quality Guidelines

I CCME (Canadian Council of Ministers of the Environment). 1991. Interim Canadian Environmental Quality Criteria for Contaminated Sites. Report CCME EPC-CS34

J USEPA Regional Screening Levels². Criteria have been adjusted to an incremental lifetime risk of cancer of 1 in 100,000 (refer to Section 4.3.1).

5 Discussion

Fertilisers, Fungicides and Herbicides

Assessment of the chemical compounds included with the fertilisers, fungicides and herbicides confirmed that the products contain trace amounts of hydrocarbons (white spirits, paraffinic oil, naphthalene, trimethylbenzenes, alkylbenzenes and toluene).

However, the resulting concentration of hydrocarbons in soil is expected to be less than 1 mg/kg. The laboratory detection limits for hydrocarbons are typically higher than 20 mg/kg, so the compounds are not expected to be detectable via standard laboratory tests for petroleum hydrocarbons. Furthermore, the compounds are expected to undergo significant natural degradation within 3 to 6 months.

Several of the products also contained chlorinated active ingredients, which can be detected as organochlorines by laboratory testing. A few of the chlorinated compounds would not be detectable 1 year after application, with the majority not being detectable within 6 months.

Laboratory Results

Soil beneath the treated timber walkway at the former shearing shed contained arsenic at a concentration exceeding the predicted background concentration. However the arsenic concentration does not exceed the Eco-SVGs or SCSs for residential, recreational and commercial / industrial land use in that location.

The significant zinc concentration (10,000 mg/kg) at sample location FRB1, in the location of the former footrot bath outflow, exceeds the predicted background concentration, as well as the Eco-SVGs for residential, recreational and commercial / industrial land. Furthermore, the zinc concentration also exceeds the SCS for residential land use, but not for recreational or commercial / industrial land use.

A nearby sample, FRB2, contains less zinc but the concentration (3,700 mg/kg) exceeds the predicted background concentration, as well as the Eco-SVGs for residential, recreational and commercial / industrial land.

The sample collected from the blacked stained soil (BS1) near to the open-sided shed contains zinc at a concentration (180 mg/kg) that exceeds the predicted background concentration, as well as the Eco-SVGs for residential and recreational land use. None of the polycyclic aromatic hydrocarbons detected in that sample were present at concentrations that exceed any relevant criteria.

6 Conceptual Site Model

A contamination conceptual site model, presented in Table 7, consists of three primary components to allow the potential for risk to be determined. These are:

- Source of contamination;
- Pathway to allow the contamination to mobilise; and
- Sensitive receptors which may be impacted by the contamination.

Table 7: Conceptual Site Model

Source	Pathway	Receptor
Heavy metals (agricultural and naturally occurring) Polycyclic aromatic hydrocarbons	Inhalation of dust Dermal absorption (direct contact) Ingestion of soil and / or produce grown in the soil Wind-blown dust; Sediment migration via stormwater; Leaching via stormwater infiltration.	Maintenance / Excavation workers Site workers Future residents and visitors Soil microbes; Soil invertebrates; Plants; Wildlife; Livestock.
Acceptable risk to human health	Earthworks Associated with Land Development Yes: The concentrations of contaminants are below the SCSs for commercial / industrial land use, which includes excavation and earthworks activities.	
Acceptable risk to human health	Future Residential Land Use No: The zinc concentration exceeds the residential SCSs for residential land use in the former livestock yards associated with a former shearing shed.	
Acceptable risk to ecological health	Future Rural Residential Land Use No: The zinc concentration exceeds the Eco-SVGs for residential, recreational and commercial / industrial land use in the former livestock yards associated with a former shearing shed, as well as at the open-sided shed.	

7 Conclusions

Information obtained as part of this investigation (refer to Section 3) indicates that five HAIL activities have occurred in various parts of the site, while it was used for rural residential purposes, the grazing of livestock and, more recently, to grow animal feed crops since as long as records are available.

Fertilisers, fungicides and herbicides have been applied to the site during the growing seasons between 2021 and 2025, but assessment of the resulting concentrations in soil confirmed that use of the agricultural chemicals would not result in significant risks to human health. Furthermore, the presence of the compounds would not be detectable within 6 months to 1 year following application.

Visually Confirmed Contamination Impacts

The soil beneath stacks of treated timber, stored at the shelter belt near to the open-sided shed, is considered likely to contain arsenic at concentrations that exceed the residential, recreation and commercial / industrial SCSs. Soil testing in those areas was not considered necessary, because the total volume of impacted soil is considered unlikely to exceed 4 m³.

The farm tip / refuse pit was also visually confirmed as containing contamination impacts. Soil samples were not collected from the base of the pit, because disturbance of the waste in the pit was considered more likely to result in additional discharges of contaminants to ground.

Two pipes were observed protruding from the ground in the area north west of the dwelling. The pipes resembled those associated with underground fuel storage tanks (USTs). The presence of a UST was not confirmed because it would require excavation in an area currently used for residential purposes. That assessment is considered more appropriate to be undertaken when the residents have vacated the property, prior to bulk earthworks commencing at the site. At that time, the removal of the tank (if present) can be undertaken as a Permitted Activity if the requirements of Regulation 8(1)¹ are fulfilled.

Intrusive Investigation

Four near surface soil samples were collected from the former livestock yards, two near surface samples were collected from the soil beneath a treated timber walkway at a former shearing shed and one sample was collected from a patch of black-stained soil measuring approximately 4 m² in the vicinity of the open-sided shed. The samples were dispatched to Hill Labs under standard chain of custody documentation. IE requested that Hill Labs analyse the samples for a suite of common heavy metals, all of which are naturally occurring at the site, as well as PAHs in the sample of stained soil (BS1).

Laboratory results confirmed that the northern part of the former livestock yards contains significant concentrations of zinc, which exceed the residential land use SCS. The impacted area is conservatively estimated at up to 200 m².

None of the other contaminants analysed exceed the SCSs or Eco-SVGs for residential, recreational or commercial / industrial use, or for earthworks activities / maintenance of underground services.

This investigation has therefore confirmed that soil in a small part of the site contains contaminants at concentrations that pose significant risks to human health, environmental health or ecological health if that area site was developed and used for residential purposes. However, the area can be used for recreational or commercial / industrial purposes without restriction. The site is therefore considered suitable for the development of golf courses, visitor accommodation and residential properties.

NES CS Applicability

Contamination impacts identified in isolated parts of the site confirm that the soil contamination exceeds the applicable standard in Regulation 7. Therefore, the proposed activities of subdividing land, changing land use and disturbing soil do not qualify as Controlled Activities pursuant to Regulation 9.

Consent will be required under the NES CS for Restricted Discretionary Activities (Regulation 10) or Discretionary Activities (Regulation 11), to enable the remediation of the impacted areas prior to the change of land use, subdivision and development of the site.

8 Recommendations

It is recommended that the Plan Change application is approved because soil contamination impacts are not considered to be a limiting factor in development of the site for residential, recreational or commercial / industrial use. However, the extents of the zinc-impacted area should be assessed in greater detail if that area is proposed to be used for residential purposes.

Assessment of the potential underground fuel storage tank in the area near to the dwelling should be undertaken when the residents have vacated the property, prior to commencing earthworks in that part of the site.

Structures that require demolition should be assessed for the presence of asbestos-containing building materials prior to demolition works commencing. If present, the asbestos-containing materials (ACMs) must be removed appropriately by a licensed removalist prior to demolition of the structure(s).

It is further recommended that consideration be given to allowing the contaminated soil identified at the site to be buried in the existing farm tip / refuse pit, which should then be capped with a layer of HDPE that extends at least 1 m beyond the waste footprint in all directions and then capped with at least 0.5 m of cleanfill material. The area would then be considered suitable for recreation activities, such as being part of a golf course.

9 References

1. Ministry for the Environment 2012: Users' Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health
2. Ministry for the Environment 2021: Contaminated Land Management Guidelines No.1: Reporting on Contaminated Sites in New Zealand
3. The New Zealand Institute for Bioeconomy Limited 2025: Determination and use of background concentrations of trace elements in soil in Otago and Southland
4. GNS Webmap Institute of Geological and Nuclear Sciences 2013: 1:250,000 Geology. Viewed at: <http://data.gns.cri.nz/geology/>
5. Otago Regional Council 2021: State of the Environment Groundwater Quality in Otago.
6. Otago Regional Council 2025: Otago Regional Council Resource Consent Database. Viewed at: <http://data.orc.govt.nz/>
7. Insight Engineering 2021: Preliminary Environmental Site Investigation at 707 Wanaka-Luggate Highway, Wanaka. Report reference: 21027
8. Otago Regional Council 2025: Mapping Resource Hazardous Activities, Industries and Bores Search. Viewed at: <https://maps.orc.govt.nz/portal/apps/MapSeries/index.html?appid=052ba04547d74dc4bf070e8d97fd6819>
9. Queenstown Lakes District Council 2025: eDocs Portal. Viewed at: <http://edocs.qldc.govt.nz/>
10. Local Government Geospatial Alliance 2025: Retrolens - Historical Image Resource Project. Viewed at: <http://retrolens.nz>
11. Google Earth v7.3.6.10441. Wanaka, Central Otago, New Zealand. -44.715743° lon, 169.217643° lat, Eye alt 4.24 km. Airbus 2026. <http://www.earth.google.com>. [February 2026]
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13. Ministry for the Environment 2011: Ministry for the Environment Hazardous Activities and Industries List
14. Ministry for the Environment 2011: Contaminated Land Management Guidelines No.2 - Hierarchy and Application in New Zealand of Environmental Guideline Values.
15. USEPA 2026: United States Environmental Protection Agency: Regional Screening Levels (RSLs) - User's Guide. Viewed at: <https://www.epa.gov/risk/regional-screening-levels-rsls-users-guide>.
16. Ministry for the Environment 2002: A Guide to the Management of Cleanfills.
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18. Canadian Council of Ministers of the Environment 1997: Recommended Canadian Soil Quality Guidelines.
19. Canadian Council of Ministers of the Environment 1991: Interim Canadian Environmental Quality Criteria for Contaminated Sites. Report CCME EPC-CS34.
20. Australian National Environmental Protection Council 2013: National Environmental Protection (Assessment of Site Contamination) Measure Schedule B(1): Guideline on the investigation levels for soil and groundwater.
21. Ministry for the Environment 2011: Methodology for deriving standards for contaminants in soil to protect human health.

10 Limitations

- i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, SIO NO12 Limited, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.
- ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.
- iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.
- iv. This Limitation should be read in conjunction with the IPENZ/ACENZ Standard Terms of Engagement.
- v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on 021 556 549 if you require any further information. The author is a Certified Environmental Practitioner (CEnvP) under the Environment Institute of Australia and New Zealand (EIANZ) accreditation system.

Report prepared by



Claude Midgley
CEnvP, MSc.
Principal Environmental Scientist



APPENDIX 1

Figures



Description	Site Location	Figure Number	1
Project	Preliminary and Detailed Site Investigation at 707 Wanaka - Luggate Highway, Wanaka	Date	Jul-26
Client	SIO NO12 Limited	Drawn by	CM
Project Number	25020	Approved by	JK



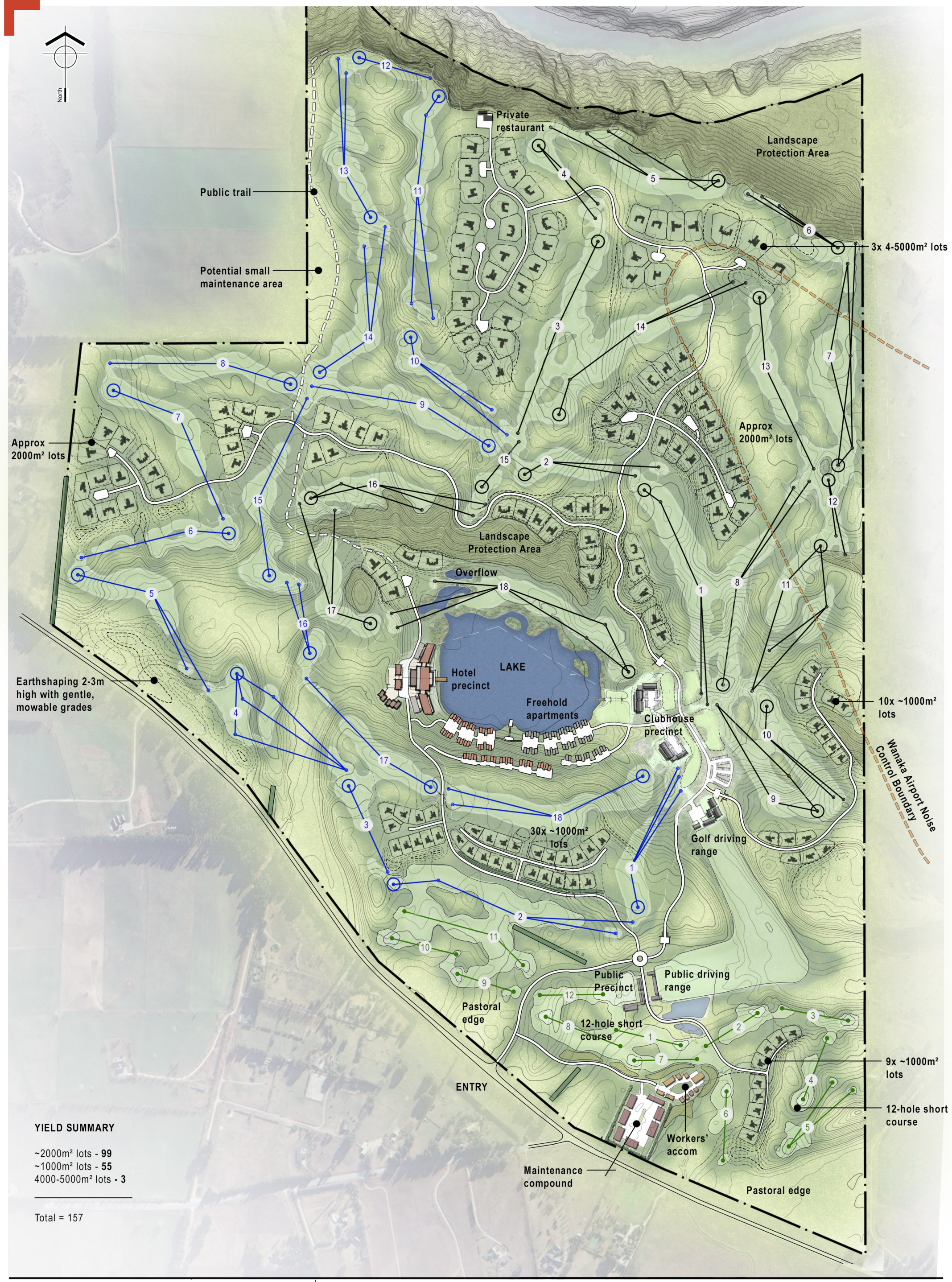


Description	Sample Location Plan	Figure Number	2
Project	Preliminary and Detailed Site Investigation at 707 Wanaka - Luggate Highway, Wanaka	Date	Jul-26
Client	SIO NO12 Limited	Drawn by	CM
Project Number	25020	Approved by	JK



APPENDIX 2

Proposed Development Plan



YIELD SUMMARY

~2000m² lots - 99
~1000m² lots - 55
4000-5000m² lots - 3

Total = 157

APPENDIX 3

Site Photographs



Photo 1: Shed in the south eastern portion of the site, north west of the dwelling.



Photo 2: Possible underground fuel tank at the northern edge of the shed.



Photo 3: Black-stained soil at the southern edge of the open-sided shed north of the residential area.



Photo 4: Close view of the black-stained soil.



Photo 5: Stacks of treated timber posts in the shelter belt north of the residential area.



Photo 6: Stacks of treated timber posts in the shelter belt north of the residential area.

Description	Site Photographs	Photos	1 to 6	
Project	Preliminary and Detailed Site Investigation at 707 Wanaka - Luggate Highway, Wanaka	Date Taken	18/12/26	
Client	SIO NO12 Limited	Taken by	CM	
Project Number	25020	Approved by	JK	



Photo 7: Southern side of the former livestock yards area.



Photo 8: Northern side of the former livestock yards area (Samples FRB1 and FRB2).



Photo 9: Walkway on the southern side of the shearing shed.



Photo 10: Former agrichemical storage area north of the shearing shed.

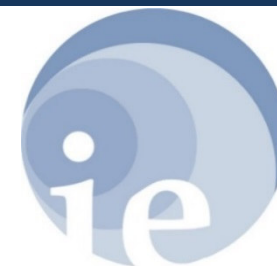


Photo 11: Farm tip / refuse pit in the south eastern portion of the site.



Photo 12: Silage area south of the farm tip / refuse pit.

Description	Site Photographs	Photos	7 to 12
Project	Preliminary and Detailed Site Investigation at 707 Wanaka - Luggate Highway, Wanaka	Date Taken	18/12/26
Client	SIO NO12 Limited	Taken by	CM
Project Number	25020	Approved by	JK



APPENDIX 4

IE 2021 PSI Report



13 July 2021

Silverlight Studios Limited
c/- Edgar Planning Ltd
1 Kamahi Street
Wanaka 9305

Re. Preliminary Environmental Site Investigation at 707 Wanaka-Luggate Highway, Wanaka

Our Reference: 21027

1 Introduction

Scott Edgar of Edgar Planning Ltd, on behalf of Silverlight Studios Ltd, requested that JKCM Ltd, trading as Insight Engineering (IE), undertake a preliminary environmental site investigation (PSI) of a portion of 707 Wanaka-Luggate Highway, Wanaka (herein referred to as “the site”) as outlined in our Short Form Agreement (reference P21027, fully executed on 31 May 2021).

Figure 1 (under Appendix 1) indicates the location of the site, which we understand is proposed to be developed for commercial use. The proposed development plans are provided in Appendix 2.

The purpose of this PSI was to assess the suitability of the site for commercial development and use, as required by the Resource Management (*National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*) Regulations ¹ (herein referred to as the NES). This investigation was undertaken in general accordance with the Ministry for the Environment (MfE) *Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand* ².

2 Objectives of the Investigation

The objective was to determine if potentially contaminating historical activities pose an unacceptable risk to human health during and post site development.

2.1 Approach

IE completed the following scope of work to satisfy the investigation objectives:

2.1.1 Review of Site Information

Several sources were contacted for information relating to the sites past and present uses and to identify any other environmental issues which may be on record. This consisted of:

- Undertaking a site walkover to describe current site conditions and assess whether any visual or olfactory evidence of contamination is present at the site;
- Interviewing a worker involved with managing the property, to obtain information relating to potentially contaminating activities that may have been undertaken at the site;

- Review of publicly available data describing the local geology and hydrogeology;
- Review of the Otago Regional Council Hazardous Activities, Industries and Bore Search database in terms of any property specific records of hazardous activities or industries that are held in their database of potentially contaminated sites;
- Reviewing the Queenstown Lakes District Council online property files to determine whether any records of contamination, or potentially contaminating activities, at the site are held in their database; and
- Reviewing publicly available historical aerial photographs and maps of the site and surrounding area;

3 Site Description

Site information is summarised in Table 1.

Table 1: Site Information

Location	707 Wanaka-Luggate Highway, Wanaka
Legal Description	Part of Sections 64, 65, 66 and 67 Block IV Lower Wanaka SD and part of Section 1 Block II Lower Wanaka SD
Property Ownership	Corbridge Estates Limited Partnership
Current Site Use	Agricultural (feed crops)
Proposed Site Use	Commercial (film studio)
Property Area	Approximately 3,220,250 m ² (322 ha)
Site Area	Approximately 5,555,000 m ² (55.5 ha)
Territorial Authorities	Queenstown Lakes District Council (QLDC) Otago Regional Council (ORC)
Zoning	Rural

The site setting is summarised in Table 2.

Table 2: Site Setting

Topography	Given the large area of the site, the topography varies significantly. Most of the site slopes down gently to steeply towards the central area, which is relatively flat and contains a large pond. Moderate to minor slopes exist in localised areas, such as a large mound on the western side of the pond area or along the sides of a wide gully in the south western portion of the site.
Local Setting	The site is located approximately 2.7 m east of the outskirts of Wanaka. The site is surrounded by agricultural / lifestyle block properties with low density residential dwellings towards the west, south and east.

Table 2: Site Setting (cont.)

Nearest Surface Water & Use	A pond, fed by a water race located in the south eastern portion of the site, is located near to the centre of the site. The Clutha River / <i>Mata Au</i>, used for recreational purposes and as a source of water for hydro-power generation as well as private irrigation schemes, is located approximately 1.1 km towards the north.
Geology	The GNS New Zealand Geology Webmap³ indicates that the site is located within the “Late Pleistocene glacier deposits” geological unit of the Albert Town Advance described as ‘<i>Unweathered to slightly weathered, loose, poorly sorted, bouldery gravel, sand, and silt (till); often with contorted bedding</i>’. The surface material observed over the majority of the site during the walkover is broadly described as light brown gravelly sand.
Hydrogeology	According to a report completed by ORC⁴, the site is located within the unconfined Wanaka-Cardrona Aquifer. Groundwater is considered likely to flow generally towards the Clutha River / <i>Mata Au</i>, north of the site.
Groundwater Abstractions ⁵	The following current or historical groundwater abstraction consents were issued for properties located at, or within 250 m of, the site: • Consent number 2003.272 was issued in 2003 for Brian Lewis Hore to take and use groundwater for the purpose of irrigation until 21 May 2028. The location of the consent is recorded on the site, Corbridge Downs, north of State Highway 6 opposite the Ballantyne Road and State Highway 6 intersection, approximately 6 kilometres east of Wanaka. • Consent number RM10.388.01.V2 was issued in 2010 for Corbridge Park Limited as Partner of the Corbridge Estates Limited to take and use groundwater for the purpose of irrigation for a fixed term expiring 1 December 2035. The location of the consent is recorded on the site, approximately 1.09 kilometres north northeast from the intersection of Ballantyne Road and Wanaka-Luggate Highway. • Consent number RM11.161.01 was on an unknown date (likely during 2010) for Corbridge Park Limited as Partner of the Corbridge Estates Limited to take water from a bore for the purpose of irrigation. The location of the consent is recorded as approximately 900m north west of the intersection of Ballantyne Road and Wanaka-Luggate Highway/ State Highway 6. • Consent number 2003.273 was issued in 2003 for Brian Lewis Hore to take and use groundwater for the purpose of irrigation for a term expiring 14 May 2028. The location of the consent is recorded as Corbridge Downs, located north of State Highway 6 opposite the Ballantyne Road and State Highway 6 intersection approximately 6 kilometres east of Wanaka.
Discharge Consents ⁵	There are no discharge consents issued for properties located at, or within 250 m of the site.

3.1 Current Site Conditions

Claude Midgley of IE completed a site walkover inspection on 3 June 2021. Observations made at that time are summarised in Table 3 and photographs are presented in Appendix 3.

Table 3: Current Site Conditions

Site description	The majority of the site consists of fenced paddocks that had been sown with animal feed crop at the time of our inspection. An agrichemical storage area is present just within to the eastern edge of the site (refer to Figure 1), adjacent to a water race. The water race runs westward and has been diverted to discharge its water to the centre of the site, where a pond has formed as a result of the discharge. A stand of willow trees, near to the north eastern site boundary, had been used as an area to dispose of small amounts of waste material including fence posts, fencing wire, old hay bales and scrap metal, as well as soil stockpiles containing cobbles and large boulders. A roughly circular area nearby to the stand of willows contained cobbles and an old excavator bucket. The area may have been used to dispose of waste in a pit, but this could not be confirmed without excavating into the area. A water pump station was located approximately 150 m west of the stand of willows. The only other significant features were two maimais on the northern edge of the near to the northern site boundary. The structures appear to have been used for duck shooting.
Visible signs of contamination	- Fence posts, fencing wire and scrap metal disposed of at the stand of willow trees near to the north eastern corner of the site. - Just within the eastern site boundary, an agrichemical storage and mixing area was located adjacent to the water race.
Surface water appearance	Water in the race was clear and free flowing. The water then discharged into the pond in the centre of the site, which appeared clear and showed no evidence of discolouration or hydrocarbon sheen..
Current surrounding land use	Mixed agricultural and low density rural residential land is located towards the east, west and south. Agricultural land is located toward the north.
Local sensitive environments	The Clutha River / <i>Mata Au</i> and the surrounding riparian zone, located north of the site, is considered a sensitive environment.
Visible signs of plant stress	No visible signs of plant stress were noted within the site boundaries.

3.2 Interview with Site Operator

Jason Watkins (*pers. comm.*), who works as an assistant to the farm manager, provided the following information:

- Mr Watkins has worked at the property since 2010.
- The majority of the property had been used as pastoral grazing for livestock. However, since approximately 2015 / 2016 the site has been sown with animal feed crops. Top dressing fertiliser is applied once per season.
- The majority of the agrichemicals used at the property, as well as fuel, equipment and sundries such as spare fence posts and fencing wire, are stored at the shed in the southern portion of the property approximately 650 m south of the site.
- Mr Watkins was not aware of any activities that could have resulted in contamination impacts within the site boundary.

3.3 ORC Property Database

IE reviewed the ORC Hazardous Activities, Industries and Bore Search database⁶ on 14 June 2021. The search confirmed that site is not currently on the ORC database, however a portion of the property has been recorded on the database. Site number “HAIL.00432.01” is located near to the farm buildings in the southern portion of the property, approximately 480 m south of the site. The area is recorded as being a verified Hazardous Activities and Industries⁷ (HAIL) site for a Category A8 activity (Livestock dip or spray race operations). The area has not been investigated, but it was identified in a subdivision application.

3.4 QLDC Property File

The property file⁸ contained documents relating to the hosting of the Wanaka Wine and Food festival, as a one day event. No information relevant to potential site contamination was contained in the property file.

No known preliminary or detailed site investigations could be found on the property file.

3.5 Review of Historical Aerial Photographs and Maps

Photographs in the Crown Collection⁹ and Google Earth¹⁰, as well as topomaps on the MapsPast¹¹ website, have been reviewed to obtain information on the past uses of the site. Aerial photographs taken between 1956 and 2016, as well as maps created between 1939 and 2009, have been reviewed. Table 4 summarises the features visible in each image.

Table 4: Historical Aerial Photographs

1939 ¹¹	The site is part of three properties, labelled as follows: '22' and '249, 0, 0'; '20' and '48, 1, 16'; and '1' and '177, 3, 29' No other significant features are visible on the map.
1949 ¹¹	No significant changes are visible, compared with the 1939 map.
1955 ⁹	The site appears to be used for pastoral grazing. Three water races branch from a single race just south of the south eastern portion of the site. A track is visible along a roughly north / south orientation in the eastern portion of the site. In the surrounding land, a few small stands of trees are visible east, north west and south west of the site. A complex of buildings with shelter belts is visible near to Wanaka – Luggate Highway, south of the site. A building resembling a shearing shed, with livestock yards on the western and southern sides, is visible between the site and the complex of buildings. Another unidentifiable object, potentially a stack of hay bales, is visible just north east of the possible shearing shed. No other significant features are visible at the site or in the surrounding land.
1958 ⁹	There are no significant changes, compared with the 1955 photograph.
1966 ⁹	A small stand of trees has become established near to the south eastern site boundary. In the surrounding land, the potential stack of hay bales is no longer visible. No other significant changes are apparent at the site or in the surrounding area.
1969 ¹¹	The site is visible with a track on the eastern side and a water race traversing through the southern portion. No other significant features are visible, compared with the 1949 map.
1974 ⁹	Apart from a new shelter belt that has been planted near to the southern site boundary and a small new building resembling a shed near to the western site boundary, there are no significant changes at the site or in the surrounding area.
1979 ¹¹	There are no significant changes compared with the 1969 map.

Table 4 (cont.): Historical Aerial Photographs

1982 ⁹	Apart from the new building no longer being present near to the western site boundary, no significant changes are apparent at the site or in the surrounding area.
1983 ⁹	No significant changes are apparent at the site or in the surrounding area.
1984 ⁹	Apart from evidence of a pond forming in the centre of the site, no significant changes are apparent at the site or in the surrounding area.
1989 ¹¹	There are no significant changes compared with the 1979 map.
1999 ¹¹	A shelter belt is marked as a green line in the southern portion of the site. A pond is marked as a blue polygon in the area north of the shelter belt. A series of watercourses are marked as blue lines in the area surrounding the pond. In the surrounding land, a label stating 'Cambridge Downs' is located in the area south of the site, near to several small black squares indicating the presence of buildings. No other significant changes are visible, compared with the 1989 map.
2003 ⁹	No significant changes are apparent at the site or in the surrounding area.
2005 ¹⁰	No significant changes are apparent at the site or in the surrounding area.
2009 ¹¹	There are no significant changes compared with the 1999 map.
2011 ¹⁰	A small area of soil disturbance is visible near to the centre of the site. A new pond has been established on the eastern side of the track in the eastern portion of the site. No other significant changes are apparent at the site or in the surrounding land.
2012 ¹⁰	No significant changes are apparent at the site or in the surrounding area.
2015 to 2019 ¹⁰	Apart from the new pond no longer being present along the track on the eastern portion of the site and the size of the pond in the centre of the site increasing, no other significant changes are apparent at the site or in the surrounding land.
2019 ¹¹	There are no significant changes compared with the 2009 map.

3.6 Summary of Identified Hazardous Activities and Industries

The following activities noted on the MfE Hazardous Activities and Industries List⁷ (HAIL) have been identified during review of the site history:

Category A1 – Agrichemicals including commercial premises used by spray contractors for filling, storing or washing out tanks for agrichemical application.

This category is represented by the agrichemical storage area just within the eastern site boundary. Evidence of mixing and minor spills was observed, therefore it is considered likely that significant soil contamination impacts have occurred within a localised area (approximately 50 m²).

Category G5 - Waste disposal to land (excluding where biosolids have been used as soil conditioners).

This category is represented by the small amounts of timber and metal waste disposed of in the north eastern portion of the site. Minor impacts are considered likely to have occurred in very localised areas e.g. in the immediate surroundings of treated timber fence posts.

According to Regulation 5 of the NES, the Regulations apply if a HAIL activity has been undertaken, or currently is being undertaken on the property.

4 Conceptual Site Model

A contamination conceptual site model, presented in Table 5, consists of three primary components to allow the potential for risk to be determined. These are:

- Source of contamination;
- Pathway to allow the contamination to mobilise; and
- Sensitive receptors which may be impacted by the contamination.

Table 5: Conceptual Site Model

Source	Pathway	Receptor
Heavy metals (treated timber) Various agrichemicals	Inhalation of dust Dermal absorption (direct contact) Ingestion of soil and / or produce grown in the soil	Maintenance / Excavation workers Site construction workers Future residents Future commercial workers
Acceptable risk to human health?	Earthworks associated with land development, as well as future Commercial use Acceptable under certain conditions: The potential risks to human health are not considered significant if they are controlled through the implementation of a Contaminated Site Management Plan (CSMP).	

1 Conclusions

Information obtained as part of this investigation (refer to Section 3) indicates that the site has been used for grazing of livestock and, more recently, to grow animal feed crops.

Evidence of two HAIL activities was found on the site (waste disposal to ground and agrichemical storage) and minor impacts from those activities are considered likely to have occurred in localised areas (refer to Figure 1).

Based on the current contamination status of the site, given the potential sources identified, it is considered highly unlikely that there will be a risk to human health if the site is developed and used for commercial purposes as long as earthworks within the areas highlighted in Figure 1 are completed under a CSMP.

2 Recommendations

It is recommended that development and use of the land for commercial purposes be allowed as a Permitted Activity under the NES¹, because the requirements of Regulation 8(4) have been met.

The earthworks volume for the proposed development is considered likely to exceed the Permitted Activity criteria in Regulation 8(3) of the NES. Therefore, it is recommended that the earthworks are allowed as a Discretionary Activity under Regulation 11 of the NES with a requirement for earthworks within the areas highlighted in Figure 1 to be covered by the CSMP provided in Appendix 4.

If any material that shows signs of potential contamination (visual or olfactory indicators such as chemical odours or abnormal stains) is unearthed in other parts of the site during the development, work should stop immediately and a suitably qualified environmental practitioner should be engaged to assess the risk to human health prior to recommencing earthworks.

3 References

1. Ministry for the Environment 2012: Users' Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health
2. Ministry for the Environment 2011: Contaminated Land Management Guidelines No.1: Reporting on Contaminated Sites in New Zealand
3. GNS Webmap Institute of Geological and Nuclear Sciences 2013: 1:250,000 Geology. Viewed at: <http://data.gns.cri.nz/geology/>
4. Otago Regional Council 2011: Integrated Water Resource Management for the Cardrona River.
5. Otago Regional Council 2017: Otago Regional Council Resource Consent Database. Viewed at: <http://data.orc.govt.nz/>
6. Otago Regional Council 2020: Mapping Resource Hazardous Activities, Industries and Bores Search. Viewed at: <https://maps.orc.govt.nz/portal/apps/MapSeries/index.html?appid=052ba04547d74dc4bf070e8d97fd6819>
7. Ministry for the Environment 2011: Ministry for the Environment Hazardous Activities and Industries List.
8. Queenstown Lakes District Council 2018: eDocs Portal. Viewed at: <http://edocs.qldc.govt.nz/>
9. Local Government Geospatial Alliance 2017: Retrolens - Historical Image Resource Project. Viewed at: <http://retrolens.nz>
10. Google Earth v7.3.3.7786. Wanaka, Central Otago, New Zealand. -44.707833° lon, 169.213974° lat, Eye alt 1.85 km. DigitalGlobe 2021. <http://www.earth.google.com>. [June 2021]
11. Mapspast 2017: Current and Historical Topographic Maps (Topomaps) of New Zealand. Viewed at: <http://www.mapspast.org.nz/>

4 Limitations

- i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our clients, Silverlight Studios Limited, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.
- ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been

inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.

- iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.
- iv. This Limitation should be read in conjunction with the IPENZ/ACENZ Standard Terms of Engagement.
- v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on 021 556 549 if you require any further information. The author is a Certified Environmental Practitioner (CEnvP) under the Environment Institute of Australia and New Zealand (EIANZ) accreditation system.

Report prepared by



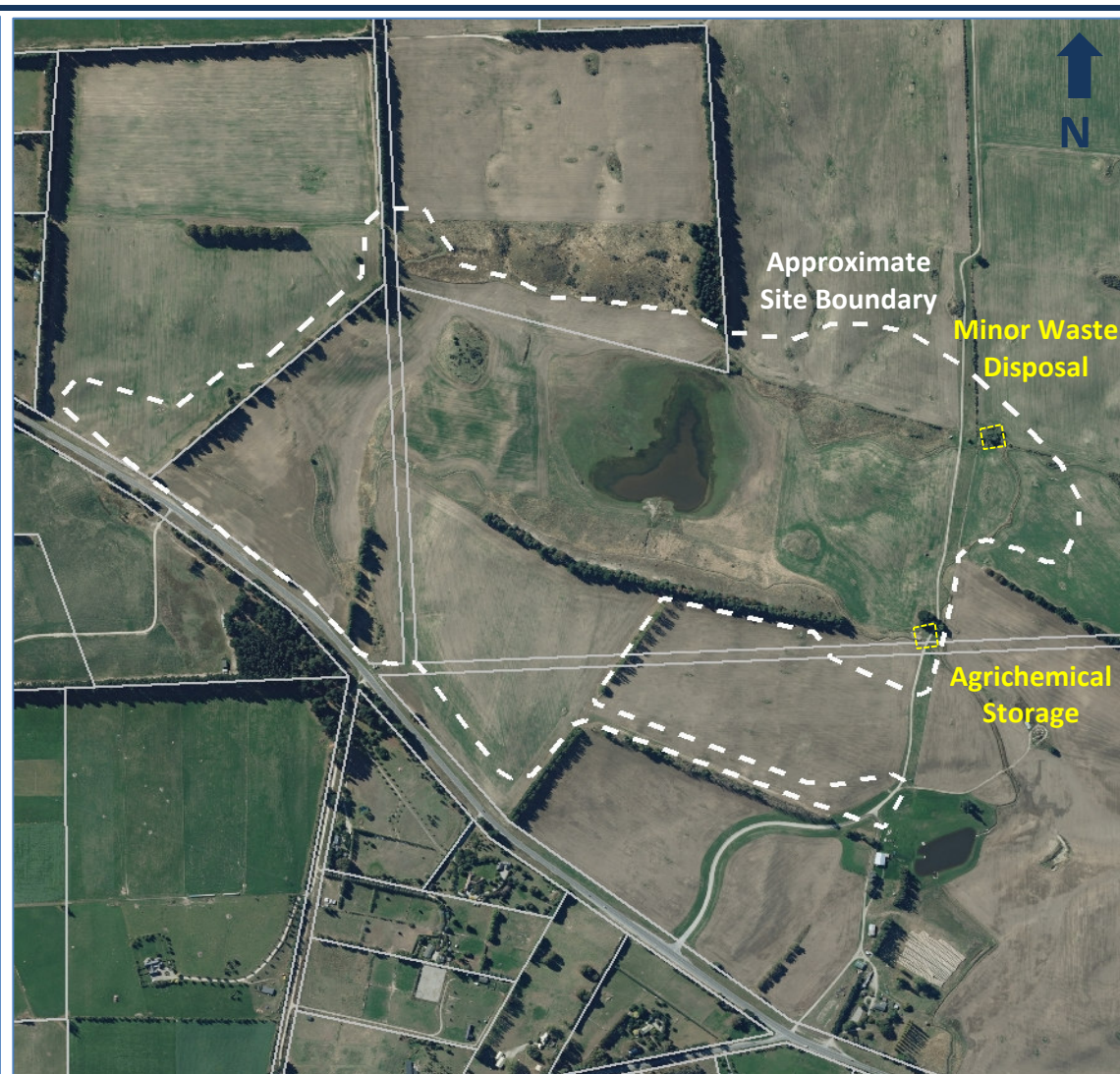
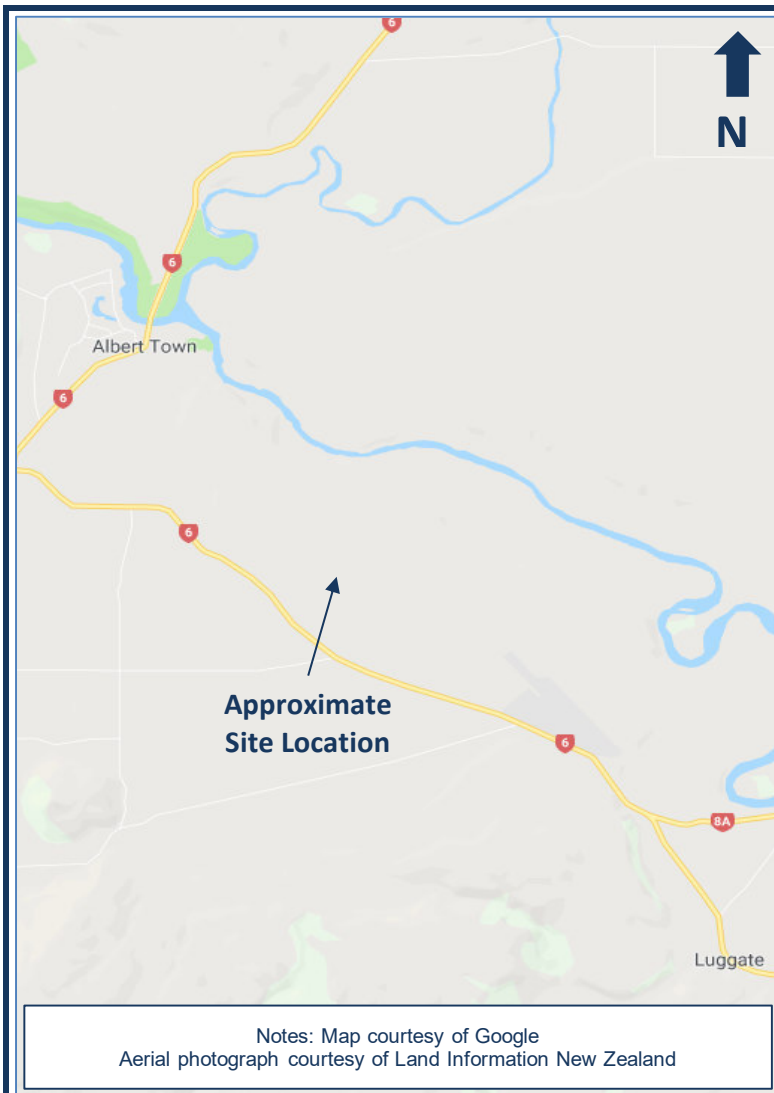
Claude Midgley, CEnvP

Associate Environmental Scientist



APPENDIX 1

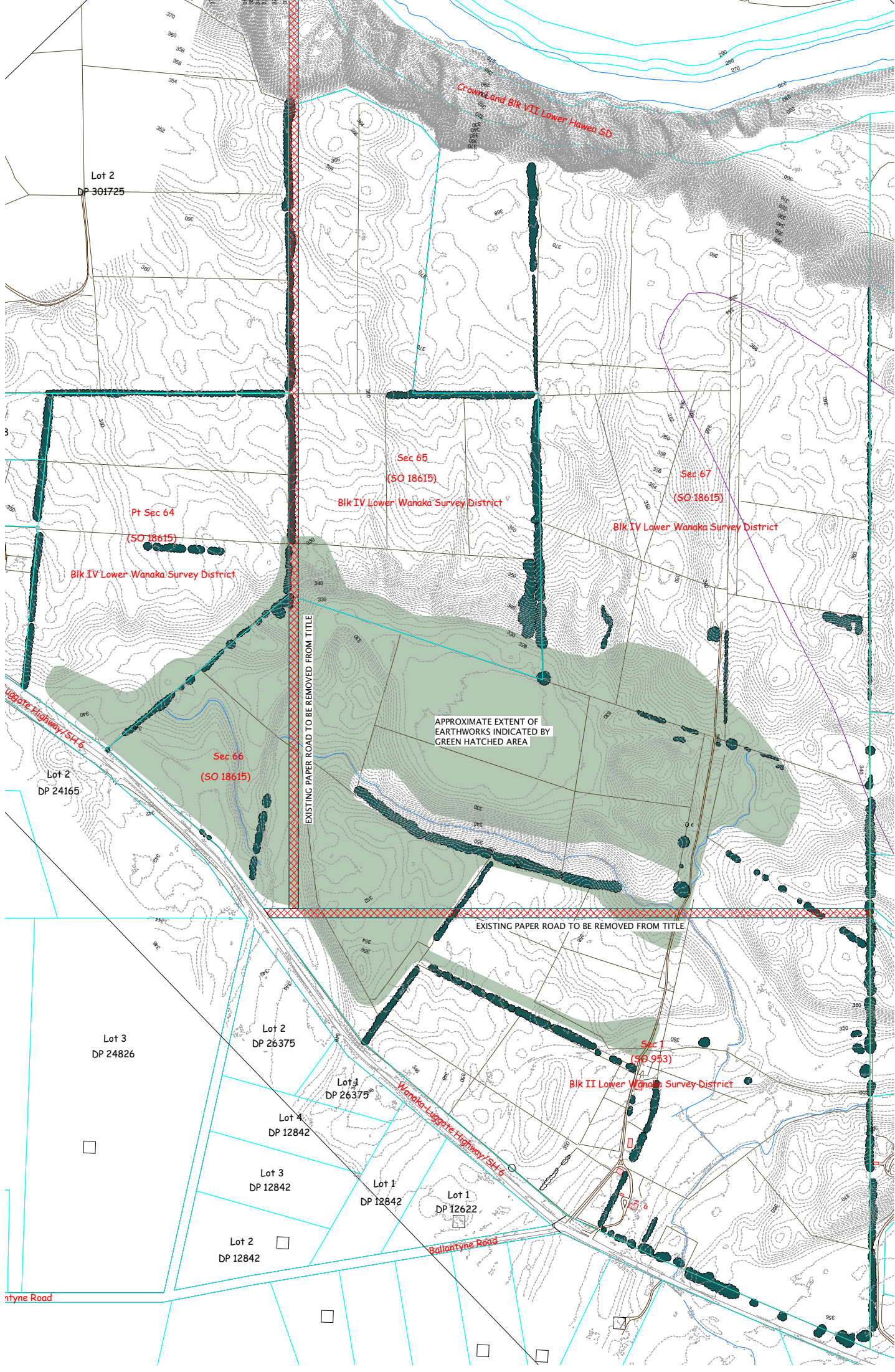
Figures



Description	Site Location	Figure Number	1	
Project	Preliminary Site Investigation 707 Wanaka - Luggate Highway, Wanaka	Date	Jul-21	
Client	Silverlight Studios Limited	Drawn by	CM	
Project Number	21027_1	Approved by	JK	

APPENDIX 2

Proposed Development Plans



2 SITE LOCATION PLAN

SITE SURVEY INFORMATION PROVIDED BY PATTERSON PITTS GROUP – REFER TO PPG DOCUMENTATION FOR TOPOGRAPHIC SURVEY INFORMATION

1 EXISTING OVERALL SITE PLAN
SCALE: 1 : 5000

SILVERLIGHT
STUDIOS

RESOURCE CONSENT

707 WĀNAKA – LUCCATE HIGHWAY,
WĀNAKA, OTAGO

SITE

EXISTING OVERALL SITE &
LOCATION PLAN

TRUE NORTH 	SHEET ISSUED 29/06/21	SCALE AT A1 (HALF SCALE IF PRINTED AT A3) 1 : 5000
PRECINCT	SHEET NUMBER	

SI-RC-01

 **TILT**
ARCHITECTURE

APPENDIX 3

Site Photographs



Photo 1: Panoramic view of the site, viewed from the south facing north.



Photo 2: Panoramic view of the western portion of the site, viewed from the north west facing south east.



Photo 3: Western portion of the site, viewed from the north facing south.

Description	Site Photographs	Photos	1 to 3	
Project	Preliminary Site Investigation 707 Wanaka - Luggate Highway, Wanaka	Date Taken	03/06/21	
Client	Silverlight Studios Limited	Taken by	CM	
Project Number	21027_1	Approved by	JK	



Photo 4: Waste disposal area, viewed from the north facing south east



Photo 5: Waste disposal area, viewed from the south facing north.



Photo 6: Stockpiles in the waste disposal area.



Photo 7: Stockpiles in the waste disposal area.



Photo 8: Stockpiles in the waste disposal area.



Photo 9: Possible former waste disposal pit west of the waste disposal area.

Description	Site Photographs	Photos	4 to 9	
Project	Preliminary Site Investigation 707 Wanaka - Luggate Highway, Wanaka	Date Taken	03/06/21	
Client	Silverlight Studios Limited	Taken by	CM	
Project Number	21027_1	Approved by	JK	



Photo 10: Water pump, west of the waste disposal area.



Photo 11: Maimai area (centre of image), north of the pond.



Photo 12: Maimais north of the pond, viewed from the east facing west.



Photo 13: Agrichemical storage area just within to the eastern edge of the site.

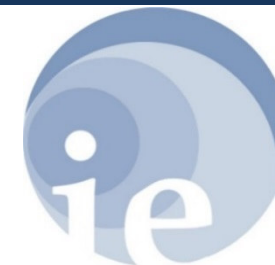


Photo 14: Agrichemical storage area just within to the eastern edge of the site.



Photo 15: Spilled / leaked agrichemicals in the agrichemical storage area.

Description	Site Photographs	Photos	10 to 15
Project	Preliminary Site Investigation 707 Wanaka - Luggate Highway, Wanaka	Date Taken	03/06/21
Client	Silverlight Studios Limited	Taken by	CM
Project Number	21027_1	Approved by	JK



APPENDIX 4

Contaminated Site Management Plan



Contaminated Site Management Plan for the Development of Silverlight Studios at 707 Wanaka- Luggate Highway, Wanaka

Prepared for: Silverlight Studios Limited

Date: 13/07/2021

Our Reference Number: 21027_2

Report prepared by: Claude Midgley
MSc, CEnvP

Reviewed by: Jana Kruyshaar
CMEngNZ

Record of Distribution

Sent to	Date	Report Status	No. of Copies
Mike Wallis and Scott Edgar	8/7/2021	Draft for Comment	1 Electronic

Record of Report Version

Date	Version Number
8/7/2021	21027_2

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Tables

Table 1: Summary of Roles Relating to CSMP

Table 2: Summary of Responsibilities

Table 3: Site Information

1 Introduction

This CSMP describes the procedures for disturbance, management and disposal of potentially contaminated soils and stormwater when undertaking earthworks at 707 Wanaka-Luggate Highway. The CSMP is also applicable during possible future maintenance of the underground services.

1.1 Why this Plan is Required

This plan was prepared following the findings of a preliminary environmental site investigation (PSI) which concluded that soil disturbance in two areas on the site (refer to Figure 1) have the potential to result in risks to human health if the earthworks are not controlled through implementation of a CSMP.

1.2 Purpose of this Plan

This CSMP has been prepared by a Certified Environmental Practitioner (CEnvP) to assist managers and workers with procedures that minimise the risks to human health during the disturbance of potentially contaminated soil.

This document covers:

- Excavation and removal of soils;
- Management of work to avoid uncontrolled releases from the site;
- Management of contaminated stormwater and sediment;
- Health and safety requirements for personnel;
- Disposal of potentially contaminated soil; and
- Validation / monitoring of the works.

This CSMP applies to soil disturbance works – the CSMP procedures are not intended to be used during disturbance of non-soil waste materials (e.g. rocks or vegetation).

This CSMP applies only to the area of the site where potential contamination impacts have been identified in a Preliminary Environmental Site Investigation (PSI), as highlighted in Figure 1. The information and recommendations are provided to augment standard site controls. This CSMP does not relieve the site contractor or the controller of the workplace of their responsibility for the health and safety of their workers and contractors. Further, this CSMP does not relieve contractors undertaking work on site of their responsibilities under the *Health and Safety At Work Act* (2015) and subsequent amendments.

1.3 Distribution, Roles and Responsibilities

This CSMP is to be distributed to the site owner (Sliverlight Studios), QLDC and ORC, as well as contractors working on the site development.

At least one copy of the plan shall be held on-site at all times. The register of the CSMP Holders, provided in Table 1, shall be maintained up to date by the site owner for each contractor undertaking work related to the new infrastructure.

The landowner will communicate to any contractor undertaking work on the infrastructure:

- The location of chemical contaminants;
- Associated hazards; and
- Required and recommended procedures.

Copies of the CSMP shall therefore be provided to the appropriate contractors undertaking any controlled activities at the site.

Table 1: Summary of Roles Relating to CSMP

Company / Organisation	Summary of Role
Silverlight Studios Limited (Landowner)	Responsible for ensuring that implementation of CSMP is enacted.
Civil Engineer (TBC)	Authorise work related to implementation of the CSMP. Distribute the most up-to-date plans to Contractors.
Earthworks Contractors	Responsible for implementation of all aspects of the CSMP. In particular, responsibilities include: • Communication of the requirements of the CSMP to all employees and sub-contractors undertaking works on the site; and • The relevance and distribution of the CSMP is maintained in accordance with Section 1.4

Responsibilities relating to this CSMP are summarised in Table 2.

Table 2: Summary of Responsibilities

Item	Responsible Party
Record Keeping	Landowner to collate all in-house, contractor and subcontractor records upon completion of the project. Contractors and subcontractors to provide all records to the landowner upon completion of works.
Training	ALL as appropriate
Access	Landowner
Meteorological Monitoring	ALL as appropriate
Supervision (under certain circumstances)	Environmental consultant to be appointed by Landowner
Emergency Response	ALL as appropriate Contractor to coordinate with input from Landowner
Contingency Measures	ALL as appropriate Contractor to coordinate with input from Landowner
Complaints Procedure	ALL as appropriate Contractor to provide details of complaints to Landowner, when received
Notification Requirements	Landowner in coordination with Contractor and / or Environmental Consultant

1.4 Document Review and Amendment

Update amendments will cater for changes in design, work undertaken by contractors and alterations to operation procedures or, in accordance with future changes in accepted best operational practice and regulations. It should also be noted that any changes to the CSMP are required to be approved by the QLDC prior to implementation.

The landowner will issue an updated CSMP to QLDC, ORC and Contractors once the changes are approved.

The most current version of the document will be distributed to, and maintained electronically by each of the parties identified in Table 1. Hardcopies should be compared to the digital version to confirm currency.

2 Site Identification

Site information is summarised in Table 3.

Table 3: Site Information

Location	707 Wanaka-Luggate Highway, Wanaka
Legal Description	Part of Sections 64, 65, 66 and 67 Block IV Lower Wanaka SD and part of Section 1 Block II Lower Wanaka SD
Property Ownership	Silverlight Studios Limited
Proposed Site Use	Film studios
Territorial Authorities	Queenstown Lakes District Council Otago Regional Council
Zoning	Rural
Topography	Given the large area of the site, the topography varies significantly. Most of the site slopes down gently to steeply towards the central area, which is relatively flat and contains a large pond. The two portions of the site that this CSMP applies to are described as follows: The waste disposal area near to the north eastern corner of the site slopes gently towards the west. Localised mounds, consisting of waste material including fence posts, fencing wire, old hay bales and scrap metal, as well as soil stockpiles containing cobbles and large boulders reach elevations up to 2 m above the surrounding ground surface. The agrichemical storage area near to the eastern site boundary slopes gently towards the north west. A water race with an embankment of approximately 0.5 m above the surrounding ground surface is located directly south of that area.
Local sensitive environments	The Clutha River / <i>Mata Au</i> and the surrounding riparian zone, located approximately 1.1 km north of the site, is considered a sensitive environment.

3 Contamination Conditions

3.1 Contaminants of Concern

Various agrichemicals, including pesticides, herbicides, fertilisers, heavy metals (arsenic, copper and chromium) from treated timber and petroleum hydrocarbons (engine oil), as well as naturally occurring heavy metals and respirable crystalline silica dust are contaminants of concern within the areas highlighted in Figure 1. Respirable crystalline silica dust could also be generated if earthworks are completed during dry conditions on other parts of the site.

3.2 Potential Fugitive Emissions

There are a number of circumstances which could lead the release and spread of fugitive emissions during the site development. Such activities include:

- Uncontrolled disposal of spoil at an unlicensed off-site location;
- Migration of contaminated soil via uncontrolled stormwater flow during rainy conditions;
- Stockpiled soil can release dust that includes respirable crystalline silica during dry and windy periods;
- Spills while refuelling earthworks machinery; and
- Accidental spills from a vacuum extraction unit (under contingency conditions).

Details of how these activities will be managed to limit the risk of causing fugitive emissions are detailed in Section 6 of this CSMP.

3.3 Contamination Risk

The presence of contaminants in soil is not expected to pose an unacceptable risk to human health under informed circumstances. However, potential receptors must be informed of unacceptable exposure pathways that they could be exposed to at the site. The following activities do have the potential to create adverse health effects:

1. Contact with contaminated soil. Acute negative health effects are likely to occur if contaminants are able to enter the body via an open wound, or through the mouth, eyes or nose. Chronic effects could occur if workers are exposed to contaminants over an extended period (months or years);
2. Accidental release of stormwater. Uncontrolled discharge of stormwater can result in migration of contaminants to adjacent parts of the site and result in localised negative impacts to the ground surface and local groundwater;

It is important that exposure to potential hazards be minimised to the maximum practicable extent. These hazards will be controlled by a combination of good hygiene practices, decontamination procedures, wearing appropriate personal protective equipment, as well as general works management. These management measures are detailed in Section 6. The following section details the monitoring measures designed to avoid potential negative outcomes.

4 Monitoring Measures

4.1 General

4.1.1 Record Keeping

A digital database will be established and maintained by the Project Manager, to store the following relevant information that will be obtained from relevant subcontractors:

- Information relating to the off-site disposal of soil, including the location and disposal dockets received from the site operator(s);
- Results of meteorological monitoring, including records of adverse weather predictions (heavy rain or high winds) and actual conditions experienced during the site development;
- Equipment / infrastructure issues during completion of earthworks;
- Incidents related to the unintended discharge of stormwater from the areas highlighted in Figure 1, including remedial works undertaken to rectify the cause(s) of the discharge(s);
- Complaints received relating to the site development;
- A register of communications, including meteorological and visual monitoring, incidents and complaints, delivered to ORC and QLDC;
- Dates and times when contractors, subcontractors, or staff representing the Territorial Authorities visited the work areas, to support contact tracing related to potential exposure to pathogens; and
- The reference number of the current version of this CSMP.

4.1.2 Meteorological Forecasting

Wind

Excavation and stockpiling work must involve review of meteorological forecasts, specifically related to predicted wind speeds. Work should be planned to occur on days with low wind speeds, to minimise the potential for dust to be released from the excavation and stockpiling areas.

Rainfall

Meteorological forecasts should be monitored regularly to assess the potential for extreme rainfall events. If excessive rainfall is expected to occur, appropriate barriers should be installed to manage stormwater by preventing concentrated flows from being generated.

4.1.3 Leaks or Spill Incidents

Staff responsible for operating and maintaining earthworks equipment shall monitor their plant visually to confirm that no leakage of contaminants is occurring from the equipment, as well as taking care to avoid spills during refuelling machinery.

4.1.4 Complaints

If complaints relating the earthworks are received, the landowner or landowner's representative will:

- Determine whether the complaint is related to the works, or other activities that have the potential to generate complaints;
- Inspect the area in relation to the details of the complaint received;
- Consult with the relevant Territorial Authority to determine the appropriate corrective course of action.

4.1.5 Communications with ORC and QLDC

Details of unexpected events, such as leaks or spills shall be communicated to the Territorial Authorities as soon as is reasonably practicable after the event has occurred.

4.1.6 Contact Tracing

Prior to allowing staff, subcontractors and / or representatives of the Territorial Authorities to access the site, contact details must be recorded in a database that supports contact tracing efforts.

4.1.7 Revisions to the CSMP

The CSMP shall be reviewed under the following conditions:

- If the earthworks methodology changes;
- If new health hazards are identified in the work areas;
- If new activities are proposed to be undertaken that involve disturbance of potentially contaminated soil at the site.

An updated version of the CSMP will be issued to the landowner, QLDC and ORC whenever major revisions are made.

5 Overview of Management Measures

As described in Section 3.3, earthworks and the associated potential exposures to hazards will be managed by a combination of measures. These measures are not intended to cover all risks present at the site, but rather those related directly to human health impacts resulting from contact with chemicals / contaminants associated with the areas identified in Figure 1.

The management measures are summarised as follows:

Dust Suppression

- The potential for dust generation should be minimised in order to avoid exposure to the contaminants of concern, as well as naturally occurring heavy metals in the soil;
- Workers should actively position themselves and equipment to be located upwind during soil disturbance activities. The site layout should be reassessed and adjusted as necessary if the wind direction changes during completion of the works;
- A suitable amount of water should be applied to soil stockpiles and excavation areas, so that dust is suppressed without causing excessive stormwater run-off.

Uncontrolled Discharges

- Incidental spillage of chemicals will be contained as soon as possible. Collection of spilled chemicals may be undertaken by a variety of means including, but not limited to use of sorbent booms and pads or vacuum recovery trucks / extraction units.
- All materials that have come into contact with stormwater within the areas highlighted in Figure 1 will be treated as being contaminated. Stockpiling or disturbing these materials will be reserved for extenuating circumstances. If materials are excavated, they must be placed into an appropriate container (dump truck, skip bin, drums, etc.) and covered with a waterproof material until an appropriate destination for the impacted material is confirmed. For off-site disposal of contaminated spoil, relevant consent(s) must first be obtained from the appropriate territorial authorities before transport, in covered trucks, to appropriately licensed facilities.

6 Contingency Measures

6.1 Roles and Responsibilities

As described in Section 1, the landowner shall be responsible for ensuring the implementation of all aspects of the CSMP, except where otherwise noted. Of particular note, the Contractor shall be authorised to enact contingency and emergency measures without delay.

6.2 Emergency Response Procedures

Should an incident occur on site which may result in uncontrolled discharges of contaminants from the areas highlighted in Figure 1, the nearest trained staff member must take control of the situation and coordinate the efforts of all on site to minimise the impact. If an incident occurs, during and as a result of work undertaken by a subcontractor, the subcontractor must take control of the situation and coordinate the efforts of their staff to minimise the impact.

6.3 Unexpected Contamination

Unexpected contamination impacts could be discovered during completion of earthworks on other parts of the site, e.g. soil showing signs of hydrocarbon impacts, such as an oily sheen or odours / vapours, could be encountered. Workers should stop immediately and the site foreman should be informed. A suitably qualified environmental practitioner should then be engaged to assess the contamination impacts and associated health risks prior to recommencing work in the area.

6.4 Personnel Exposure

People who have ingested contaminated soil must be taken to the nearest healthcare facility immediately.

If any open wounds have come into contact with stormwater generated in the areas highlighted in Figure 1, the wound shall be rinsed thoroughly on site.

6.5 Deviations from the CSMP

Any deviations to this CSMP must be approved by QLDC and the SQEP.

7 General Health and Safety Measures

7.1 General Health and Safety

All works will be conducted in accordance with the contractors health and safety procedures. A site specific Safety, Health and Environment (SHE) plan will be prepared and implemented prior to the commencement of any works on-site. The plan shall identify the hazards and proposed control measures to be implemented for the works. The health and safety plan shall, as a minimum, include:

- Location of exclusion and decontamination zones (if required)
- Hazard identification
- Personal protective equipment
- Appropriate health and safety training for workers, and
- Emergency response and evacuation procedures, including provisions for notifying and managing other site users.

All parties working on the site shall comply with:

- Applicable parts of their Company Health and Safety Policy

- The SHE Plan
- The Health and Safety at Work Act 2015 and Regulations (and subsequent amendments of and additions to both)
- The requirements of the District and Regional Plans, and
- Any other applicable legislation, regulations, codes and guidelines, for example confined space entry requirements.

7.2 Site Security

Appropriate signage will be established adjacent to the areas highlighted in Figure 1 to warn contractors and subcontractors of the hazards associated contaminated soil and dust.

7.3 Protective Equipment

The following additional PPE will be mandatory for all personnel working in the areas highlighted in Figure 1:

- During excavation works, full-length coveralls, gloves and safety glasses with side shields should be worn.
- During excavation work that generates visible dust, half-face respirators fitted with P2 filters should be worn if workers are unable to avoid coming into contact with the dust.
- Any additional PPE requirements shall be documented in the SHE Plan.

The above PPE should be utilised in addition to PPE required to meet legislative requirements for undertaking the relevant activity under normal environmental conditions, i.e. non-contaminated sites.

8 Limitations

- i. Conditions should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.
- ii. This Limitation should be read in conjunction with the IPENZ/ACENZ Standard Terms of Engagement.
- iii. This LTMMMP is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on 021 556 549 if you require any further information. The author is a Certified Environmental Practitioners (CEnvP) under the Environment Institute of Australia and New Zealand (EIANZ) accreditation system.

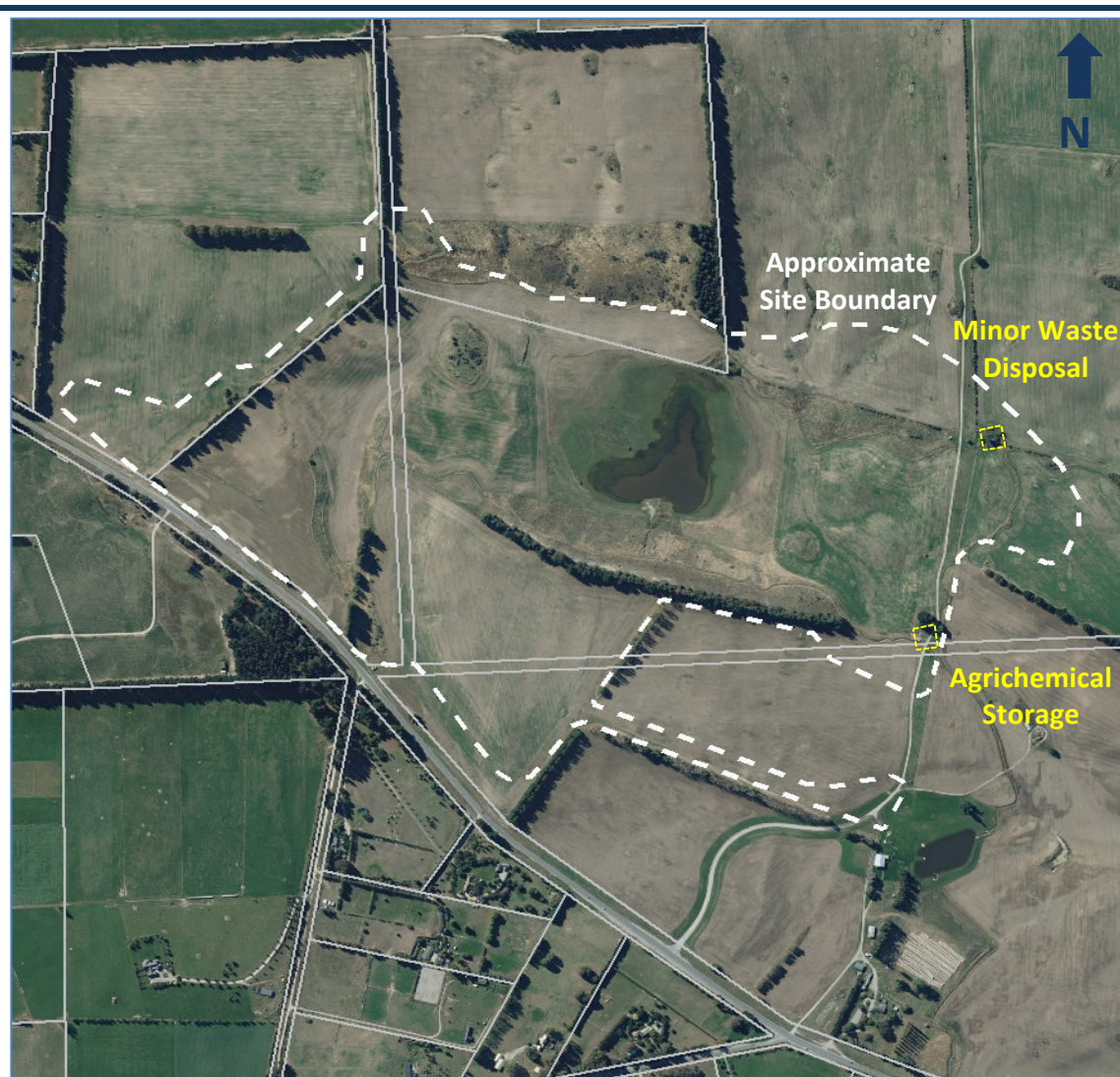
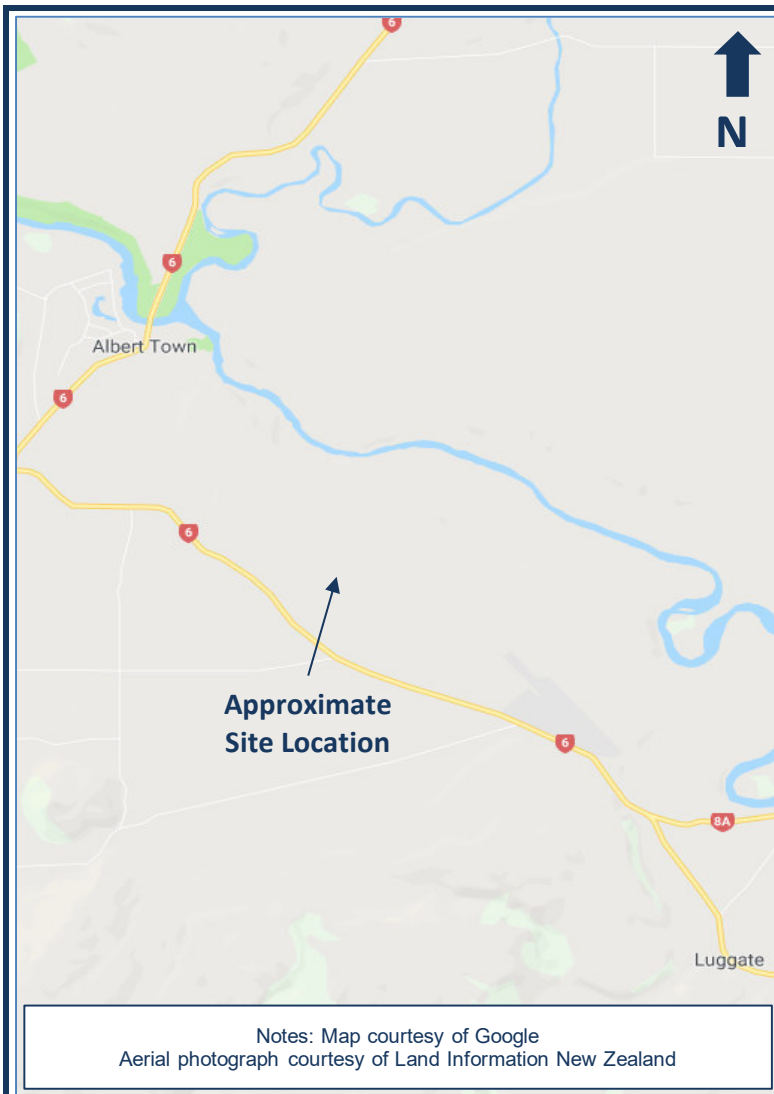
Prepared by

Claude Midgley, CEnvP
Associate Environmental Scientist



APPENDIX 1

Figures



Description	Site Location	Figure Number	1	
Project	Preliminary Site Investigation 707 Wanaka - Luggate Highway, Wanaka	Date	Jul-21	
Client	Silverlight Studios Limited	Drawn by	CM	
Project Number	21027_2	Approved by	JK	

APPENDIX 5

Laboratory Results and Chain of Custody Documentation

Certificate of Analysis

Page 1 of 2

Client:	Insight Engineering	Lab No:	4081706	SPv2
Contact:	Claude Midgley C/- Insight Engineering PO Box 456 Cromwell 9384	Date Received:	23-Jan-2026	
		Date Reported:	30-Jan-2026	
		Quote No:	137281	
		Order No:		
		Client Reference:	25020	
		Submitted By:	Claude Midgley	

Sample Type: Soil

Sample Name:	FRB 1	FRB 2	FRB 3	FRB 4	SW 1
Lab Number:	4081706.1	4081706.2	4081706.3	4081706.4	4081706.5
Heavy Metals, Screen Level					
Total Recoverable Arsenic mg/kg dry wt	10	7	8	8	19
Total Recoverable Cadmium mg/kg dry wt	0.42	0.16	< 0.10	0.12	< 0.10
Total Recoverable Chromium mg/kg dry wt	12	12	11	9	16
Total Recoverable Copper mg/kg dry wt	15	13	15	17	24
Total Recoverable Lead mg/kg dry wt	14.8	12.3	12.8	65	13.2
Total Recoverable Nickel mg/kg dry wt	10	10	11	9	11
Total Recoverable Zinc mg/kg dry wt	10,000	3,700	52	121	76

Sample Name:	SW 2	BS 1
Lab Number:	4081706.6	4081706.7

Individual Tests

Dry Matter g/100g as rcvd	-	74
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Heavy Metals, Screen Level

Total Recoverable Arsenic mg/kg dry wt	8	8
Total Recoverable Cadmium mg/kg dry wt	0.10	0.15
Total Recoverable Chromium mg/kg dry wt	10	10
Total Recoverable Copper mg/kg dry wt	14	26
Total Recoverable Lead mg/kg dry wt	59	22
Total Recoverable Nickel mg/kg dry wt	10	9
Total Recoverable Zinc mg/kg dry wt	80	270

Polycyclic Aromatic Hydrocarbons Screening in Soil*

Total of Reported PAHs in Soil mg/kg dry wt	-	3.8
1-Methylnaphthalene mg/kg dry wt	-	< 0.014
2-Methylnaphthalene mg/kg dry wt	-	< 0.014
Acenaphthylene mg/kg dry wt	-	< 0.014
Acenaphthene mg/kg dry wt	-	< 0.014
Anthracene mg/kg dry wt	-	0.038
Benzo[a]anthracene mg/kg dry wt	-	0.31
Benzo[a]pyrene (BAP) mg/kg dry wt	-	0.36
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	-	0.58
Benzo[a]pyrene Toxic Equivalence (TEF)*	-	0.57
Benzo[b]fluoranthene + Benzo[j] fluoranthene mg/kg dry wt	-	0.56
Benzo[e]pyrene mg/kg dry wt	-	0.30
Benzo[g,h,i]perylene mg/kg dry wt	-	0.36
Benzo[k]fluoranthene mg/kg dry wt	-	0.198
Chrysene mg/kg dry wt	-	0.31
Dibenzo[a,h]anthracene mg/kg dry wt	-	0.068



This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised. The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Soil			
Sample Name:		SW 2	BS 1
Lab Number:		4081706.6	4081706.7
Polycyclic Aromatic Hydrocarbons Screening in Soil*			
Fluoranthene	mg/kg dry wt	-	0.39
Fluorene	mg/kg dry wt	-	< 0.014
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	0.35
Naphthalene	mg/kg dry wt	-	< 0.07
Perylene	mg/kg dry wt	-	0.113
Phenanthrene	mg/kg dry wt	-	0.086
Pyrene	mg/kg dry wt	-	0.36

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-7
Total of Reported PAHs in Soil	Sonication extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	7
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required. US EPA 200.2 (modified), APHA 3125 B: Online Edition.	0.10 - 4 mg/kg dry wt	1-7
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	7
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	7
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.024 mg/kg dry wt	7
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.024 mg/kg dry wt	7

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 23-Jan-2026 and 30-Jan-2026. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.



Kim Harrison MSc
Client Services Manager - Environmental

ENVIRONMENTAL Analysis Request Form

CLIENT

Name **Insight Engineering** [229068]
PO Box 456
Cromwell 9342

Phone: 021 556 549 Fax:

Client Reference: 25020 (Project Code)

Quote Number: 137281 Order No: (Cost Centre)

RESULTS TO

☐ Fax Results
☒ Email Results

☐ Mail Client

☐ Mail Submitter

claude@insighteng.co.nz

Additional Information

Hill Laborato

R J Hill Laboratories Limited — accredited
 Accreditation NZ

1 Clyde Street,
 Private Bag 3205,

Telephone:
 Facsimile:

Job No: Date Recv: 23-Jan-26 13:41

408 1706

Received by: Nathaniel Sue



3140817061

Hill Laboratories office use only:

Date In

Job #

No. of Samples

Submitted By **Claude Midgley** [228982]

Charge To: **Insight Engineering** [229068]

☒ C.O.C & coversheet to be scanned and emailed back

Chain of Custody Record

Delivered to **Hill Laboratories** (Depatched by) Date & Time: **21/01/2026 15:00**
 Name: **Claude Midgley**
 Signature: *[Signature]*

Received at **Hill Laboratories** Date & Time:
 Name:
 Signature:

Condition ☐ Ambient Temp ☐ Chilled **22.8°C**

PRIORITY

☐ Normal (up to 10 days)
 Results required by:

☒ High (approx 5 days)

☐ Urgent (MUST be pre-arranged)

Sample types

GW Bore/well **TW** Trade waste **S** Saline water **ES** Soil/Solid **PI** Plant
SW Surface water **E** Effluent **O** Oil **Sed** Sediment **BM** Fish/shellfish/Biota
P Potable/DI **L** Leachate **SI** Sludge **BS** Biosolid **M** Misc (Specify)

Site ID	Sample type	Tests required	Comments
FRB 1	ES	MSHMS	
FRB 2	"	"	
FRB 3	"	"	
FRB 4	"	"	
SW 1	"	"	
SW 2	"	"	
BS 1	"	" + PAHSc	