

APPENDIX J

Davis Consulting Group: Preliminary Site Investigation (PSI) Report
and Addendum

Proposed Rezoning of Lakeview Queenstown Preliminary Site Investigation

For

Queenstown Lakes District Council

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Proposed Rezoning of Lakeview, Queenstown
Preliminary Site Investigation

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EXECUTIVE SUMMARY

The Queenstown Lakes District Council proposes to rezone part of the Queenstown Town Centre to create the Lakeview Subzone. Rezoning the Lakeview site requires the QLDC to undertake a range of investigations to ensure the site is appropriate for the proposed change in landuse. One of the investigations required by the QLDC is an assessment of potential activities that have occurred on the site that may have impacted soil quality.

In order to understand the condition of the soils on the Lakeview site preliminary site investigation (PSI) was undertaken by Davis Consulting Group Limited (DCG). The PSI involved a detailed review of the historical activities that have occurred across the council owned section of the to be Lakeview Sub Zone and identification of any hazardous activities that may have occurred to assess the risks to human health and the environment that may be associated with landuse change.

The scope of work completed for the PSI included:

- Review of the site history including records held by the Queenstown Lakes District Council, Otago Regional Council and the Lakes Museum;
- Review of historical aerial photographs, certificate of titles, and the Heritage Impact Assessment undertaken for the site (New Zealand Heritage Properties Ltd, 2014);
- Liaison with personnel familiar with the historical and current use of the Lakeview site;
- Identification of hazardous activities and substances that may have been associated with the historical landuse and consideration of the likely impacts to soil quality; and
- Consideration of the risk to human health based on the proposed land use change of the site.

Based on the findings of the PSI, DCG concludes the following:

- The Queenstown Lakes District Council is seeking to change the district plan to rezone the Lakeview site in Queenstown. The new zone is proposed to form part of the Queenstown Town Centre Zone, and will be called the 'Lakeview Sub zone';
- The site is subject to the provisions of the NES due to the presence of the holiday park workshop, bulk storage of diesel, possible power transformers, historical use of the site as a cricket field and the maintenance of holiday park camping areas;

- The proposed landuse of the Lakeview site is consistent with three landuse scenarios set in the NES including high-density residential, parks/recreational and commercial/industrial landuse;
- It is highly unlikely heavy metal and persistent pesticides have accumulated in the site's soils that exceed the NES soil contaminant standards for high density residential, parks/recreational and commercial industrial landuse;
- Hydrocarbon contamination of soils may be present but will most likely be localised and associated with small drips and spills from refuelling activities;
- The servicing of older transformers on the site may have resulted in small releases to ground, however the impact is expected to be very localised and unlikely to be a risk to human health based on the proposed high density residential and commercial/industrial landuse;
- Houses and holiday park buildings constructed prior to the 1980s may contain asbestos materials.
- DCG understands that consideration of risks to human health associated with demolition and construction would be necessary prior to building consent application to ensure the provisions of the Building Code are met (first schedule of the *Building Regulations, 1992*), as well as the relevant provisions of the Health and Safety in Employment Act 1992.
- Some consideration of contaminant concentrations should be undertaken if offsite disposal of soil is required to ensure the soils are disposed of appropriately.

1.0 INTRODUCTION

1.1 Purpose

The Queenstown Lakes District Council (QLDC) is currently preparing a plan change to rezone the Lakeview site in Queenstown. The new zone is proposed to form part of the Queenstown Town Centre Zone, and will be called the 'Lakeview Sub Zone'.

As part of the plan change process the applicant proposes to undertake a number of investigations to determine the suitability of the subject land for its proposed landuse under the plan change. One of these investigations includes a review of the soil quality across the site to determine if historical activities have impacted the soil condition such that it may present a risk to human health or the environment. In order to understand the condition of the sites soils the QLDC commissioned Davis Consulting Group Limited (DCG) to undertake a Preliminary Site Investigation (PSI) designed to review the historical activities across the council owned section of the to be Lakeview Sub Zone, identify any hazardous activities that may have occurred and assess the risks to human health and the environment that may be associated with landuse change resulting from the rezoning of the subject land. DCG's experience in the provision of contaminated land services is provided in Appendix A.

1.2 Scope of Work

The following scope of work completed for the PSI:

- Review of the site history including records held by the Queenstown Lakes District Council, Otago Regional Council and the Lakes Museum;
- Review of historical aerial photographs, certificate of titles, and the Heritage Impact Assessment undertaken for the site (New Zealand Heritage Properties Ltd, 2014);
- Liaison with personnel familiar with the historical and current use of the Lakeview site;
- Identification of hazardous activities and substances that may have been associated with the historical landuse and consideration of the likely impacts to soil quality;
- Consideration of the risk to human health based on the proposed land use change of the site;
- Preparation of a PSI report in accordance with the requirements of the Contaminated Land Management Guidelines (CLMG) No. 1.

1.3 Limitations

The findings of this report are based on the Scope of Work outlined above. DCG performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental science profession. No warranties, express or implied, are made. Subject to the Scope of Work, DCG's assessment is limited strictly to identifying the risk to human health based on the historical activities on the site. The confidence in the findings is limited by the Scope of Work.

The results of this assessment are based upon site inspections conducted by DCG personnel, information from interviews with people who have knowledge of site conditions and information provided in previous reports. All conclusions and recommendations regarding the properties are the professional opinions of DCG personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, DCG assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside DCG, or developments resulting from situations outside the scope of this project.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site under investigation is located to west of Queenstown's Central Business District and lies to the north of Man and Brunswick Streets (Figure 1). The legal descriptions of the parcels of land within the Lakeview Sub-Zone are listed below:

Council Owned Properties

- Section 1 Blk LVI TN of Queenstown
- Pt Block LV1 TN of Queenstown
- Section 1 SO 12299
- Pt Block XXXII TN of Queenstown
- Lot 1 DP 7498
- Lot 1-3 DP 354070
- Sections 1-4 SO 24298
- Pt Section 15 Blk XXIX TN of Queenstown
- Section 6-14 Blk XXIX TN of Queenstown

Privately Owned Properties

- Lot 1-6 DP 8860
- Lot 1-2 DP 17797
- Lot 1-4 DP 9388

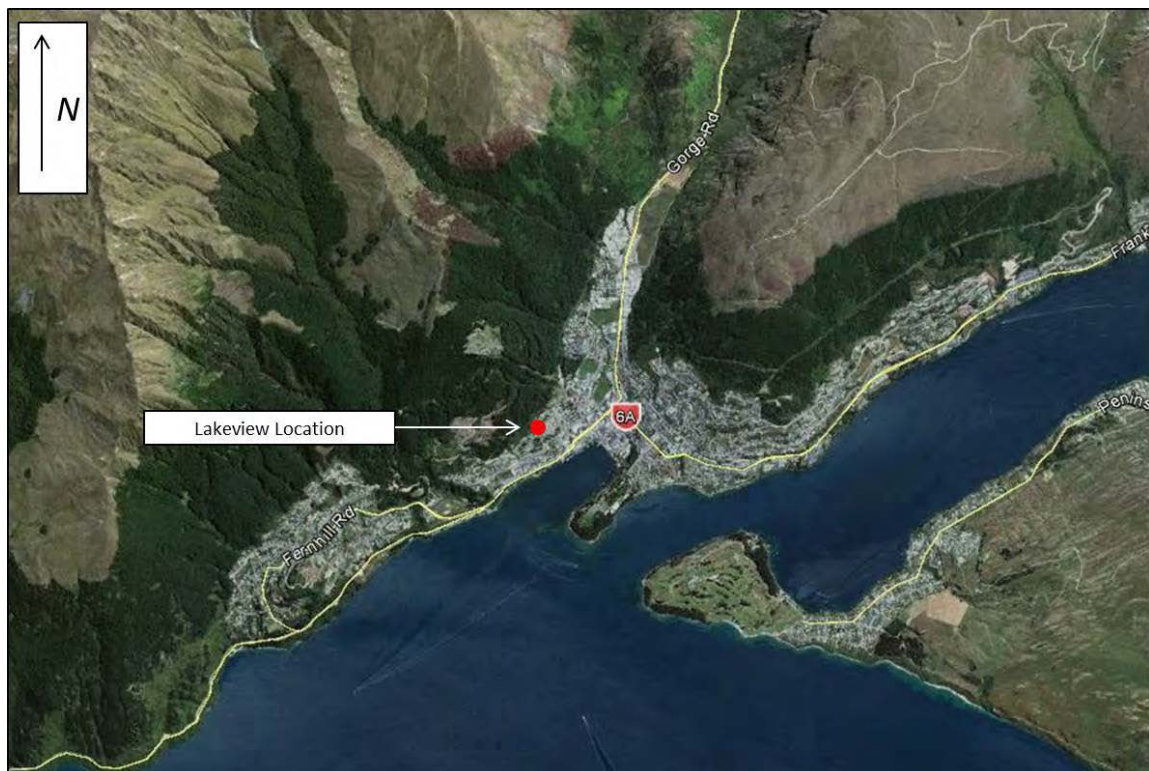


Figure 1: Site Location Plan

Site investigation took place within the Lynch, Freehold, Reserve and Holiday Park Blocks of the Lakeview Sub-Zone. These four sub-blocks are shown in Figure 2, shaded light blue. The section of privately owned land in the south-west corner of the Lakeview Sub-Zone was excluded from investigation. This is shaded blue in Figure 2.



Figure 2: Proposed Lakeview Sub-Zone. Council owned sub-blocks and privately owned land.

The following section provides a detailed historical account of the landuse within each of the council owned sub-blocks of the proposed Lakeview Sub-Zone.

2.2 Site History

2.2.1 Chronological List of Site Ownership and Uses

Figure 3 presents a plan of Queenstown in 1875-76 from the Wises Directory of New Zealand. At this time the landuse of the Lakeview site included the following:

- Cemetery Reserve which covered the whole of the Holiday Park block
- Recreation Reserve and Cricket Ground which covered the whole of the Reserve Block
- Trout breeding, agricultural lease and Lake View gardens on the Freehold Block; and
- Residential landuse on the Lynch Block.

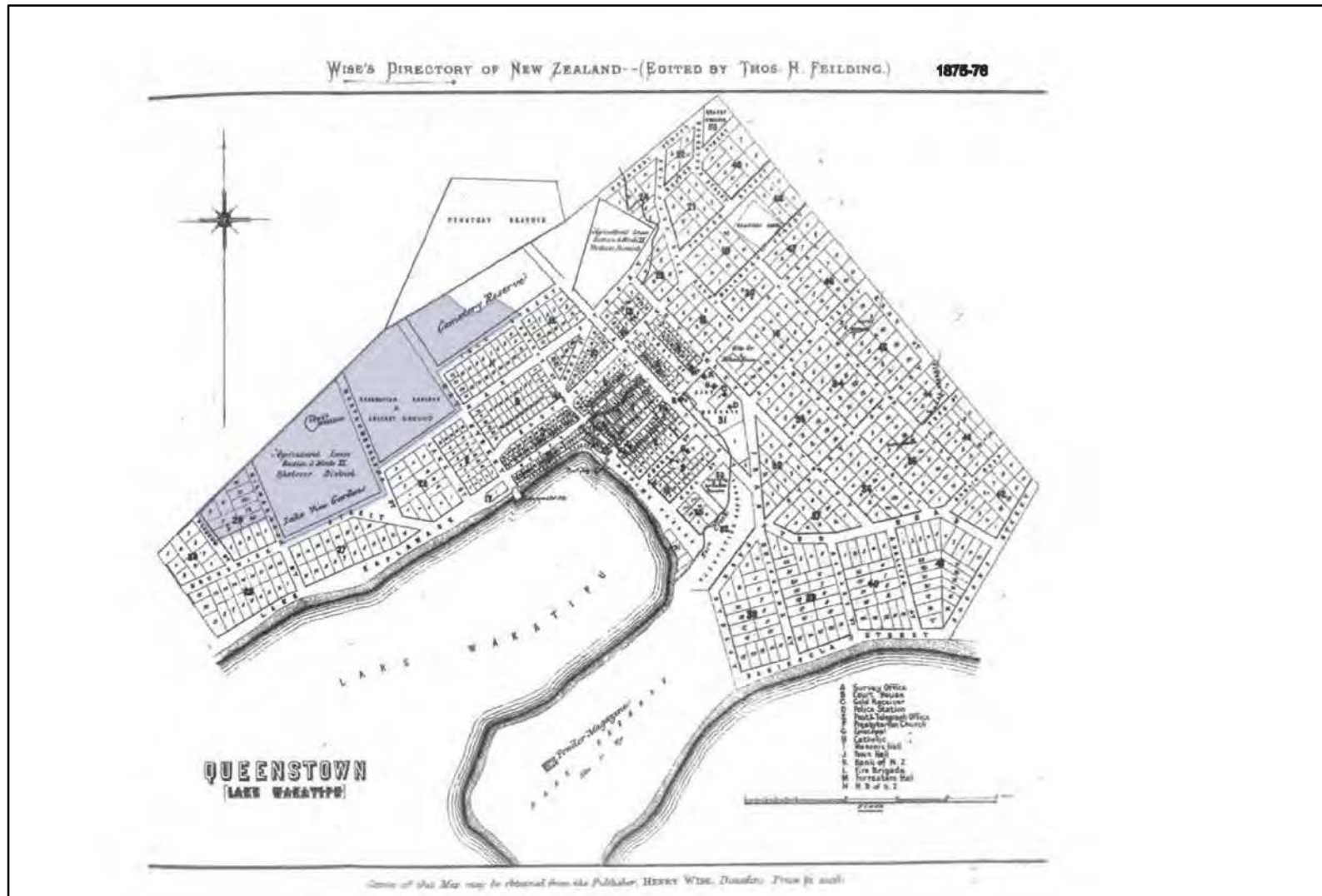


Figure 3: 1875 Plan of Queenstown showing the study area (Council owned property shaded blue)

Holiday Park Block

The north eastern corner of Lakeview (Holiday Park Block) was gazetted as a cemetery reserve in the 1870's. Aerial photography from 1956 to 1993 indicates the cemetery has always been situated on land to the north east of Cemetery Road which separates the cemetery from the Holiday Park Block.

From as early as 1950 the Holiday Park Block was used as overflow camping for the main camp ground area to the west (David Clarke, pers. comm. 2014). Plans submitted to the council in 1959 proposed a campground, cribs, ablution block, buildings for staff residence and power transmission lines within the site (QLDC E Docs, 2014) (Appendix B). These facilities were established by 1970 as observed in the 1970 aerial photograph (Figure 4). By 2000, the original buildings were demolished and the Holiday Park Block was redeveloped into the park that is present today.



Figure 4: 1970 Aerial Photograph

The existing holiday park is shown in the 2013 aerial photograph (see Figure 5). Current facilities include a public waste water dump station, ablution block, motel units and holiday park reception (Plate 1). A plan of the holiday park is included in Appendix B. Waste water from the ablutions and waste water dump stations is reticulated to the main town waste water system, as

shown in the QLDC sewer plan in Appendix C (QLDC web site, 2014). It is understood that sewage waste water has been reticulated from ablutions for as long as it has been possible to be connected to the mains sewage lines (Andrea Jarvis, pers. Comm. 2014).

A public waste water dump station and allied petroleum diesel tank and fuel pump bowser are located to the north of the project boundary on Cemetery Road (Plate 2). There is no evidence of onsite septic or effluent disposal fields on the site. Power is distributed by underground electrical utilities and a transformer is located to the west of the carpark area.



Plate 1: Holiday park facilities



Plate 2: Public waste water dump station and diesel tank and fuel pump on cemetery road



Figure 5: 2013 Aerial Photograph

Reserve Block

The centre, east area of the project site (Reserve Block) was gazetted as a recreation reserve and cricket ground in the 1870's. Photography from 1900 shows maintained grassed area fencing and tree lines. Throughout the 1930's to 1950's, eyewitness accounts describe this area being used for sports recreation (Hamilton, 2012). An aerial photograph from 1956 shows a cricket pitch and grounds as the main landuse of the Reserve Block while a row of small units are present along the northern boundary of this block.

Plans submitted to the council in 1959 propose a camp ground, cribs, ablution block and power transmission lines within the site (QLDC E Docs, 2014) (Appendix B). These proposed facilities were established by 1970 as observed aerial photography (Figure 4) showing maintained lawn areas for camping, cribs and associated facilities. Between 1999 and 2004, the ablution blocks in the south western corner of reserve block were removed and replaced by present day ablutions located in the south eastern corner, as seen in historical park plans (Appendix B) and aerial photographs.

The present day holiday park is shown in the 2013 aerial photograph (see Figure 4). Current facilities on the Reserve Block include a waste water dump station, power lines, ablution block

and cribs (Plate 3). Waste water from the ablutions and waste water dump stations is reticulated to the main town waste water system, as shown in the QLDC sewage plan included in Appendix B. Waste water from the demolished ablution blocks was reticulated to the main town waste water system, as shown in the QLDC sewers plan in Appendix B. There is no evidence of onsite septs or effluent disposal fields on the Reserve Block. Powerlines and associated electrical transformers are shown in electrical plans are included Appendix B.



Plate 3: Operational Facilities on Reserve Block. Waste water dump station, ablution block and campervan parking

Freehold Block

The land parcel that forms the proposed Freehold Block was gazetted as an agricultural lease in the 1870's. The agricultural lease included the Lake View Gardens to the south and a trout breeding area in the north. This area was then used as a camp ground and recreation reserve from the early 1950's (Speedy, pers. com, 2014) with maintained lawn areas for camping, cribs and associated facilities.

Plans submitted to the council in 1959 propose a camp ground, cribs, ablution block, power transmission lines park administration, stores and garage within the site (QLDC E Docs, 2014) (Appendix B). These proposed facilities were established by 1970 as observed in aerial photography (Figure 4) showing maintained lawn areas for camping, cribs, buildings and associated facilities. The camp ground and most of the facilities within the Freehold Block were closed around the year 2000 and remain in place today. A plan dated 2005 shows buildings described as motel units and tourist flats (Appendix B).

Closed holiday park facilities remaining on site include two waste water dump stations, ablution block, motel units, power lines, original holiday park reception and caretaker residence (Plate 4). Many of these buildings were constructed prior to 1980 and consequently may contain asbestos in building materials and/or insulation. These buildings appeared to be in good structural condition.

It is understood that sewage wastewater has been reticulated from ablutions for as long as it has been possible to be connected to the mains sewage lines (Andrea Jarvis, pers. Comm. 2014). Plans showing sewage reticulation to the closed facilities are included in Appendix B. Powerlines and associated electrical transformers are shown in electrical plans included Appendix B.

The original holiday park workshop is still in use (Plate 5), located adjacent to the original park reception on the eastern boarder of Freehold Block. The workshop building has a partially sealed cement floor that drains south to an area of earth that appears to be free draining. Minor volumes of chemicals are stored in the workshop including a 210L drum of fuel and small 20L drums of oil and cleaning products.

Existing buildings and facilities are shown in the 2013 aerial photograph (see Figure 5).



Plate 4: Closed holiday park facilities within Freehold Block. Ablutions block, waste water dump station, power lines, park administration and store (left to right).



Plate 5: Freehold Block motor vehicle workshop (active)

Lynch Block

The western extent of the project area between Glasgow Street, Kilmarnock and Mountaineer Streets (Lynch Block) was gazetted into small residential sections in the 1870's (See Figure 3). The Heritage Impact Assessment undertaken for the site suggests the sections may have had activities on site associated with an arborist company and a sawmilling and logging company (New Zealand Heritage Properties Ltd, 2014). Throughout the 1930's to 1950's, eyewitness accounts describe this area as residential housing (Hamilton, 2012). There is currently over 30 occupied residential buildings within this area.

All of these buildings were constructed prior to 1980 and consequently may contain asbestos in building materials and/or insulation. These buildings appeared to be in good structural condition (Plate 6). Waste water from the cribs is reticulated to the main town waste water system, as shown in the QLDC sewers plan in Appendix B. It is believed that sewage waste water has been reticulated from ablutions for as long as it has been possible to be connected to the mains sewage lines (Andrea Jarvis, pers. Comm. 2014). Powerlines are shown in electrical plans included Appendix B.



Plate 6: Cribs within Lynch Block

2.3 Contaminants Commonly Associated with the Landuse

As described in the previous sections, the landuse of the Holiday Park, Reserve and Freehold Blocks have been used as a holiday park and for recreational purposes and it is likely that these areas have been the subject of persistent pesticide and fertiliser application for the maintenance of grounds, in particular for lawn surfaces. The Ministry for the Environment Hazardous Activities and Industries List (HAIL) lists sports pitches as an activity which may cause contamination and lists a range of hazardous substances that may be associated this activity including arsenic, lead, copper, mercury, and organic compounds including organophosphates such as endosulfan and organochlorine's such as DDT.

On the north east corner of the Lakeview Site, along Cemetery Road there is a diesel tank and fuel pump bowser. The HAIL lists the bulk storage of fuel as a hazardous activity with the potential to cause ground contamination. The diesel tank was in good structural condition however it does not appear to be bunded. The associated fuelling pump/bowser was also not bunded and spilt diesel has stained the ground over 4 square meters of roadway beside the fuelling area (Plate 2).

A motor vehicle workshop adjoins the previous park reception and residence. Based on the HAIL, the hazardous substances that may be associated with the motor vehicle workshop include polycyclic aromatic hydrocarbons (PAHs), solvents, and metals contained in waste oil.

2.4 Additional Site Information

The following list provides a summary of information that the CLMG No. 1 (MfE, 2003a) indicates should be included in a PSI report:

- Presence of drums, wastes and fill materials – Site history suggests all waste has historically been removed off site to local landfill facilities. No fill materials or drums were observed during the site visit.
- Odours – No odours were noted during site visit.
- Flood Risk – the site is not subject to flood risk (QLDC webmaps).
- Surface Water Quality – There was no surface water observed on site.
- Site boundary condition – Some portions of the site are fenced.
- Visible Signs of Contamination – The only visible sign of contamination observed was at the diesel tank and fuel pump bowser, located to the north of the project boundary on Cemetery Road (plate 1).
- Local Sensitive Environments – no sensitive environments were observed in the project area.

2.5 Site Condition and Surrounding Environment

The site is bound by several roads, with land to the west, south and east containing residential and retail commercial properties, the cemetery and mini golf area are located to the north-east and bordering the north is a recreation reserve.

Buildings and roadways observed within the project site were in good structural condition.

On the north east boundary of the Lakeview Site, along Cemetery Road, there is diesel tank and fuel pump bowser owned by Allied Petroleum. The tank was in good structural condition, but does not have a bund, and therefore could not have contained any spillage that may have occurred. The fuelling area was not banded to contain spillage during fuelling and consequently, diesel was observed in a layer over 4 square meters of roadway beside the fuelling area (Plate 2).

2.6 Geology and Hydrogeology

The Lakeview Site is characterised by a flat terrace of low relief, adjoining steep slopes along the northern boundary of the site, which extend upwards toward Bob's Peak. The Preliminary Geotechnical Assessment (Hadley Consultants, 2014) describes alluvial deposits and glacial till over schist bedrock. The depth of alluvial deposits and till are described as shallow and varying across the site with some surface outcrops of schist and metamorphic schist bedrock. An area of rock fall and/or colluvium debris is noted in the north-east boundary of the Lakeview Site around the toe of steep northern slopes (Hadley Consultants, 2014).

Hydrogeology and Hydrology

The historic maximum lake level corresponds with the northern boundary of the site, therefore beach deposits would be present in and around the site (Hadley Consultants, 2014).

The 2014 geotechnical assessment describes minor ephemeral streams from steep, adjacent slopes (Hadley Consultants, 2014).

The site investigation did not include a groundwater assessment and the site is not located within an aquifer zone according to the ORC Regional Water Plan.

The Hadley report notes that minor groundwater is expected to be present beneath the site in some areas, and observed some minor groundwater seepage in the toe of steep, north slopes in several areas.

3.0 CONCEPTUAL SITE MODEL

3.1 Sources of Potential Contamination

Based on our review of the current and historical activities that have occurred on the Lakeview site the potential contaminants that may be present include:

- Contaminants in persistent pesticides such as DDT and heavy metals may have accumulated in the surface soils as these materials may have been applied for the control of grass grub on the cricket pitch and the grassed areas through the holiday park;
- Hydrocarbons associated with the bulk storage of fuel on Cemetery Road and smaller quantities of fuel at the holiday park workshop;
- Polychlorinated biphenyls (PCBs) associated with the maintenance of transformers located through the site; and
- Asbestos in the building materials and insulation associated with buildings that were built prior to the early 1980's.

3.2 Risks to Human Health

The risk to human health from exposure to contaminants depends on the contaminant toxicity, concentration and the length of time and type of the exposure. To account for the range of exposure scenarios the NES soil contaminant standards have been derived for five standard landuse scenarios. These landuse scenarios are presented in Table 1 below. Based on the proposed Lakeview plan change, DCG understands the landuse of the site will be consistent with high-density residential landuse, parks and recreation, and the commercial/industrial landuse scenarios. These scenarios have greater soil contaminant standards compared to the residential or rural residential landuse scenario. The contaminants listed above are discussed below in the context of the proposed landuse.

Table 1: NES Landuse Scenarios

Scenario	Description
Rural / lifestyle block	Rural residential land use, including home-grown produce consumption (25 per cent). Applicable to the residential vicinity of farm houses for protection of farming families, but not the productive parts of agricultural land. Note: Consumption of eggs, milk and meat from animals raised on site is excluded. Produce consumption is limited to home-grown vegetables. Sites for which consumption of home-grown eggs, milk or meat is important will need to be evaluated on a site-specific basis.
Residential	Standard residential lot, for single dwelling sites with gardens, including home-grown produce consumption (10 per cent).
High-density residential	Urban residential with limited soil contact, including small ornamental gardens but no vegetable garden (no home-grown produce consumption); applicable to urban townhouses, flats and ground-floor apartments with small ornamental gardens, but not high-rise apartments.
Parks / recreational	Public and private green areas and reserves used for active sports and recreation. This scenario is intended to cover playing fields and suburban reserves where children play frequently. It can also reasonably cover secondary school playing fields but not primary school playing fields.
Commercial / industrial outdoor worker (unpaved)	Commercial / industrial site with varying degrees of exposed soil. Exposure of outdoor workers to near-surface soil during routine maintenance and gardening activities with occasional excavation as part of maintaining subsurface utilities (ie, a caretaker or site maintenance personnel). Also conservatively applicable to outdoor workers on a largely unpaved site.

3.2.1 Persistent Pesticides and Heavy Metals

Based on our experience, we consider it is highly unlikely there are persistent pesticide (DDT and dieldrin and arsenic) contaminant concentrations on the former cricket field or grassed areas of the holiday park that would exceed the NES soil contaminant standards for either the high-density residential, parks/recreation, or commercial/industrial soil contaminant standards.

3.2.2 Hydrocarbons

Hydrocarbon contamination in the vicinity of the bulk fuel storage facility is also highly unlikely to be more than localised contamination associated with small drips and spills. If a significant loss had occurred the district council or regional councils should have been informed. Neither council holds any records associated with any fuel spills on the site.

3.2.3 Polychlorinated Biphenyls (PCBs)

Electrical services were established on the site by 1970. Transformers associated with the electrical services would have been on the Lakeview site and it is highly likely that oils containing PCBs were used in the site transformers. It is possible the servicing of the transformers resulted in oil losses to ground resulting in some impact to soils. Two transformers are located within the project site, at the intersection of Man Street and to the east of the carpark within Holiday Block.

The transformer location at Man Street is likely to have been established by 1970. The transformer located within the Holiday Block, however, was most likely installed during the developments that took place around the year 2000.

While there is some risk of PCB contamination associated with the former transformers DCG considers the area of impacted soils (if present) would be very small in area and highly unlikely to present a risk to human health given the high density residential and commercial landuse that is proposed for Lakeview.

3.2.4 Asbestos

As discussed above, it is possible pipelines, houses and ancillary buildings associated with the holiday park that were constructed before 1984 may contain asbestos. The buildings appear to be in good condition and the current risk to human health is considered to be low however any demolition work that may be associated with redevelopment of the site will require an asbestos survey.

3.3 Other Risks

The risks to human health from contaminated soils are considered low. However there are other risks associated with the development of the site that need to be considered, specifically any offsite disposal that may be required. Section 3.2.1 highlights the possible accumulation of heavy metals and persistent pesticides in the former cricket ground and grassed areas of the holiday park. As discussed, if present the concentrations are highly unlikely to be a risk to human health based on the proposed landuse however the Class B landfill acceptance criteria are often much lower than the NES soil contaminant standards. For example, the Class B landfill acceptance criteria for arsenic is 10 mg/kg compared to the NES soil contaminant standard for high density residential of 45 mg/kg.

At this stage in the project it is unclear what degree of earthworks will be involved in the development of Lakeview, however if offsite disposal of soil is required some analysis of soil contaminant concentrations should be undertaken.

4.0 SUMMARY

Based on the findings of the PSI, the following conclusions are made:

- The Queenstown Lakes District Council is seeking to change the district plan to rezone the Lakeview site in Queenstown. The new zone is proposed to form part of the Queenstown Town Centre Zone, and will be called the 'Lakeview Sub zone';
- The site is subject to the provisions of the NES due to the presence of the holiday park workshop, bulk storage of diesel, electrical transformers, historical use of the site as a cricket field and the maintenance of holiday park camping areas;
- The proposed landuse of the Lakeview site is consistent with three landuse scenarios set in the NES including high-density residential, parks/recreational and commercial/industrial landuse;
- It is highly unlikely heavy metals and persistent pesticides have accumulated in the site's soils in concentrations that exceed the NES soil contaminant standards for high density residential, parks/recreational and commercial industrial landuse;
- Hydrocarbon contamination of soils may be present but will most likely be localised and associated with small drips and spills from refuelling activities;
- The servicing of older transformers on the site may have resulted in small releases to ground, however the impact is expected to be very localised and unlikely to be a risk to human health based on the proposed high density residential and commercial/industrial landuse;
- Pipelines, houses and holiday park buildings constructed prior to the 1980s may contain asbestos materials.
- DCG understands that consideration of risks to human health associated with demolition and construction would be necessary prior to building consent application to ensure the provisions of the Building Code are met (first schedule of the *Building Regulations, 1992*), as well as the relevant provisions of the Health and Safety in Employment Act 1992.
- Some consideration of contaminant concentrations should be undertaken if offsite disposal of soil is required to ensure the soils are disposed of appropriately.

5.0 REFERENCES

Hadley Consultants Ltd. (2014) *Queenstown Lakes District Council - Proposed Queenstown Town Centre: Lakeview Subzone Plan Change, Preliminary Geotechnical Assessment.*

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