

Preliminary Site Investigation
34 Brecon Street, Queenstown

For

Brecon Street Partnership Limited

August 2014



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**34 Brecon Street, Queenstown
Preliminary Site Investigation**

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EXECUTIVE SUMMARY

The Queenstown Lakes District Council (QLDC) is currently preparing a plan change to rezone the Lakeview site in Queenstown. Brecon Street Partnerships Limited (BSP) owns 34 Brecon Street and has requested that this parcel of land is also incorporated into the parcel of land subject to the Lakeview plan change.

Davis Consulting Group Limited (DCG) completed a Preliminary Site Investigation (PSI) for the Lakeview site in July 2014. The findings of this report are documented in the main body of this report. Subsequent to the completion of this work BSP commissioned DCG to complete an additional investigation of 34 Brecon Street so that this property could be included in the Lakeview plan change application. The following report documents the findings of this PSI completed for 34 Brecon Street, Queenstown.

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. Brecon Street Partnership Limited, is investigating including the 34 Brecon Street site within the Lakeview rezoning. The new zone is proposed to form part of the Queenstown Town Centre Zone, and will be called the 'Lakeview Sub zone';
- The Brecon Street site is subject to the provisions of the NES due to historical use of the site as a recreation area and landscaped mini golf course;
- The proposed landuse of the Brecon Street 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;
- The cemetery boundary has remained beyond the northern boundary of the Brecon Street site;
- It is unlikely that contaminants associated with the neighbouring cemetery (nitrates, lead, mercury, formaldehyde and biological hazards) would be present at levels that exceed the NES soil contaminant standards for either the high-density residential, parks/recreation, or commercial/industrial soil contaminant standards because it is highly unlikely that contaminants associated with the neighbouring cemetery have migrated from the neighbouring cemetery onto the Brecon Street site.
- 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. Brecon Street Partnerships Limited (BSP) owns 34 Brecon Street and has requested that this parcel of land is also incorporated into the parcel of land subject to the Lakeview plan change.

Davis Consulting Group Limited (DCG) completed a Preliminary Site Investigation (PSI) for the Lakeview site in July 2014. The findings of this report are documented in the main body of this report. Subsequent to the completion of this work BSP commissioned DCG to complete an additional investigation of 34 Brecon Street so that this property could be included in the Lakeview plan change application. The following report documents the findings of this PSI completed for 34 Brecon Street, Queenstown.

1.2 Scope of Work

The following scope of work was 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, 2014b);
- Liaison with personnel familiar with the historical and current use of the 34 Brecon St 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 at 34 Brecon Street, to the east of the Lakeview Site investigated by DCG in June/July 2014. The site is located to the west of Queenstown's Central Business District, north of Isle St and between Cemetery Road and Brecon Street (Figure 1). The legal description of the land parcel is Lot 1 DP 27703.

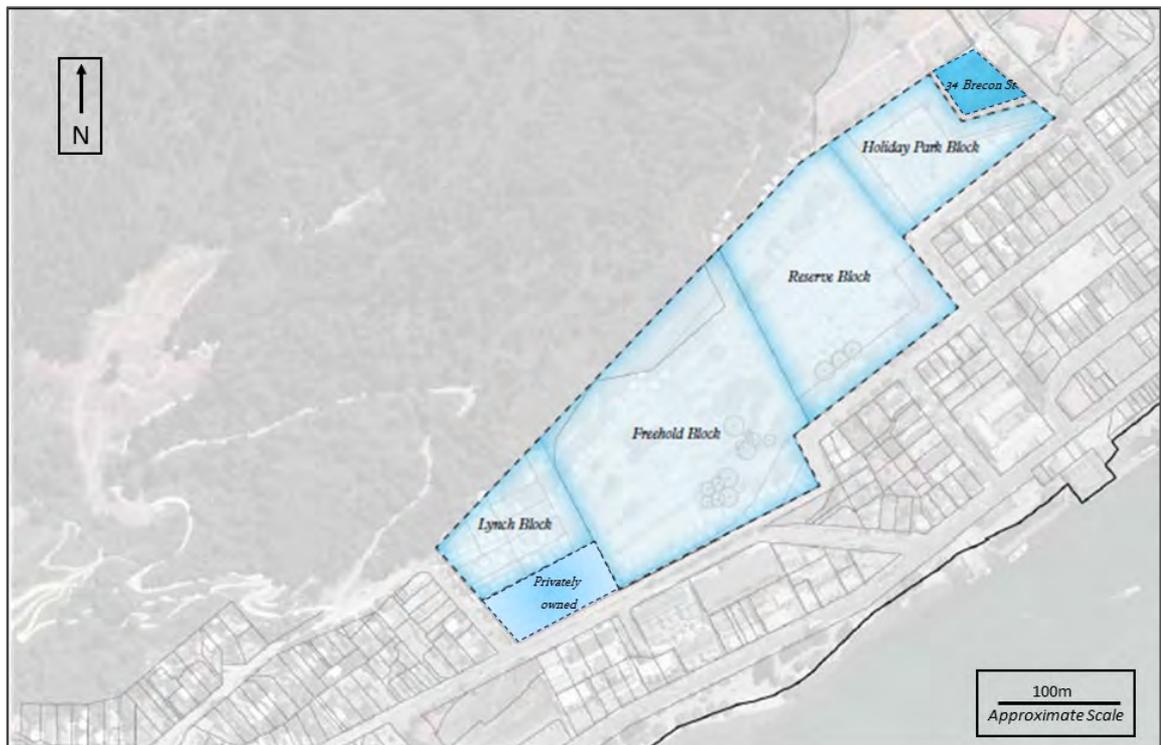


Figure 1: 34 Brecon Street site (dark blue) relative to proposed Lakeview Sub-Zone (light blue).

The following section provides a detailed historical account of the landuse within the Brecon Street site.

2.2 Site History

2.2.1 Chronological List of Site Ownership and Uses

Figure 2 presents a plan of Queenstown in 1875-76 from the Wises Directory of New Zealand.

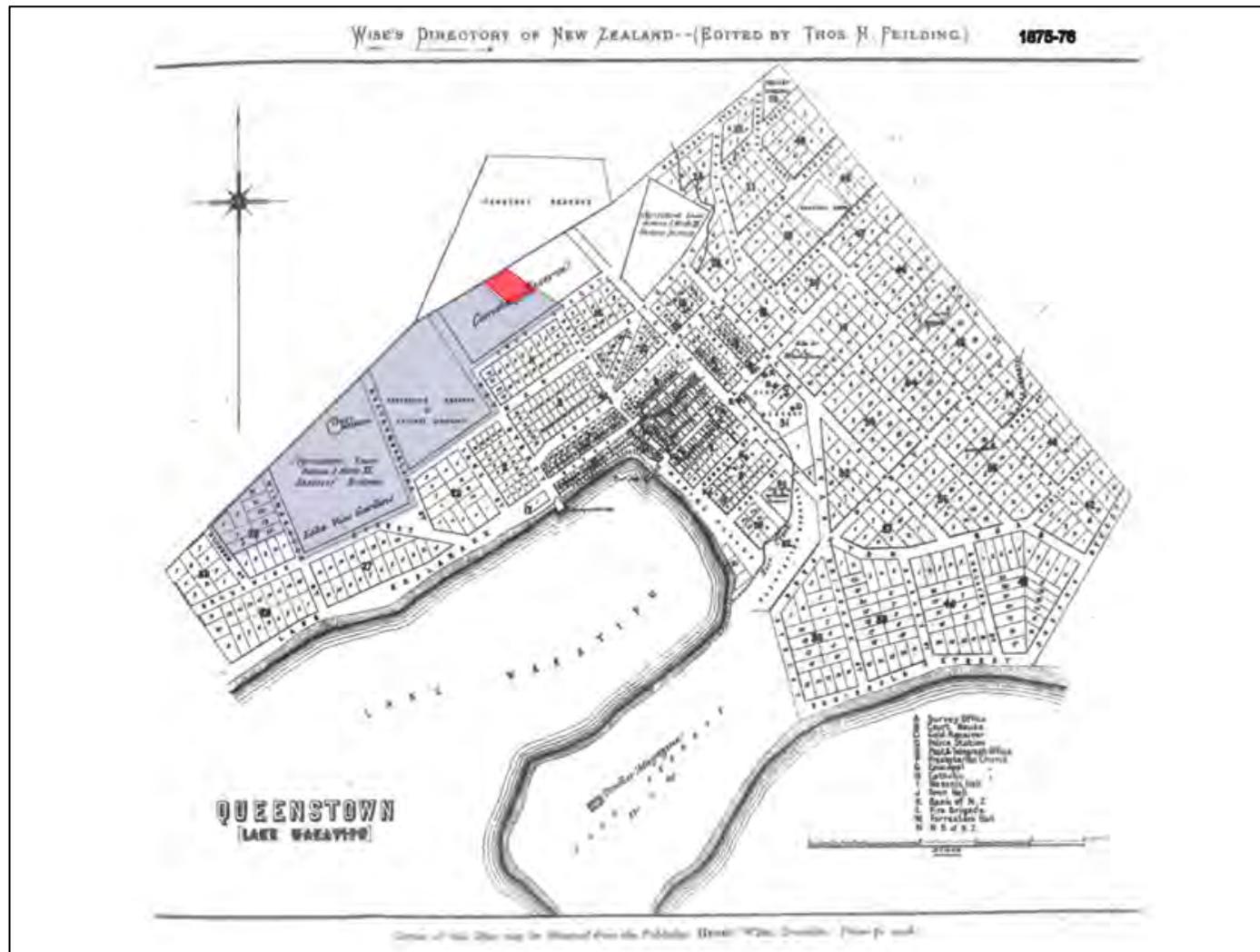


Figure 2: 1875 Plan of Queenstown showing the study area (red) and the council owned land of the proposed Lakeview Sub-Zone (grey)

The Brecon Street site was gazetted as a cemetery reserve in the 1870's (Figure 2), however it is unlikely that this site was utilised for this purpose. Historical photography indicates the cemetery has always been situated on land to the north of the present mini golf car park. The cemetery can be seen in the background of Plate 2, beyond the mini golf carpark.

Photographs from the early 1900's show buildings and fences within the site (Plate 1). Historical accounts suggest that there was no agricultural or industrial activities in the area of the site (A. McGuire pers comm, 2014) (Hamilton, 2012).



Plate 1: Photograph of Queenstown in 1903 showing the 34 Brecon Street site (within red perimeter).

Historically, the land has been gazetted as recreation reserve administered by the District Council. Photos from the 1950's depict tennis courts and in the 1970's the site was converted to a bicycle motocross track. The site was developed into a mini golf course in the early 1990's. This succession of landuses can be seen in Figure 3.



Figure 3: Aerial photographs of the Brecon Street site from 1956 to 1999.

Applications for building and resource consents submitted in 1993 and 1995 are supported by plans describing the kiosk building and the mini golf course landscaping. These plans are provided in Appendix B (QLDC E Docs, 2014). The mini golf facilities were established between 1993 and 1995 and are present today. These facilities can be seen in the 2013 aerial photograph (see Figure 4). Current facilities include a building that incorporates a kiosk and toilet, landscaping with garden beds, concreted golf course foundations and water features. These facilities are shown in photographs provided in plates 1 to 4.

Sewage waste water is reticulated from the Kiosk ablutions to the mains sewage lines along Brecon Street as shown in plans included in Appendix B.

Powerlines run to the north of the site, as seen in Plate 1, and there is no evidence of historical or present electrical transformers within the site.



Figure 4: 2013 Aerial Photograph. 34 Brecon Street (yellow). Proposed Lakeview Sub-Zone council owned sub-blocks (red) and privately owned land (orange).



Plate 2: Mini golf carpark showing cemetery and powerlines in background



Plate 3: Mini golf carpark and kiosk building



Plate 4: Mini golf course



Plate 5: Mini golf course entrance

2.3 Contaminants Commonly Associated with the Landuse

The 34 Brecon Street site has been used for sports recreation and mini golf. It is therefore likely that the site has 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 that may cause contamination and lists a range of hazardous substances that may be associated with this activity including arsenic, lead, copper, mercury, and organic compounds including organophosphates such as endosulfan and organochlorine's such as DDT.

HAIL lists cemeteries as an activity that may cause contamination and lists a range of substances that may be associated with this activity including nitrates, lead, mercury, formaldehyde and biological hazards. It is possible that the neighbouring cemetery within 20 meters of the Brecon Street site has impacted on the Brecon Street site. Item H of the HAIL lists acknowledges 'any land that has been subject to the migration of hazardous substances from adjacent land in sufficient quantity that it could be risk to human health or the environment'.

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 – 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 – The site is fenced, except for the car park.
- Visible Signs of Contamination - No visible signs of contamination.
- Local Sensitive Environments – no sensitive environments were observed in the project area.

2.5 Site Condition and Surrounding Environment

The land to the south and east of the site contain residential and retail commercial properties, to the north and north-west is the Queenstown Cemetery and to the west is the Lakeview Holiday Park.

The cemetery can be seen in the background of Plate 2, beyond the mini golf carpark. The cemetery is approximately 20 meters from the mini golf fence and within several meters of the mini golf car park. There are no surface water features connecting the cemetery to the Brecon Street site and Hadley Consultants (2014)

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

2.6 Geology and Hydrogeology

The Lakeview Site is characterised by a flat terrace of low relief, adjoining steep slopes beyond the northern boundary of the site, which extend upwards toward Bob's Peak. The Preliminary Geotechnical Assessment (Hadley Consultants, 2014, 2014b) 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 (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 (Hadley Consultants, 2014).

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 of the Lakeview Site. Hadley note that within the Brecon Street, limited groundwater is expected to be present beneath the site (Hadley Consultants, 2014b).

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 Brecon Street 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.
- Nitrates, lead, mercury, formaldehyde and biological hazards that may have migrated from the neighbouring cemetery.

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 higher 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 and heavy metal (DDT, dieldrin and arsenic) contaminant concentrations on the former recreation area or landscaped gardens and grassed areas of the mini golf course 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 Cemetery contaminants

We consider it is highly unlikely that contaminants associated with the neighbouring cemetery, including lead, mercury, formaldehyde, biological hazards, nitrates have migrated from the neighbouring cemetery onto the Brecon Street site. Methods of contaminant migration such as surface water, ground water or transfer of earthen material have not been observed during this preliminary site investigation.

It is therefore unlikely that contaminants associated with the cemetery would be present at levels that exceed the NES soil contaminant standards for either the high-density residential, parks/recreation, or commercial/industrial soil contaminant standards.

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 recreation area and landscaped areas of the mini golf course. 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 the Lakeview site, 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 proposed landuse of 34 Brecon Street 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;
- The cemetery boundary has remained beyond the northern boundary of the Brecon Street site;
- It is unlikely that contaminants associated with the neighbouring cemetery (nitrates, lead, mercury, formaldehyde and biological hazards) would be present at levels that exceed the NES soil contaminant standards for either the high-density residential, parks/recreation, or commercial/industrial soil contaminant standards because it is highly unlikely that contaminants associated with the neighbouring cemetery have migrated from the neighbouring cemetery onto the Brecon Street site;
- 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.*

Hadley Consultants Ltd. (2014b) *Queenstown Lakes District Council - Proposed Queenstown Town Centre: Lakeview Subzone Plan Change, Preliminary Geotechnical Assessment – Addendum Report 34 Brecon Street, Queenstown.*

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Queenstown Lakes District Council E Document Viewer. Accessed 05/08/2014

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Ministry for the Environment (2012) *Users' Guide: National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.* Wellington: Ministry for the Environment.

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Appendices

Appendix A

Davis Consulting Group Contaminated Land Experience



Davis Consulting Group Contaminated Land Experience

Glenn Davis is the director of Davis Consulting Group and has over 15 years post graduate experience working as an Environmental Scientist. Glenn has accumulated a significant volume of work experience in the contaminated land field undertaking preliminary site investigations (PSIs), detailed site investigations (DSIs) and remediation projects in New Zealand, Australia, Asia, the United Kingdom and Ireland. The following provides a summary of Glenn Davis's experience.

Davis Consulting Group (2007 – present): Principal Environmental Scientist – completed multiple preliminary and detailed site investigations in Otago and Southland predominantly for the land development industry. In addition to undertaking investigation and remedial work DCG advises the Southland Regional Council on contaminated land matters including the review of consultant reports and consent applications. Key projects DCG has undertaken include:

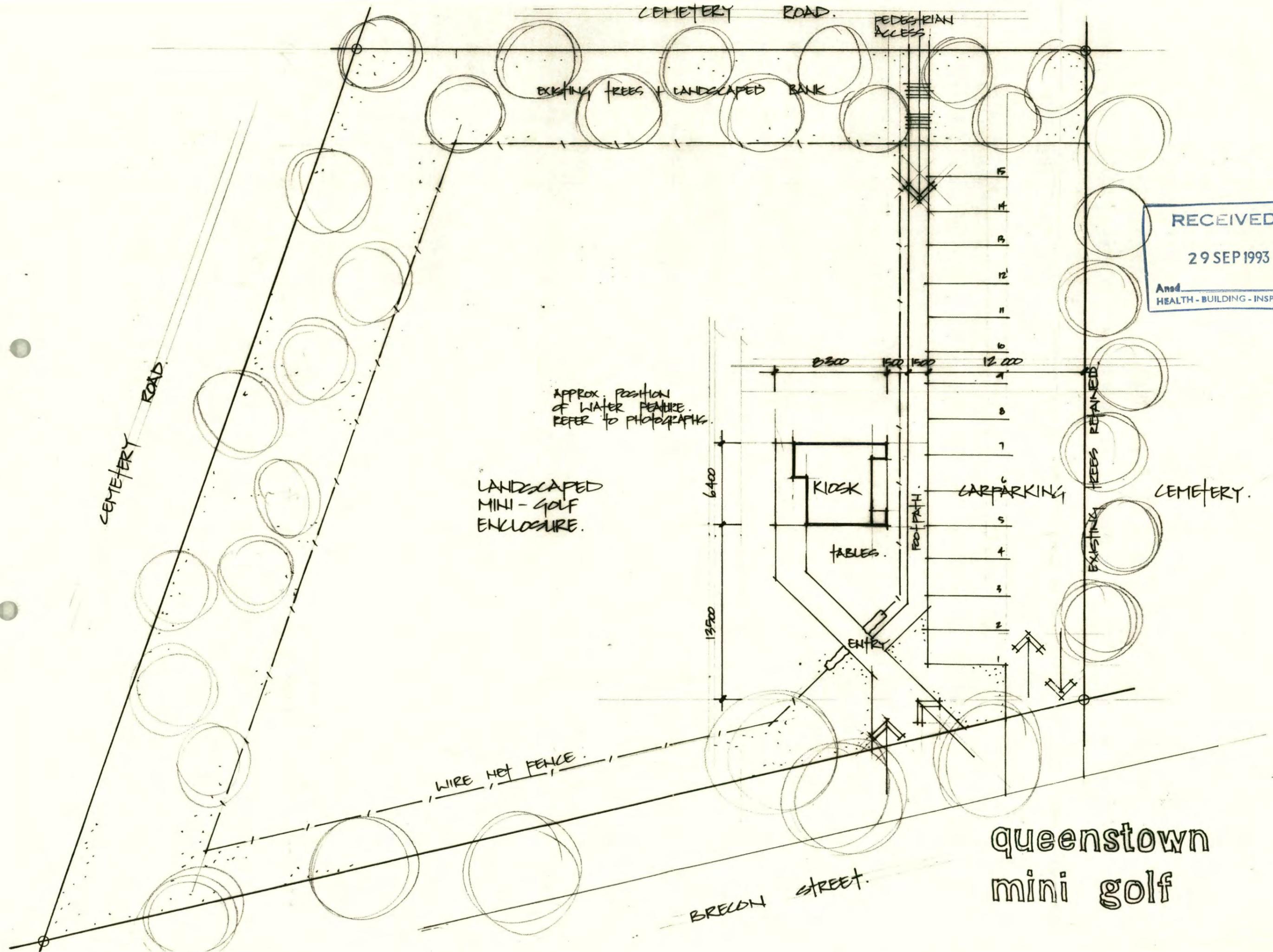
- Review of groundwater contamination associated with the former Invercargill gasworks site including the completion of a groundwater investigation and completion of an environmental risk assessment report to support a discharge consent application;
- Completion of site investigations on former landfills in Invercargill to consider the suitability of the sites for commercial/industrial development;
- Management of the removal of an underground fuel tank in Gore and subsequent groundwater investigation; and
- Completion of a number of detailed site investigations in the Te Anau area to consider the suitability of former farm land for residential development.

RPS Australia (2003 – 2006): Supervising Environmental Scientist managing multiple detailed site investigations in the land development industrial and operated as an environmental specialist for Chevron on Barrow Island monitoring and managing a number of large contaminated groundwater plumes.

URS Ireland (2001 – 2003): - Senior Environmental Scientist undertaking multiple PSIs and DSIs on services stations and train station throughout Ireland. Glenn was also involved in the design and operation of a number of large scale remediation projects, predominantly associated with the removal of hydrocarbon contaminated soil and recovery or hydrocarbons impacting groundwater.

ERM Australia (1998 – 2000) – Working as a project level environmental scientist Glenn completed in excess of 30 detailed site investigations and remedial projects on service stations, concrete batching plants, and transport depots.

Appendix B
Historical and Present Day Plans



RECEIVED
 29 SEP 1993
 And
 HEALTH - BUILDING - INSPECTOR

APPROX. POSITION
 OF WATER FEATURE.
 REFER TO PHOTOGRAPHS.

LANDSCAPED
 MINI - GOLF
 ENCLOSURE.

queenstown
 mini golf

CEMETERY ROAD

CEMETERY ROAD

PEDESTRIAN ACCESS

EXISTING TREES LANDSCAPED BANK

BRECKON STREET

WIRE HOT FENCE

KIOSK

TABLES

ENTRY

FOOT PATH

CARPARKING

EXISTING TREES REMAINED

CEMETERY

5
4
3
2
1

6400
13500

8300 1500 1500 12000

CEMETERY ROAD.

PEDESTRIAN ACCESS.

EXISTING TREES + LANDSCAPED BANK.

PROPOSED DRAINAGE PLAN

CEMETERY ROAD.

APPROX. POSITION OF WATER FEATURE. REFER TO PHOTOGRAPHS.

LANDSCAPED MINI-GOLF ENCLOSURE.

6400

13500

6300 1500 1500 12000

KIOSK

TABLES

ENTRY

NEW SEWER CONNECTION

CARPARKING

EXISTING TREES REMAINED.

CEMETERY.

WIRE MESH FENCE.

BRECON STREET.

queenstown mini golf

RECEIVED
11 OCT 1993
Apod
HEALTH-BUILDING INSPECTOR



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