APPLICATION FOR RESOURCE CONSENT

OR FAST TRACK RESOURCE CONSENT
FORM 9: SECTION 88 RESOURCE MANAGEMENT ACT 1991

1 Dunorling Street
PO Box 122, Alexandra 9340
New Zealand

03 440 0056

Info@codc.govt.nz
www.codc.govt.nz

Email to: resource.consents@codc.govt.nz

Post to: The Chief Executive
Central Otago District Council
PO Box 122
Alexandra 9340

CONTACT DETAILS OF APPLICATION

Full name(s) and contact details of owner/occupier/applicant: *(name will be issued on the decision)*

Hawkeswood Mining Limited

399 Whitford Park Road, Auckland 2576
Postal Address

info@hawkeswood.co.nz — Email
09 530 8077 — Phone

Full name(s) and contact details for service of application *(if different from above)* e.g. Agent:

Anita Collie, Town Planning Group

PO Box 35, Christchurch 8013
Postal Address

Anita@townplanning.co.nz — Email
021 568 335 — Phone

DETAILS OF PROPERTY

Street address/rapid number of property to which this application relates:

1346-1536 Teviot Road, Millers Flat

Legal description of land:

Refer to AEE, page 7 Table 1

DETAILS OF APPLICATION

Application Type(s) applying for: *(please tick one)*

- ☒ Land use consent
- ☐ Subdivision consent
- ☐ Change/Cancelation of consent or consent notice conditions
- ☐ Extension of lapse period of consent (time extension) s125
- ☐ Certificate of compliance
- ☐ Existing use certificate

Description of proposal:

Establish and operate an alluvial gold mining operation

- ☐ No additional resource consents are needed for the proposed activity.

Or

- ☒ The following additional resource consents are needed for the proposed activity. *(give details)*
  They have / have not been applied for: *(please highlight)*

Resource consent will also be required from ORC and this is being sought separately

Under section 87AAC a controlled activity or deemed permitted boundary activity may be eligible for fast-track processing. Please select one:

I opt out ☐ / I do not opt out ☐ of the fast-track consent process.

PAYMENT DETAILS

I confirm amount and date paid:

Reference used (if applicable):

- ☒ Bank Transfer to 020916 0081744 00 (BNZ Alexandra Branch). Please reference: "RC APP" and the applicant's surname in the payment details eg, RC APP SMITH
- ☐ Manual payment (can only be made once application lodged and RC reference number issued)

APPLICATION CHECKLIST

The following is attached to this application:
(please tick boxes as appropriate)

- ☐ *Non-refundable application fee of the prescribed amount (an additional charge may also be payable where the initial application fee is inadequate to recover Council costs).
- ☐ Assessment of the Effects on the Environment (AEE).
- ☐ *Copy of current Certificate of Title.
- ☐ *A location plan.
- ☐ *A site plan which shows the location of any buildings, driveways, parking areas or other significant features in relation to site boundaries. (Please ensure the paper size is either A4 or A3.)
- ☐ A building plan including the floor plan of the proposed building and elevations (if appropriate). (Please ensure the paper size is either A4 or A3.)
- ☐ Photographs of the site and of any important features relative to the application.
- ☐ Any other information required by the District Plan or Act or regulations to be included.

**Items with a star are required for all consent applications.*

Full details relating to the contents of applications are contained in the checklists and guidance notes available on Councils website www.codc.govt.nz or from any Council office.

Note to applicant:

You may apply for two or more resource consents that are needed for the same activity on the same form.

You must pay the charge payable to the consent authority for the resource consent application under the Resource Management Act 1991 (if any).

I/We attach, in accordance with the Fourth Schedule of the Resource Management Act 1991, an assessment of environmental effects in the detail that corresponds with the scale and significance of the effects that the proposed activity may have on the environment.

I/We attach any information required to be included in this application by the district plan, the regional plan, the Resource Management Act 1991, or any regulations made under the Act.

(List all documents that you are attaching)

AEE, Form 9, and 16 other attachments

Subdivision consent requirements

As/if this is an application for a subdivision consent, I/We attach information that is sufficient to adequately define: *(delete if this is not an application for a subdivision consent)*

(a) The position of all new boundaries; and

(b) the areas of all new allotments; and *(delete if the subdivision involves a cross-lease. Company lease or unit plan)*

(c) the locations and areas of new reserves to be created, including any esplanade reserves and esplanade strips; and

(d) the locations and areas of any existing esplanade reserves, esplanade strips, and access strips; and

(e) the locations and areas of land below mean high water springs of the sea, or of any part of the bed of a river or lake, to be vested in the Crown or local authority under section 237A of the Resource Management Act 1991; and

(f) the locations and area of land to be set aside as new roads.

As this is an application for a resource consent for reclamation, I/We attach information to show the area proposed to be reclaimed, including its location, the position of all new boundaries, and the portion of that area (if any) to be set apart as an esplanade reserve or esplanade strip. *(delete if this is not an application for a resource consent for reclamation)*

24/10/2023

Signature Date

(to be signed by applicant or person authorised to sign on behalf of applicant)

TOWNPLANNING
GROUP

Application for Resource Consent to the Central Otago District Council:

Hawkeswood Mining Limited

LAND USE CONSENT TO ESTABLISH AND OPERATE A GOLD MINING ACTIVITY AT 1346-1536 TEVIOT ROAD, MILLERS FLAT.

25 October 2023

www.townplanning.co.nz

Document prepared by:

Town Planning Group (NZ) Limited

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Offices in Tāhuna, Wānaka, Ōtautahi & Tāmaki Makaurau

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1 Executive summary

Hawkeswood Mining Limited (the **Applicant**) applies for land use consent to establish and operate an alluvial gold mining operation at 1346 - 1536 Teviot Road, Millers Flat (the **site**). A 10-year duration is sought.

The Applicant has undertaken exploration of the site and has been granted a mining permit in accordance with the Crown Minerals Act 1991.

The site is rurally located and currently used for pastoral farming activities. Land mined will be rehabilitated back to pastoral farmland on completion of the project. The Applicant has access arrangements in place with landowners located within the proposed mine footprint.

A fundamental premise of this application is that adverse effects on significant environmental values and risks will be avoided or appropriately mitigated by design of the mining activity. To this end, the mine footprint avoids waterways and HAIL sites, with appropriate setbacks from key features and public spaces, along with a suite of operational controls to mitigate adverse effects. The proposed mine will add approximately 20 jobs and consequent economic value to the district.

The site is zoned Rural Resource Area under the Central Otago District Plan (**District Plan**). Overall, resource consent is required for a **Discretionary Activity** under the District Plan.

Earthworks have occurred on the site as part of exploration activities that exceeded permitted volumes in the District Plan. Retrospective resource consent for these activities also forms part of this application.

The project requires resource consents for water and discharge permits from Otago Regional Council, and these applications are currently in process.

This Assessment of Environmental Effects (**AEE**) report is supported by technical assessments, including reports addressing acoustic effects, landscape amenity, flood hazard, contaminated land and dust. The Applicant has provided a mining methodology report which addresses operational matters.

In recognition of outcomes of consultation with Council, the Applicant requests public notification of this application.

2 Site and surrounds

2.1 Site details and description

The site is located at 1346 – 1536 Teviot Road, Millers Flat. **Table 1** details the site legal descriptions and Record of Titles.

Table 1 *Site legal descriptions*

Site Address	Legal Description	Record of Title	Ownership
	Section 3 SO 24438	OT18C/235	Alan Thomas Parker
1426D Teviot Road, Millers Flat	Section 102 Block VIII Benger SD	OT380/99	Jacks Ridge Limited
1426C Teviot Road, Millers Flat	Section 84 Block VIII Benger SD	OT360/183	Jacks Ridge Limited
1484 Teviot Road, Millers Flat	Section 110, 118 Block VIII Benger Survey District	241193	Alan Thomas Parker
1534 Teviot Road, Millers Flat	Part Section 96 Block VIII Benger Survey District	OT12C/430	Matthew Ross Hunter, Georgia Rose Parker
	Section 92 Block VIII Benger Survey District	OT230/94	Central Otago District Council
	Section 90 Block VIII Benger Survey District	OT374/110	Jacks Ridge Limited
1426A Teviot Road, Millers Flat	Section 91 Block VIII Benger Survey District	OT360/184	Jacks Ridge Limited
1426E Teviot Road, Millers Flat	Section 106 Block VIII Benger Survey District	OT12C/572	Donna May Parker, Joanne Helen Parker
	Lot 2-3 Deposited Plan 375668	304420	Gabrielle Claire Campbell-Lloyd, Gareth David Wilson
1406 Teviot Road, Millers Flat	Lot 4 Deposited Plan 375668	304421	Gabrielle Claire Campbell-Lloyd, Gareth David Wilson
	Section 93 Block VIII Benger SD	OT374/111	Laurie Allan Crawford, Pamela Fay Crawford
	Section 97 Block VIII Benger Survey District	OT270/85	Laurie Allan Crawford, Pamela Fay Crawford
	Section 40 Block VIII Benger Survey District	OT117/72	Laurie Allan Crawford, Pamela Fay Crawford
1346 Teviot Road, Millers Flat	Part Section 89 Block VIII Benger Survey District	OTB1/707	Laurie Allan Crawford, Pamela Fay Crawford

The Record of Titles and relevant instruments are appended as **Attachment [B]**. There are no relevant instruments that impede the proposed land use. The location of the site is shown in **Figure 1** and **Figure 2** below.

The site extent also includes road reserve within the boundary indicated in **Figure 2** below. The site extent does not intrude on the Clutha River / Mata-au marginal strip.

Figure 1 Site location

The site is located on gently rolling terrain, on a plateau above the Clutha River / Mata-au to the South and West. Teviot Road forms the north-eastern site boundary, and is a rural road used predominantly by local traffic with most through traffic using State Highway 8 on the opposite side of the Clutha River / Mata-au.

Most of the site is currently used for pastoral farming activities. The Tima Burn flows near to the south-eastern boundary of the site.

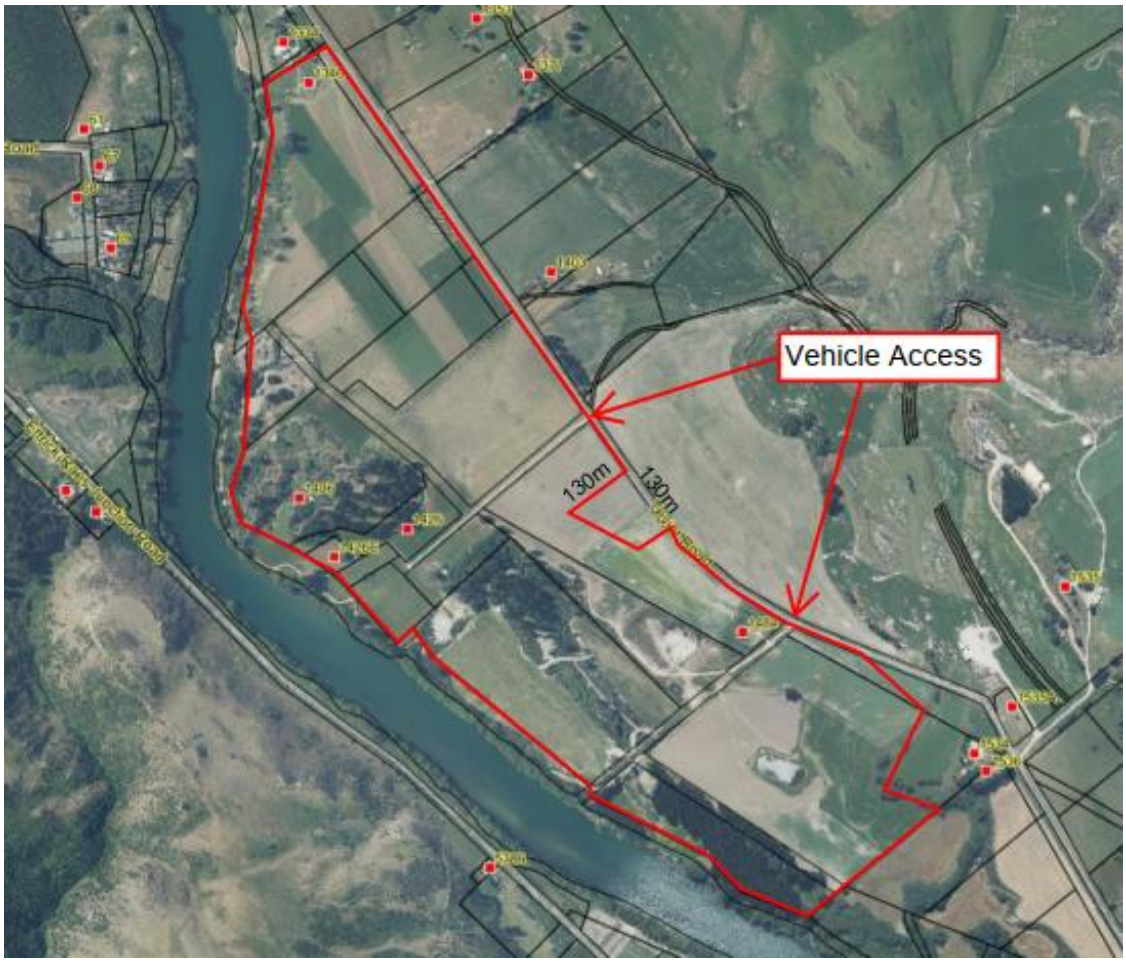


Figure 2 Extent of application site area generally indicated in red outline (CODC GIS)

We understand that part of the site (Sec 92 Block VIII Benger SD) indicated in **Figure 3** below, is a former gravel pit that owned by Council, and public access to this area was closed off earlier in 2023.

Figure 3 Gravel pit location visible on aerial photograph, eastern part of land parcel indicated by yellow and black outline (CODC GIS)

Vehicle access to the site is via two existing formed gravel vehicle access ways, indicated on **Figure 2** above. The northern vehicle access is across paper road that provides only private property access, with no access to public spaces. An agreement is in place with all owners who access their property by this access. This agreement also covers relocation of power and telephone infrastructure located along this access.

The southern-most vehicle access is Council owned paper road, providing formed vehicle access from Teviot Road only as far as the gravel pit indicated in **Figure 3** above. This paper road also provides pedestrian and cyclist access to the Clutha River / Mata-au and facilitates the Clutha Gold Cycle Trail.

The site has a history of mining, though there are no recorded heritage sites within the project area in the District Plan. The Applicant has commissioned an archaeologist to review potential archaeological sites and apply to Heritage New Zealand Pouhere Taonga for an Archaeological Authority.

2.2 Existing authorisations

The following permits have been granted for the site.

- Minerals Exploration Permit 60712 granted under the Crown Minerals Act 1991 on 19 October 2021 approving exclusive right to explore for gold on the site until 19 October 2024.
- Minerals Mining Permit 60908.01 granted under the Crown Minerals Act 1991 on 17 April 2023 approving exclusive right to mine for gold on the site until 17 April 2033.

These permits are appended as **Attachment [C].**

2.3 Surrounding Environment

The surrounding area is rural with land predominantly used for pastoral farming activities.

The township of Millers Flat is located approximately 1km to the southeast at the closest point. The township of Ettrick is located approximately 800m northwest of the site at the closest point.

The Clutha River / Mata-au is located to the west and southwest of the site. The river is a Statutory Acknowledgement Area and has a range of intrinsic, cultural, recreational and aesthetic values, and is used by the general public for fishing, boating and other recreational uses.

The Clutha Gold Cycle Trail (the **cycle trail**) is a compacted gravel track, running between Roxburgh and Lawrence, and linking to other cycle trails in Central Otago. The cycle trail runs along the Clutha River / Mata-au to the west and south-west of the site, before cutting through the site via a paper road, to then travel along Teviot Road toward Millers Flat.

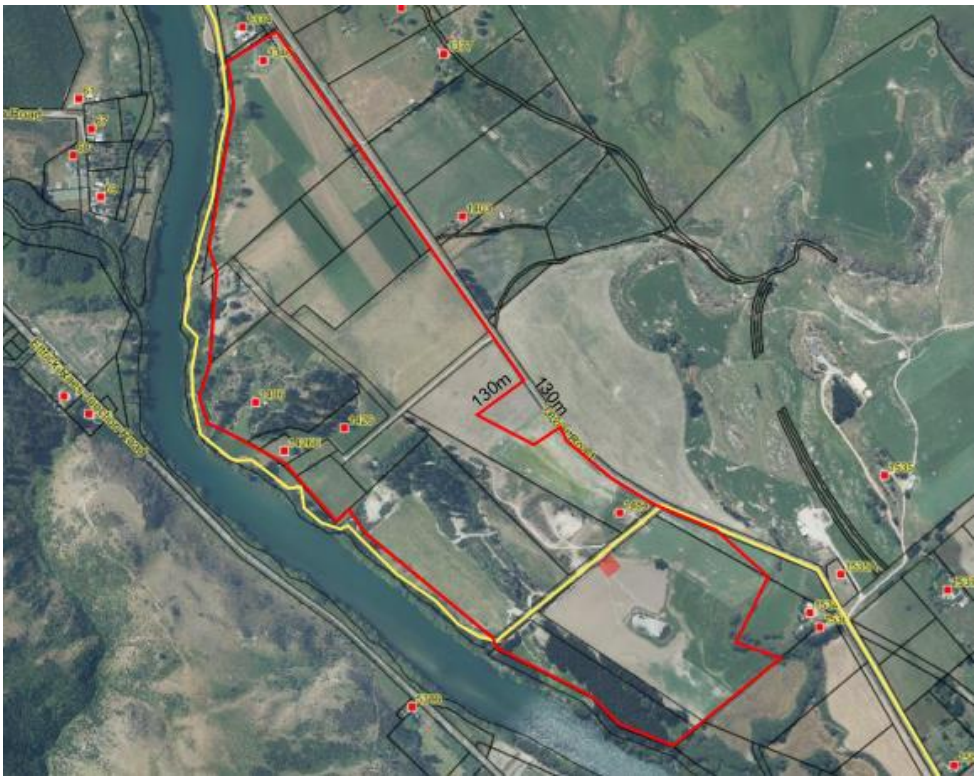


Figure 4 Approximate path of Clutha Gold Cycle Trail indicated in yellow. Extent of application site area indicated in red outline (CODC GIS)

An area adjacent to the site is known as a former landfill, located as shown in **Figure 5** below. This area is excluded from the application site area. Definition of this area has been undertaken by EC Otago in their Preliminary Site Investigation Report (**PSI**), included as **Attachment [F]**. The EC Otago report sets out a conservative boundary to the old landfill, verified by site investigations, to ensure that the mine site does not intersect with the former landfill.

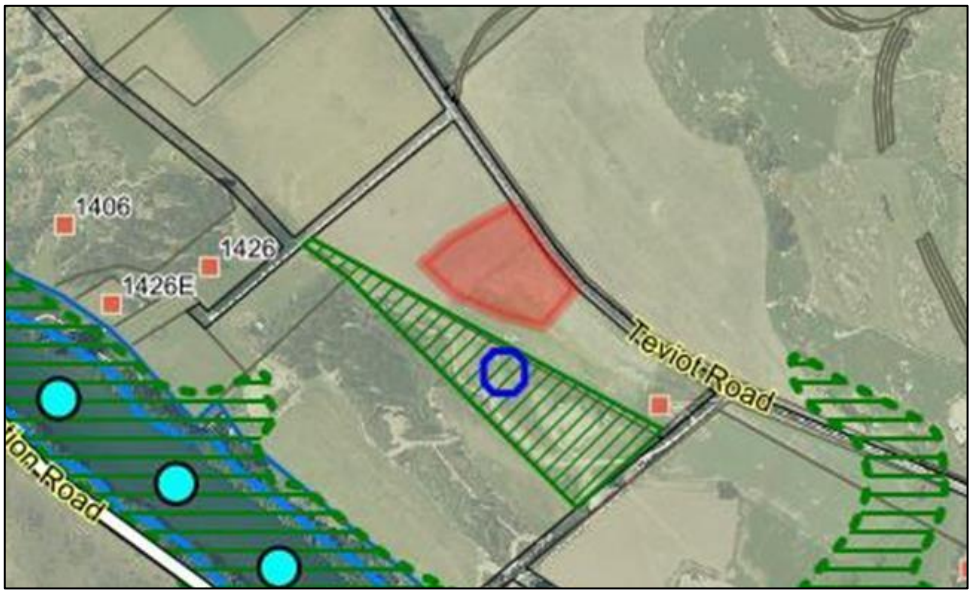


Figure 5 Former landfilling site approximate location indicated by red polygon in centre of image (Provided by CODC staff by email 14-4-2022)

Additionally, an historic stockyard has been identified by EC Otago's aerial photograph review. **Figure 6** below shows the stockyards, which EC Otago advised are visible in 1973-74, but not in 1983. **Figure 7** shows the stockyard extent identified by the red circle in **Figure 6** transposed onto a current aerial photograph.

Figure 6 Historic aerial imagery from 1973 showing likely stockyards identified within the red circle on Part Section 96 Block VIII Benger SD. Teviot Road is along the top of the image. (Source: EC Otago)

Figure 7 Current aerial imagery with location of historic stockyards transposed. Paper road is to the left of the green polygon in the image. Corners of the polygon are defined by NZMG coordinates:

North corner E:1319064 N:4938520; West corner E:1319046 N:4938504; South corner E:1319085 N:4938500; East corner E:1319100 N:4938516 (Source: EC Otago).

3 Description of the proposal

3.1 Overview

The Applicant proposes to establish an alluvial gold mine on the site, including on-site processing, and stockpiling of overburden, which will operate Monday to Friday 7am – 7pm and Saturday 7am – 1pm with no earthworks or processing work occurring on Sundays or public holidays. Some machinery maintenance and dust control activities may occur on Saturday afternoons, Sundays and public holidays. Up to 20 staff will be employed on the project, including machinery operators, mechanics and engineers. The Site Plan is appended as **Attachment [D]** and a Mining Methodology Report is included as **Attachment [E]**.

Overburden will be removed with excavators and dump trucks and stockpiled on site. Some of the overburden will be used to form bunds around the site perimeter during the operational phase of mining. The maximum height of bunds along the site boundaries will be 4m and these will be vegetated with grass. Overburden stockpiles internal to the site may be up to 7m above ground level and may not be vegetated due to their temporary and transient nature. Topsoil will be stockpiled separately for rehabilitation purposes and grassed to prevent erosion.

The depth of excavation varies across the site, with the base of the gold bearing wash layer being located approximately 13m to 18m below ground level. Earthworks will be below the natural groundwater level and the mine pit will be partially dewatered to allow access to the resource.

The gold bearing wash will be processed on site. The Gold Recovery Plant (**GRP**) will be located within the active mine pit, on a floating dredge. The estimated processing rate will be approximately 180m^3/hour.

Gold will be processed on site using gravity separation methods. Tailings comprising non-gold bearing on-site material (e.g., rock, silts etc.) will be replaced in the mine pit. No chemical methods will be used for gold extraction.

Areas where the gold bearing wash has been removed will be backfilled with overburden from progressive stages. A small terminal void may remain at the completion of the project, though all overburden removed will be placed back in the mine pit and any bunds will be deconstructed on completion of the project.

An accidental discovery protocol will be followed in case of unexpected accidental discovery of archaeological or cultural material. The Applicant also has an application for an Archaeological Authority in progress, which will likely provide for more detailed management of potential archaeological or cultural material.

3.2 Summary of earthworks area and volume

While the District Plan rule framework deals with earthworks for tracks and extraction / displacement activities separately, it is considered that these subsets of the activity are not able to be easily separated in respect of this proposal. Haul roads for machinery and light vehicle access (both fitting within the District Plan definition of tracks) will be constructed internally through the mine footprint area and will be constructed on the mine pit batters to provide vehicle access to the pit. Earthworks volumes stated in this section comprise both types of activity.

The total project volume of earthworks is estimated to be approximately 12 million cubic metres. Gold bearing wash is approximately 2.3 million cubic metres, and the remainder is overburden. The Applicant will likely progress the project in 4 stages as shown in **Figure 8** below, though the next stage will progress while the previous is under rehabilitation due to the moving mine cell methodology.

The project area is approximately 68 hectares. The active work area, comprising the mine pit, internal haul roads and area where rehabilitation is underway is expected to be a maximum of 12 hectares. Up to 7ha has been allowed for temporary stockpiling, though this may overlap with the active work area. A maximum of 8ha of the project area will be occupied by ancillary activities where the surface will effectively be stabilised for the project duration, including the workshop, site office, settling ponds, bunding, and vehicle access. These areas combine to a maximum work area of 27ha, though noting that the work area will fluctuate, and this area is proposed as a conservative maximum estimate.

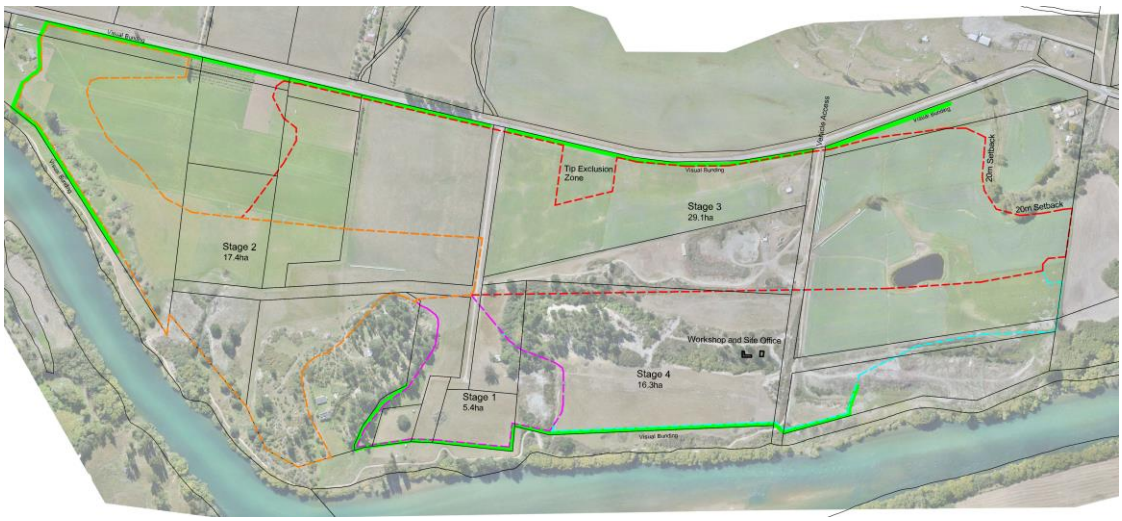


Figure 8 Stage Plan (refer to **Attachment [D]** for a larger version)

3.3 Earthworks undertaken without consent

The Applicant has undertaken approximately 5,118m^3 of earthworks to undertake exploration work, which was not authorised by resource consent and does not comply with Rule 4.7.6J(b) in the District Plan. Retrospective consent for this work also forms part of this application.

A survey plan is provided in **Attachment [G]**, which identifies the earthworks completed to date. Areas of roading have not been included in the total volume of earthworks as Rule 4.7.6J(a) permits earthworks for roading / tracks without limitation on the volume or area of earthworks.

The survey plan (**Attachment [G]**) separately identifies areas of tracks and areas of earthworks for other purposes. As this separation was difficult to complete, the Applicant does not propose to separate types of earthworks for the purposes of future works proposed by this application, as outlined in section 3.2 above. This is considered to be a conservative approach. The separation has already been completed for the retrospective aspect of this application, and is a more accurate approach, hence it is an appropriate method to define this aspect of the activity.

3.4 Noise and dust mitigation

Hegley Acoustics have provided an assessment of noise effects (**Attachment [H]**). Their initial report is based on a previous version of layout and so included is a letter from Hegley confirming that their conclusions apply to the revised mine layout.

Bunds will be constructed as recommended by Hegley Acoustics as detailed within their Noise Report, page 13, and shown in **Figure 8** above:

- A 4m high bund will be constructed across the northern side of the mining and nominally 300m down the western side of the site and 700m down the eastern side of the site.
- A bund at least 3m high and 300m long, will be constructed opposite the dwelling at 5386 Ettrick-Raes Junction Road. This bund is likely to be constructed to 4m height for consistency with other site works.

Dust will be controlled on site in accordance with good industry practise, including use of water carts and establishing vegetation on the bunds so as to minimise any dust nuisance to surrounding properties. A Dust Management Plan is included as **Attachment [I]**.

3.5 Servicing, lighting and access

Temporary on-site services will be provided appropriate to staffing levels at each stage of the operation. Drinking water will be sourced from an existing on-site private scheme and a copy of the potable water supply agreement is included as **Attachment [J]**. Two portaloos will be provided, and wastewater will be removed from site by a contractor weekly.

Lighting will be required around the processing and site office areas, and at the active work area within the mine pit, particularly in winter. These lights will be directed at the work areas and are sufficiently distanced from roads and residential dwellings such that lighting can be installed so as to comply with the light spill standards in the District Plan. This is proposed to be measured and verified by a lighting specialist.

During the mobilisation phase of the project, machinery will be brought to the site. Subsequently, an average of two heavy vehicle movements per day are expected, such as fuel trucks and deliveries. Staff vehicles will also travel to the site.

Up to 60,000 litres of diesel storage will occur on site to fuel the machinery. Diesel will be stored on the site in a containment facility compliant with Health and Safety at Work (Hazardous Substances) Regulations 2017. The storage location will be on a flat area of land near to the workshop, away from an areas of flood hazard and excavation.

Vehicle access to the site is by existing formed accesses, and these will be upgraded in accordance with Abley's recommendations discussed in section 5.6 below. Vehicle access will be sealed for distance of 5m from Teviot Road and drained. Vehicles will travel at slow speeds and dust control measures will be used on the access roads as necessary.

A parking area for staff and visiting vehicles will be provided, though the exact location is yet to be determined. The surface of the parking area will be compacted gravel and managed so as not to create a dust nuisance. There will be sufficient manoeuvring space in the parking area such that vehicles do not need to reverse off site. A minimum 6m queuing space will be provided between the car parking area and the road boundary.

3.6 Public Access

Public access to the Clutha River / Mata-au and cycle trail will be maintained throughout the project. Existing access will be temporarily affected and so the Applicant will create nearby temporary alternative accesses for the period when existing accesses are affected. The work site will be fenced so as to prevent public access for health and safety reasons.

The Applicant has discussed the proposal extensively with the Clutha Gold Charitable Trust, who are responsible for the operation of the Clutha Gold cycle trail and come to an agreed diversion with the Trust, shown in **Figure 9** below (see **Attachment [K]** for a larger version of the below plan).

Figure 9 Proposed diversion and existing cycle trail shown in red. Blue dashed line indicates section of cycle trail temporarily affected by the proposal. Yellow line is the diversion route.

No new road crossings are required to facilitate the cycle trail diversion. The total length of the diversion is approximately equivalent to the length of cycle trail that will be temporarily affected by the proposal, being approximately 1150 metres.

3.7 Temporary buildings

A number of temporary buildings will be required for the duration of the project to provide a site office, storage and a machinery workshop area. All buildings and containers on the site will be painted Resene Iron Sand or similar.

- A portacom will be used as a temporary site office and will be approximately 15m long x 4m wide x 3m high.
- Six 40ft containers will be required on site for storage, with these measuring approximately 12.2m long x 2.4m wide x 2.6m high.
- A container shelter will be installed over two of the containers to form the workshop area. The canopy will be up to 6 metres high.

An indication of the container shelter appearance is shown in **Figure 10** below. The image represents the shape of the structure only; the colour of the containers will be Resene Iron Sand and the shelter fabric will be painted a dark green (not white as shown in the below image).

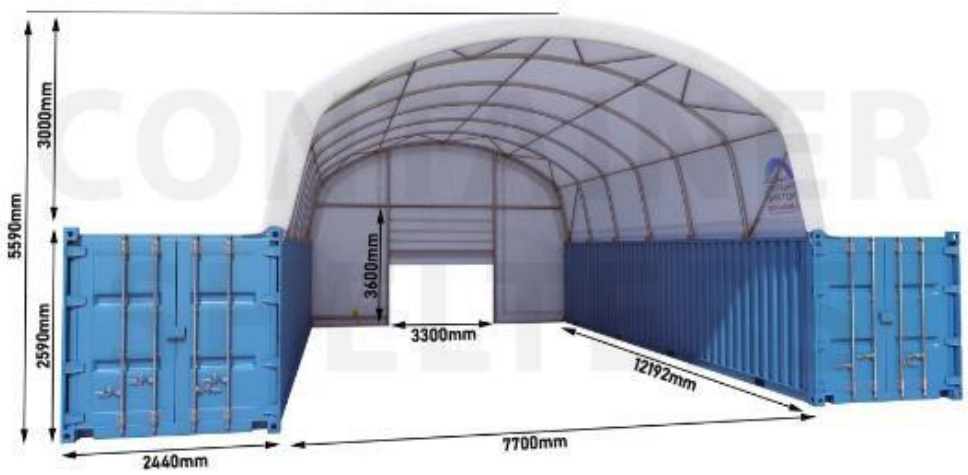


Figure 10 Representation of structure of container shelter (Source: https://www.containershelters.co.nz).

3.8 Rehabilitation

The site will be rehabilitated in accordance with landowner agreements, to the same or better standard of farmland as currently exists. The following matters will be included in rehabilitation:

- The site will be rehabilitated to pasture, contoured to align with adjacent land and provide drainage in accordance with pre-mining drainage patterns.
- Topsoil will be stripped and stockpiled separately.
- Rehabilitation will occur progressively, as the mine cell moves the overburden will be utilised as backfill.
- Rehabilitated land will be sown with pasture grass and irrigated as necessary.
- Agricultural advice will be sought with respect to seeding, cultivation, fertiliser and stock management on rehabilitated land.

3.9 Duration

A 10-year consent duration is requested based on a 5-7 year mine life. The proposed duration will allow for project start up and rehabilitation.

4 Statutory provisions

4.1 Central Otago District Plan

The site is located within the **Rural Resource Area Zone** under the District Plan as shown in **Figure 11** below, and is subject to a number of notations as follows:

- Designation 236 – The designation purpose is "Green waste Refuse Management Purposes" and the requiring authority is Central Otago District Council. Land affected is Section 92 Block VIII Benger SD.
- Scheduled Activity 75 - Gravel Pit - Millers Flat Landfill (Sec 92 Block VIII Benger SD)
- Flood prone land – applicable to parts of the application site near the Clutha River / Mata-Au and Tima Burn.
- Teviot Road is identified in Schedule 19.7 as an Arterial Road.

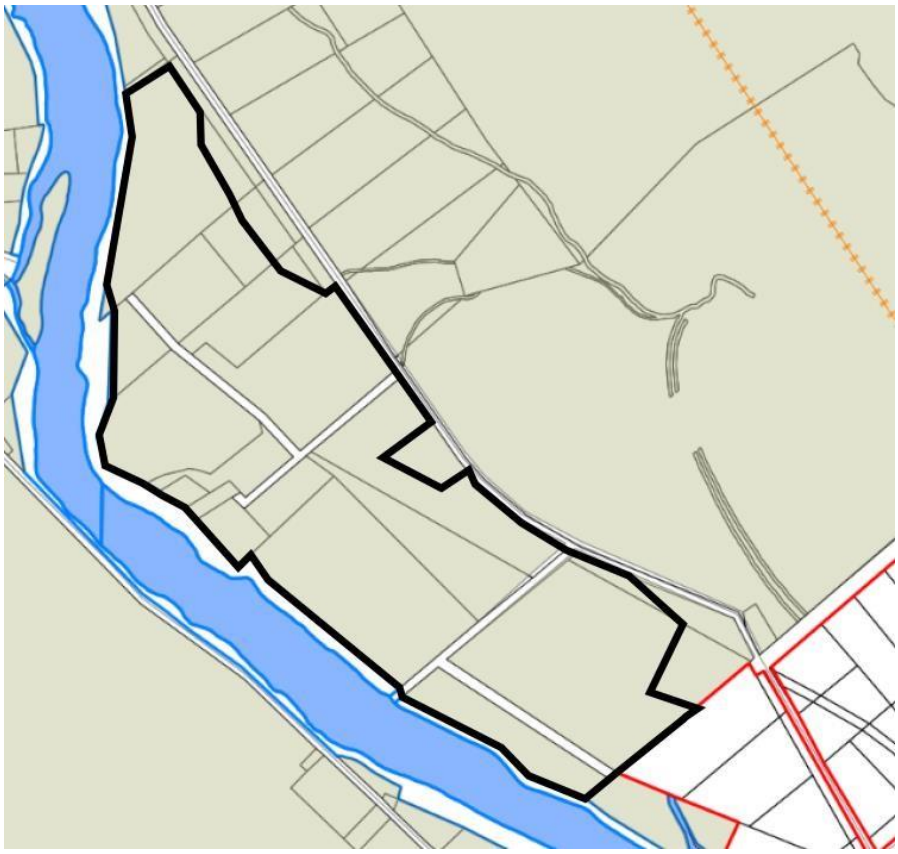


Figure 11 Excerpt from District Plan Map 63 with part of application site area in black outline (CODC)

There are no District Plan overlays identifying specific landscape or ecological values within the site.

4.1.1 Compliances

The proposal will comply with the following District Plan provisions:

- Standard 4.7.6A – buildings, storage areas and stockpiles shall be set back a minimum of 20 metres from waterbodies (part (c)), shall not exceed 10m height (part (f)), nor be located within 15m of a legal road intersection (part (h)).
- Standard 4.7.6D – Given the position of the temporary buildings set back from the edge of the terrace and screened by bunds and vegetation, it is considered that the buildings will not protrude onto a skyline or above a terrace edge when viewed from public spaces, in compliance with part (c) of the standard. The colour of all temporary buildings will be a dark green / grey, complying with the colour and light reflectivity criteria in 4.7.6D(a)(ii) and (iii).
- Standard 4.7.6E – the activity will comply with the noise standard, as assessed by the Hegley Acoustics report (**Attachment [H]**).
- Standard 4.7.6G – the Applicant will provide sufficient temporary services on site to meet staff requirements. Parking, access and manoeuvring will be provided in accordance with the District Plan Chapter 12 requirements, except where noted below.
- Standard 4.7.6H – a sign not exceeding $3m^2$ at the site access will comply with the provisions of this standard.
- Standard 4.7.6I – no works will be undertaken within 10m of the Tima Burn or Clutha River / Mata-au. A 20m setback is proposed.
- Rule 12.7.1 (Access Standards from Roads) – the existing accesses comply with the provisions in part (i) (Construction and Maintenance) and part (ii) (Sight Distances).
- Standard 12.7.2 – vehicle parking will be provided on site and in accordance with this rule.
- Standard 12.7.6 – lighting will be installed so as to comply with this standard.
- For clarity, the activity will comply with all other relevant provisions of section 12.7, including those relating to loading spaces, noise and signage.

4.1.2 Non-compliances

Resource consent is required under the District Plan for the following:

- **Restricted Discretionary Activity** under Rule 4.7.3(iii) – the workshop will not comply with the finish requirements of Standard 4.7.6D, as the container shelter is made of PVC, which is not on the list of compliant materials in 4.7.6D(a)(i). Other temporary buildings formed of containers are coloured steel and do comply with this part of the standard.
- **Restricted Discretionary Activity** under Rule 4.7.3(i) – storage areas and stockpiles will only be partially screened from all public viewpoints, and may be

visible from Teviot Road, the paper road and/or the Clutha River / Mata-au at various stages of the proposed operation (non-compliance with Standard 4.7.6F).

- **Restricted Discretionary Activity** under Rule 4.7.3(vi) - the proposed tracks (also referred to as haul roads) may not comply with Rule 4.7.6J as the tracks are intended to be only temporary and for limited vehicle access. As such, cut or fill batters on ramps within the mine pit may exceed 2m in height.
- **Discretionary Activity** under Rule 4.7.4(i) – the proposed operation will involve more than three persons (20 staff proposed) and will not comply with Standard 4.7.6B(b), both parts (i) and (ii) (Traffic Generation and Characteristics of Activities).
- **Discretionary Activity** under Rule 4.7.4(i) – the proposal will involve greater than 2000m^2 and 3000m^3 of earthworks and so will not comply with Standard 4.7.6J(b) (Earthworks for Extraction and Displacement Activities).
- **Discretionary Activity** under Rule 4.7.4(ii) – the proposal will involve 60,000 litres of on-site diesel storage, which exceeds the permitted volume of 10,000 litres of a class 3c substance in the Rural Resource Area, listed in Schedule 19.14.
- **Restricted Discretionary Activity** under Rule 12.7.1 (iii) – the existing accesses to Teviot Road are not sealed. Discretion is restricted to the matters in 12.7.1(viii).

Overall, the proposal is to be treated as a **Discretionary Activity** under the District Plan.

4.2 National Environmental Standards

In terms of compliance or otherwise with National Environmental Standards ("NES"), there are two NES's that are of potential relevance to this proposal with these being:

- the NES for Assessing and Managing Contaminants in Soil to Protect Human Health (**NESCS**); and
- The NES for Freshwater (**NESFW**).

4.2.1 NES for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS)

As described in section 2 above, there is a known historic landfill near the site. The Applicant has engaged EC Otago to assist with defining the boundaries of the historic landfill, and determine an appropriate setback distance, so as to avoid any soil disturbance near the historic landfill. Their report is attached as **Attachment [F]**.

A set of historic stockyards were also identified in the property review by EC Otago and these fall within the proposed mine area. As the Applicant initially planned to avoid this

area, the stockyards are not addressed in the PSI. This part of the site is defined as a 'piece of land' under clause (5) of the NESCS and so the NESCS does apply to the area of the stockyards. The remainder of the site area is not 'piece of land' under the NESCS. Resource consent is required for soil disturbance in the stockyards area for a **Discretionary Activity** (NESCS clause 11), given no DSI exists.

4.2.2 NES for Freshwater (NESFW)

The NESFW applies to works within freshwater bodies inclusive of rivers and wetlands. The site is near to both the Tima Burn and the Clutha River / Mata-au. However, no works are proposed within 20m of any permanently flowing watercourse and there are no known wetlands to consider. For these reasons, no requirements under the NPSFW will be triggered.

4.3 Other resource consents and permissions

The Applicant has identified that resource consent will also be required from Otago Regional Council for water and discharge permits. An application is currently in process.

The Applicant has engaged an archaeologist and is in the process of preparing an application to Heritage New Zealand Pouhere Taonga for an Archaeological Authority.

The Applicant advises that all necessary permissions for mining under the Crown Minerals Act have been obtained.

5 Assessment of effects

5.1 Overview

In accordance with Section 88 and Schedule 4 of the RMA an assessment of any actual or potential effects on the environment that may arise from the proposal is required with any details of how any adverse effects may be avoided, remedied or mitigated. Accordingly, the below is an assessment of effects relative to the scale and significance of the proposed activity.

This assessment is addressed under the following headings:

- Written Approvals
- Permitted baseline
- Visual amenity and landscape character effects
- Effects of earthworks
    - Dust effects
    - Noise effects
    - Vibration effects
    - Effects on land stability
    - Effects on waterbodies
- Soil disturbance in a HAIL site
- Transport effects
- Effects of scale of activity on rural character
- Effects on cultural values
- Effects on archaeological values
- Effects on public access
- Flood hazard effects
- Effects of hazardous substance storage
- Positive effects

5.2 Written approvals

Written approvals from the following parties listed in **Table 1** below are included in **Attachment [Q]**. Effects on these parties must be disregarded in accordance with sections 95D, 95E and 104 of the RMA.

Table 1 List of written approvals provided.

Party	Address	Legal description of land
Alan Thomas Parker	1484 Teviot Road, Millers Flat	Section 3 SO 24438 Section 110, 118 Block VIII Benger Survey District
Jacks Ridge Limited	1426A, C, D & E Teviot Road, Millers Flat	Sections 84, 90, 91, 102 & 106 Block VIII Benger Survey District
Matthew Ross Hunter, Georgia Rose Parker	1534 Teviot Road, Millers Flat	Part Section 96 Block VIII Benger Survey District
Gabrielle Claire Campbell-Lloyd, Gareth David Wilson	1406 Teviot Road, Millers Flat	Lots 2-4 Deposited Plan 375668
Laurie Allan Crawford, Pamela Fay Crawford	1346 Teviot Road, Millers Flat	Sections 40, 93 & 97 Block VIII Benger SD Part Section 89 Block VIII Benger Survey District
Chika Matsuno Liyanarachchi, Gregory Asoka Liyanarachchi	1403 Teviot Road, Millers Flat	Section 34 Block VIII Benger SD

5.3 Permitted baseline

Sections 95D(b), 95E(2)(a) and 104(2) of the RMA provide discretion to Council (for the purposes of forming an opinion as to actual or potential effects) to disregard any adverse effects of the proposal on the environment (or on a person) if the District Plan or National Environmental Standard permits an activity with that effect.

The District Plan recognises the Rural Resource Area as an area with a district environmental character, where activities may locate that are reliant on the rural resource. The permitted baseline provides guidance as to the activities and effects that may occur as part of the anticipated rural environment. Activities which would be permitted as of right by the District Plan, relevant to the proposal, are set out below.

- Rule 4.7.6E sets out noise standards that are applicable to all activities, except temporary activities, emergency service sirens, audible bird deterrents and frost

protection devices (the latter two are subject to separate criteria). Examples of permitted activities that could be undertaken as of right and could feasibly occur on the subject site include tree felling (i.e., with use of bulldozers and excavators) and farming activities (for example, operation of farm machinery, fencing, and use of diggers for drainage work).

- Standard 4.7.6A permits buildings and structures up to 10 metres in height, provided the colour and finish requirements are met under Standard 4.7.6D are met and the structure does not protrude onto a skyline. It is feasible to construct structures on this site that comply with these requirements, such as sheds or grain silos.

- Standard 4.7.6F permits storage areas, including contractors' yards and temporary stockpiles for a duration of up to six months, provided these are screened from public spaces or adjacent sites. While these could occur as of right behind bunding on this site, the bunding itself may require resource consent. In limited locations on the site, areas are sufficiently screened by topography and/or established vegetation to enable stockpiling and storage areas that would comply with this rule.

- Standard 4.7.6J(a) permits earthworks for access tracks, without any limit on volume or area, provided that tracks are constructed to certain specifications. These specifications would be achievable for farm access tracks.

- Standard 4.7.6J(b) (Earthworks for Extraction and Displacement Activities) permits up to 2,000m^2 and 3000m^3 of earthworks per site in relation to extraction and displacement activities, excluding the construction of access tracks. There are 15 sites included in the project area, and so the maximum quantities of permitted earthworks are 30,000m^2 and 45,000m^3, noting these would need to be evenly spaced across the 15 sites in order to be permitted.

The proposal has been developed to operate in alignment with the District Plan standards, as far as possible. For example, structures will be constructed to align with the design guidelines to be unobtrusive, bunding is proposed in order to alleviate views to the stockpiling and mining activity on site, and operating hours have been selected to align with noise standards.

Overall, it is considered that the above permitted baseline presents a useful comparison as to the nature and scale of activity that could be carried out on the site and the associated actual or potential adverse effects, and adds to understanding of outcomes anticipated in the rural environment.

5.4 Visual amenity and landscape character effects

The Applicant has engaged Mike Moore Landscape Architect, to prepare a landscape effects assessment report (**Attachment [L]**). The site is within an 'other rural landscape', i.e., not within an outstanding or significant natural landscape. The District Plan Objective 4.3.3 seeks to: *maintain and where practicable enhance rural amenity*

values created by the open space, landscape, natural character and built environment values of the District's rural environment, and to maintain the open natural character of the hills and ranges.

Mr Moore advises that the site is not in an area of significant landscape quality and sensitivity to mining is lowered considering the extent that is has already been subject to mining and quarrying. The site's position between the Clutha Gold cycle trail and Teviot Road increases its sensitivity to visual amenity impacts.

Mr Moore advises that the proposal does not affect the open natural character of the hills and ranges, and the effects of the proposal are on the already modified valley landscape, in particular characteristics of openness, naturalness and rural amenity. The mitigation measure recommended by Mr Moore minimise adverse effects to the extent practicable. The recommended mitigation measures are:

- Limit the consent duration to 10 years and require rehabilitation to be undertaken within that timeframe.
- Grassed earth bunds to 4m high, shall be established to assist with screening of the working area of the mining works from Teviot Road.
- Gravel stockpiles shall be no higher than 7m.
- Progressive rehabilitation of areas where mining is complete, with land contoured to blend with the surrounding land and established in pasture.
- Removal of all buildings, roadways, stockpiles, plant and bunds on completion of mining.
- 20m minimum setback from the Tima Burn.
- Containers / buildings on the site to be finished in Resene Iron Sand (LRV 9%) and the container shelter fabric to be painted dark green.

Overall Mr Moore concludes that the effects on landscape amenity are:

- Adverse / moderate (more than minor) – adverse / high (significant) for the operational period, from nearby locations (e.g., Teviot Road and the cycle trail).
- Adverse / moderate-low (minor) – adverse / moderate (more than minor) for the operational period, from more distant locations (e.g., Oven Hill Road).
- Nil or positive following rehabilitation.

These conclusions are subject to the mitigation measures recommended by Mr Moore, which the Applicant proposes to adopt.

5.4.1 Temporary buildings

The following assessment relates specifically to the temporary building (workshop formed from containers and the shelter/canopy described in section 3.7 and **Figure 10**), which will not comply with the District Plan Standard 4.7.6D due to the nature of

the material forming the canopy. Other temporary buildings will comply with the District Plan requirements.

Mr Moore has provided advice that the container shelter canopy should be a dark green colour and considers that this will assist with the visual integration of this structure with the other temporary buildings on the site and minimise its prominence. The Applicant adopts this recommended mitigation.

The workshop structure will be partly screened from external viewpoints due to the bunding proposed around the site, but due to its height, it will likely be visible in some locations. Visible structures of similar height are anticipated by the District Plan in the Rural Resource Area (refer to section 5.2 above), hence the workshop is not considered to be out of character with local context.

Temporary buildings, including the workshop / container shelter, will be removed on completion of the mining project. Mr Moore concludes that following rehabilitation there will be no residual adverse landscape effects.

5.5 Effects of earthworks

5.5.1 Dust effects

Attachment [I] is a Dust Management Plan (**DMP**) for the operation. Dust will be controlled on site in accordance with good industry practise, including use of water carts as necessary, slow vehicle speeds on unsealed roads and establishing vegetation on the bunds. A moving mine cell method of operation will ensure progressive rehabilitation of the site and limit the active work area to approximately 12ha at a time.

Water for dust control will be sourced from dewatering of the mine pit. At least 30L/s (continuous) will be dewatered from the pit and discharged to a sediment treatment pond and then to an infiltration basin. The necessary water and discharge resource consent applications are in process with ORC. Dust management will be undertaken with a 40,000L water tanker which is sufficient to undertake a circuit of the maximum anticipated exposed area of the mine over approximately 40 minutes. The tanker can then refill and repeat as necessary.

The Applicant will have access to a weather monitoring station and dust monitors with telemetered data that can be monitored electronically. Real time wind and dust information will be telemetered, with notifications to the Site Manager or their delegate when wind speeds or dust deposition rates are above the trigger values specified in the DMP.

Air Matters have reviewed the DMP (**Attachment [M]**) and conclude that the proposed controls are well described and generally in accordance with best practises. Air Matters provide the following recommendations for improvements to the DMP:

- Add identification of specific risks and controls where work is undertaken within 250m of existing residences.

- Locate the wind anemometer between 4-8m height. A stop work wind speed trigger of 10m/s is appropriate, but this may be increased and should be adapted using visual observations and the boundary dust monitoring.
- Deployment of two real-time particulate monitors at the boundary of the site.
- Include the following standard form templates in the DMP: complaints investigation form, daily and weekly dust monitoring plan observations, and a real-time dust level exceedance investigation form.

Air Matters conclude that, subject to the implementation of the recommendations, dust emissions will be appropriately controlled beyond the site boundary.

The recommendations have been incorporated into the DMP (Revision dated 16 October 2023) (**Attachment [I]**)).

5.5.2 Noise effects

The Hegley Acoustic Consultants have assessed the noise effects of this proposal with their recommendations and conclusions detailed within the Noise Report appended as **Attachment [H]**. Their key conclusion is that the bunds will ensure that sound from the mining activities will comply with the District Plan daytime noise provisions, provided bunds as specified are constructed. The Applicant agrees to construct the bunds recommended in the noise report.

5.5.3 Vibration effects

A vibration assessment as requested has been undertaken by a suitably qualified and experienced consultant. The vibration assessment is appended as **Attachment []**. The vibration report concludes that vibration effects will be well within a reasonable level.

5.5.4 Effects on land stability

The earthworks design will focus on avoiding steep slopes and areas of instability which will enable works to occur with minimal disruption at all times of year and little impact on slope stability. No earthworks will occur during high rainfall events and any areas that suffer damage from storm events will be restabilised so as to avoid further damage. Mine pit detailed design will be undertaken informed by geotechnical expertise as necessary to maintain pit stability.

5.5.5 Effects on waterbodies

No earthworks will be undertaken within 20m of flowing watercourses to protect water quality. A 20-metre setback is proposed to the Tima Burn. Works are located on a terrace above the Clutha Rier / Mata-au. As such, any adverse effects on water quality and freshwater ecological values will be avoided.

5.6 Soil disturbance in a HAIL site

The Applicant proposes to undertake earthworks within a 'piece of land', as defined in the NESCS. The area was used as a stockyard in the 1970s.

Given the discrete nature of the 'piece of land', the Applicant proposes to manage the potential effects on human health and the environment by way of conditions. The Applicant proposes to engage a Suitably Qualified Environmental Professional (**SQEP**) to undertake soils testing and create a Site Management Plan (**SMP**) which addresses:

- A summary of testing undertaken and reporting on any contaminant concentrations compared to the appropriate standards.
- Mitigation methods to address any risk posed by contaminants to human health.
- Suitability of retaining soil on site, and any recommended mitigation measures for soil placement within rehabilitated areas.
- Monitoring and reporting on actions required by the SMP.

5.7 Transport effects

The site has frontage to Teviot Road, two un-named public gravel access roads and paper road as indicated in **Figure 2**. Vehicle access to the site will be provided from Teviot Road only, via an existing formed gravel access road.

Teviot Road is a two-way, two-lane, sealed road with a north-westerly to south-easterly alignment and is classified as an Arterial Road under the District Plan. Teviot Road is signposted with a 100km per hour speed limit with no cyclist or pedestrian infrastructure, and no on-road parking.

Abley have provided a transport assessment report (**Attachment [O]**) that addresses traffic safety effects of the proposal and use of the vehicle accesses. Abley have assessed the additional traffic generation in section 5.2 of their report and concluded that the additional vehicle movements generated by the proposal are well within the capacity of the adjacent road network and will not reduce road safety performance.

Abley recommend that the vehicle accesses are sealed for a distance of 5m from Teviot Road and adequately drained; the Applicant adopts this mitigation.

Abley conclude that the application is supportable from a traffic engineering perspective.

5.8 Effects of scale of activity on rural character

Standard 4.7.6B(b) states that no more than 3 persons shall be engaged in any activity of a commercial, industrial, or manufacturing nature within the Rural Resource Area, and no person shall be engaged in any activity of a commercial, industrial, or manufacturing nature within the Rural Residential Zone. A reason for these

requirements is that commercial, industrial, or manufacturing natured activities have the potential to significantly affect the character of the rural environment.

The mining activity will operate on Monday to Friday 7am – 7pm and Saturday 7am – 1pm with up to 20 staff. Machinery maintenance and dust control activities will occur outside of these core operating hours. The staff activities will be spread across the large site with a focus of activity around the site office, workshop and storage areas which will be largely screened by the bunds or undertaken underground.

Vehicle movements will be concentrated at the start and finish of the day as staff arrive and depart the site in cars. Staff will be based in the surrounding towns, and it is likely that a car-pooling arrangement will be made for travel to the site. Even in a conservative assessment scenario where all staff travel to site individually in a car, the number of vehicle movements is not considered to be disruptive to the character of the rural environment.

The Applicant estimates an average of two heavy vehicle movements per day once the mine is established. The number of heavy vehicle movements is not considered to be noticeably greater than that which could normally occur in the surrounding environment, given stock trucks, machinery and other heavy vehicles are a normal part of the rural environment.

Effects on the existing rural character of the locality will be mitigated by the activities undertaken on the site being largely screened or underground, bunding around the site perimeter providing mitigation of noise and visual effects, and appropriate hours of operation.

5.9 Effects on cultural values

The Kāi Tahu Ki Otago Natural Resource Management Plan 2005 (**NRMP**) Section 5.4.6 sets out considerations for mining applications, which are addressed in further detail in **Section 6.3.1** below.

The Applicant has designed the mining operations to avoid any known features that may have significant cultural values, by including setbacks from the Tima Burn and Clutha River.

There are no sites of cultural significance recorded in the District Plan or NRMP within the project area. The Applicant accepts an Accidental Discovery Protocol forming a condition of consent to mitigate against any potential discovery.

Mined land will be rehabilitated to the same or better standard, and the proposal avoids any known potentially contaminated sites to avoid any potential hazardous substances.

The Applicant has sent copies of their application to Aukaha in September 2022, met with Aukaha on 8 August 2023, and invited Kā Rūnaka representatives to a hui on site on 6 October 2023, which was cancelled due to non-attendance.

The Applicant understands that Aukaha has identified concerns with the proposal and consultation is ongoing.

5.10 Effects on archaeological values

The Applicant has commissioned Heritage Properties Limited to undertake an archaeological assessment over the project area and apply for an archaeological authority (if necessary). The Applicant accepts an accidental discovery protocol condition on the District Council consent subject of this application. There are no notations in the District Plan identifying any archaeological values within the site area.

5.11 Effects on public access

The proposal will have the effect of restricting public access to paper roads within the site, one of which provides access to the Clutha River / Mata-au. The work will also impact the Clutha Gold cycle trail.

The Applicant has undertaken to operate the mine in a manner which will provide for a similar level of local public access, and this is reflected in the proposal design and mitigation.

5.11.1 Paper Roads

There are two paper roads affected by the works, identified in **Figure 12** below, which will be referred to as the northern and southern paper road.

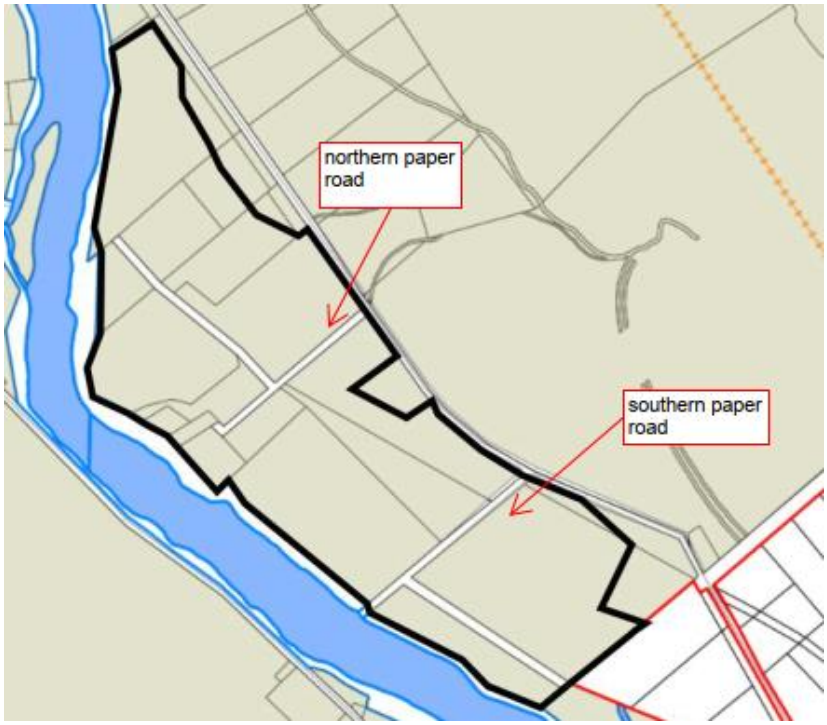


Figure 12 Site outline showing paper road locations.

The northern paper road provides access to private properties, and the owners of these properties are all party to an access agreement with the Applicant. The northern paper road does not provide through-access to any other public road, nor the Clutha / Mata-au.

The southern paper road provides access to private properties, and the Clutha River / Mata-Au. The owners of the properties accessed from this paper road have also provided written approval to the application.

Various people use this southern paper road for access to the Clutha River / Mata-Au for recreational purposes, fishing access, and also the Clutha cycle trail traverses part of this paper road.

The Applicant's will provide a separate temporary river access for the general public over a rehabilitated part of the work site to the north of the existing river access, or over unmined land to the south, when the mine reaches a stage of impacting on this paper road. The Applicant will erect signage to inform the public of the duration of the closure of the paper road, and the location of the alternative access. A condition of consent is proposed as follows:

> *The consent holder shall ensure that mining work does not prevent public access to the Clutha River / Mata-Au across the site. Prior to restricting public access to the Clutha River / Mata-Au via the paper road adjacent to 1534 Teviot Road, Millers Flat, the consent holder will provide an alternative public access route to the Clutha River / Mata-Au within 1km and constructed to a similar standard. Signage shall be erected explaining the duration of closure and location of the alternative access.*

5.11.2 Cycle Trail

The Applicant has discussed the proposal extensively with the Clutha Gold Charitable Trust, who are responsible for the operation of the Clutha Gold cycle trail and has committed by way of private agreement with the Trust to:

- Provide a diversion of the cycle trail across private land owned by the Applicant and public road.
- Ensure that there will always be a trail for use by the Trust.
- Reinstatement of the existing trail on completion of mining.

The above principles can be incorporated as a condition of consent as follows:

> *The consent holder shall ensure that mining work does not prevent public access to the Clutha Gold cycle trail. The cycle trail may be temporarily diverted to enable ongoing public use and access.*

The effect of this condition is that public access to the cycle trail will be maintained.

5.12 Flood hazard effects

The site is located within an area noted for flood hazard within the District Plan maps. Geosolve have provided a Flood Hazard Assessment Report (**Attachment [P]**).

Geosolve conclude that flooding within the mine pit is unlikely and, if it did occur, there would likely be an extended warning period as the river rises, which would enable the evacuation and / or protection of staff and machinery. Flooding of the mine pit would have the overall effect of attenuating flood waters, thereby having a net positive effect on downstream flooding.

Geosolve further conclude that there is no reduction in floodplain capacity due to the setbacks proposed from the waterway, positioning of the bunds and reinstatement of the site following completion of mining.

Overall, the existing capacity of the floodplain is protected, and the proposal will not exacerbate any effects of flooding on private property or the wider environment. In the unlikely event that the mine pit is flooded, internal damage is able to be managed or remediated by the Applicant without effect on the wider environment.

5.13 Effects of hazardous substance storage

Up to 60,000 litres of diesel storage will occur on site to fuel the machinery, where the permitted quantity is 10,000 litres. Diesel will be stored on the site in a containment facility compliant with Health and Safety at Work (Hazardous Substances) Regulations 2017, including in a double skinned tank that has an appropriately sized secondary containment (bunded) area.

The diesel will be stored on flat land near the workshop. The storage location will be outside of the flood hazard areas identified in the district plan, and setback from the active mine pit.

It is noted that the District Plan pre-dates current hazardous substance control legislation, and that the provisions of the Health and Safety at Work (Hazardous Substances) Regulations 2017 are considered to appropriately manage the activity.

5.14 Positive effects

The proposed works will have positive effects, providing employment to approximately 20 people and with flow on social and economic benefits to the wider community.

5.15 Conclusion

In consideration of the abovementioned matters, it is considered that there are no persons that will be adversely affected by the proposed development. Any potential for adverse effects can be appropriately avoided, remedied, or mitigated, and will be less than minor in the context of the receiving environment.

6 Statutory assessment

6.1 Section 95, RMA

6.1.1 Section 95A assessment

Section 95A of the RMA considers the need for public notification and sets out four steps in a specific order to be considered in determining whether to publicly notify.

In terms of Step (1), the Applicant requests public notification of this application. In accordance with s95A(2)(a), the consent authorities must publicly notify the application.

6.1.2 Section 95B assessment

An assessment under s95B is not required as the application is to be publicly notified.

6.2 Section 104(1), RMA

Section 104 (1) of the RMA requires that the consent authority must, subject to Part 2, have regard to a range of matters when considering an application. Section 5 of this AEE addresses the matters contained in Section 104 (1) (a) and (ab).

Section 104(1)(b) of the RMA requires that the provisions of any national policy statement, the Operative Plan, or any other matter the consent authority considers relevant and reasonably necessary, to be considered when assessing an application. Therefore, the Otago Regional Policy Statement, Proposed Otago Regional Policy Statement and District Plan require consideration. No National Environmental Standards are considered relevant to this application. The key objectives and policies outlined in the abovementioned document are set out below.

6.2.1 National Policy Statement for Highly Productive Land 2022 ("NPSHPL")

The NPSHPL was gazetted on 19 September 2022 and is in effect from 17 October 2022.

The site has not been identified or classified in any Regional Policy Statement ("**RPS**") or District Plan as Highly Productive Land ("**HPL**"). Section 3.5(7) sets out criteria for identifying HPL, prior to maps of HPL being included in an operative RPS. In regard to these criteria:

- The site is zoned rural general.
- The site comprises land with land use capability class 4 and 7.
- The site is not identified for future urban development or subject to a plan change.

As none of the site comprises land with land use capability class 1-3, the NPSHPL is not relevant.

6.2.2 Otago Regional Policy Statement (2019)

The Otago Regional Policy Statement is a higher order planning document intended to provide guidance and focus to lower order planning documents, identifying issues across the Region, with the objectives and policies providing greater clarity and direction as to how issues are to be addressed. Those policies of most relevance to the proposal are identified as follows.

Objective 3.1 seeks to recognise, maintain, and enhance where degraded, the intrinsic values of ecosystems and natural resources. **Policy 3.1.7** safeguards the life-supporting capacity of soil and requires that production soil fertility is maintained or enhanced. The application site is currently production land and will be returned to pastoral production on completion of mining, with the topsoil being stockpiled for future re-use. **Policy 3.1.8** seeks to minimise soil erosion, which will be achieved by vegetating soil stockpiles and undertaking progressive rehabilitation.

Objective 5.1 states that public access to areas of value to the community is to be maintained or enhanced. **Policy 5.1.1** requires that public access to the natural environment, including rivers, is maintained unless restricting access is necessary for nominated reasons in the policy, including the protection of public health and safety. Public access to the Clutha River / Mata-Au will be maintained by providing nearby alternative access to the general public, when mining reaches a stage such that temporary closure of the existing public access via the southern paper road is necessary. The existing public access will be reinstated as part of the rehabilitation programme.

Objective 5.3 seeks to ensure that sufficient land is managed and protected for economic production. **Policy 5.3.1** seeks to manage activities in rural areas, to support the region's economy and communities, by providing for mineral exploration, extraction and processing (clause (b)). **Policy 5.3.4** further recognises "*the functional needs of mineral exploration, extraction and processing activities to locate where the resource exists*". Policy 5.3.4 is thereby critical to the proposal as the subject site has been specifically selected based on the potential mineral value present, thereby voiding the possibility of alternative site selection. The proposal seeks, where possible to avoid and mitigate potential adverse effects of the proposed works in a manner that still enables mineral extraction and processing to occur.

Objective 5.4 seeks to minimise addresses adverse effects of using and enjoying Otago's natural and physical resources. **Policy 5.4.8** sets out a management regime specific to mineral extraction and processing, giving preference to avoiding location such activity in specified, high-value areas. This activity is not located in any of the high-value areas identified in clause (a) of the policy. Clause (c) of the policy further requires that mineral extraction activities avoid effects on the health and safety of the community. This proposal achieves this by isolating the work site from the public, mitigating effects of dust, and meeting appropriate transport requirements. The

proposal includes progressive rehabilitation of the site in accordance with clause (f) of the policy.

Overall, the proposal is deemed to be consistent with the objectives and policies of the RPS.

6.2.3 Proposed Regional Policy Statement (pRPS)

The pRPS 2021 was notified on 26 June 2021 and hearings were closed on 17 October 2023. The notified version of the pRPS is used for this assessment. It is anticipated that a decisions version of the pRPS may be available following notification.

Significant resource management issue 10 (SRMR-I10) identifies:

> *"Agriculture, fishing and minerals extraction support employment and economic well-being but also change landscapes and habitats."*

The site is located within the Clutha River / Mata-au FMU, and Roxburgh rohe. **Objective LF-VM-O2** identifies a vision that the Clutha River / Mata-Au FMU is recognised as a single connected system, that freshwater is managed in accordance with the LF-WAI objectives and policies, and that the ongoing relationship of Kāi Tahu with wāhi tūpuna is sustained. **Objective LF-WAI-O1** seeks to protect the mauri of Otago's water bodies. In regard to this application, earthworks are set back from waterbodies and no physical works in waterbodies is proposed.

Objective LF-LS-O11 requires that soil resources are safeguarded, and the capacity of highly productive land is maintained. In the case of this proposal, topsoil will be separately stockpiled, and the land returned to pastoral use on rehabilitation of the mine.

Objective LF-LS-P22 provides for public access along lakes and rivers, and only restricting access where necessary for health and safety (and other) reasons. Public access will be maintained by providing an alternative nearby public access during mining.

6.2.4 District Plan

The objectives and policies in the District Plan that are of direct relevance to this Application are identified below.

Chapter 4 of the District Plan is specific to the Rural Resource Area. **Objective 4.3.1** outlines the need to enable communities to provide for their social, economic and cultural wellbeing whilst also ensuring environmental quality is maintained. The proposal will add to the economic and social wellbeing of local people and businesses by creating jobs and local economic benefit. Environmental quality can be maintained by appropriately mitigating the effects of the proposal.

Objective 4.3.3 discusses the need to protect the rural amenity values of the district created by open space, landscape, natural character and built environment values. Supporting **Policy 4.4.2** seeks to manage effects through a number of measures.

Relevant to this proposal is that views of the activity will be mitigated by bunds and much of the actual mining activity will be below ground level. No permanent structures are proposed, and the land will be recontoured to its former state on completion of mining, thereby maintaining the quality of the environment and protecting the openness of the landscape. Effects on the amenity values of adjoining properties, including noise, dust, traffic and activity, will be avoided, remedied or mitigated as described in this application.

Policy 4.4.8 relates to the potential for effects to be observed from neighbouring properties and requires that these are not significant. Effects of noise, dust, traffic generation have been assessed in section 5 above. The privacy of neighbours will not be affected due to the separation distances between the rural properties. The safe and efficient operation of the roading network will be maintained considering the small number of additional vehicles that will arise as a result of the proposal.

Objective 4.3.4 seeks to maintain and enhance public access to recreation resources. **Policy 4.4.13** promotes the provision of public access opportunities to significant natural features, including for recreational purposes. The Application provides alternative access while the existing public river access is unavailable due to mining.

Objective 4.3.6 requires the preservation of the natural character of water body margins, and this proposal will achieve that with separation distance between the mining operation and waterbodies.

Objective 4.3.7 relates to the maintenance of soil resources. **Policy 4.4.6** is specific to protecting soil resources seeking to ensure that erosion, instability and loss of soil resources will not occur. All areas of exposed soil will be battered, and topsoil will be stockpiled separately for rehabilitation.

Chapter 12 of the District Plan addresses District Wide matters. **Objective 12.3.1** promotes the safe and efficient operation of the district's roading network. Supporting **Policy 12.4.1** requires safe and efficient access points to the roading network, and off-street parking, loading and manoeuvring space. It is considered that the proposal achieves these matters given the small increase in traffic anticipated which will utilise existing vehicle access points, and the provision of on-site parking and manoeuvring space.

6.3 Section 104(1)(c) of RMA

6.3.1 Kāi Tahu Ki Otago Natural Resource Management Plan 2005

The Kāi Tahu Ki Otago Natural Resource Management Plan 2005 (**NRMP**) is the relevant iwi management plan to the application site area.

Chapter 5 sets out issues, objectives and policies. Impacts on water will be addressed through the groundwater study currently in process (that will form part of the application to ORC). There are no identified wāhi tapu sites in the application site area, though the

Applicant adopts an accidental discovery protocol condition and is separately seeking advice from an archaeologist and consultation with Kā Rūnaka is ongoing.

Section 5.4.6 notes that mining is to be discouraged within landscapes of cultural significance or highly visible landscapes. The application site area is not considered to be highly visible and setbacks from known culturally important features, namely the Clutha River / Mata-Au have been proposed.

Section 5.4.6 (17) further states that all applications for mining should include the following:

i. site rehabilitation plans that include the planting of indigenous species and address long term concerns; and
ii. requirement for screening off of the work site; and
iii. prevention or reduction of vibration, dust, noise, soil and water contamination; and
iv. restriction of the hours during which explosives may be used;
v. provision for the containment of all waste discharges from mining operation.

The Applicant proposes to rehabilitate the site to its current state (as farmland), which does not include any planting of indigenous species. The remediation proposed enables the intended end use of the land as farmland. The work site will be screened, and effects of noise and dust appropriately managed, as described through this application. No explosives are proposed to be used, and any waste from the operation will be natural material that will be replaced in the pit. No chemicals are to be used in the mineral extraction process and so the project will not generate contaminated waste.

Section 5.4.6 (19) requires that earthworks mitigate effects on landform, soil instability and other adverse effects. These matters have been addressed in the application, and appropriate mitigation for the effects have been proposed. There will be no impacts on significant natural landforms or areas of indigenous vegetation.

Overall, it is considered that this application appropriately addresses the key matters identified by the NRMP.

6.4 Purpose and principles of the RMA

We understand from recent case law that a consent authority is generally no longer required to consider Part 2 of the RMA beyond its expression in the relevant statutory documents. Notwithstanding this and noting the requirements of Schedule 4 of the RMA, we provide the following assessment against Part 2 of the RMA.

The purpose of the RMA, as set out under Section 5 (2) is to promote the sustainable management of natural and physical resources. The relevant matters in Sections 6, 7 and 8 of the RMA also require consideration. Section 6 identifies matters of national importance under that need to be recognised and provided for in this application:

(d) the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:

This proposal provides for alternative nearby public access to the Clutha River / Mata-Au while the existing public access is disrupted due to mining activity.

(d) the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:

Consultation is ongoing in relation to these matters; however, the Applicant's preliminary investigations have not identified any wāhi tapu or other known sites of cultural significance within the project area. The Clutha / Mata-au has cultural significance and protection of this is incorporated into the proposal by way of setbacks from the activity.

The RMA specifies that particular regard shall be had to the relevant other matters listed in Section 7 including:

(b) the efficient use and development of natural and physical resources:

(c) the maintenance and enhancement of amenity values:

(f) maintenance and enhancement of the quality of the environment:

(g) any finite characteristics of natural and physical resources:

The proposal will result in the efficient use of land resources in a manner that will protect and maintain amenity values and the quality of the natural environment, whilst also recognising the finite nature of natural and physical resources. All land will be rehabilitated upon completion of works. This proposed activity will create further social and economic benefits to the region.

Section 8 requires that the principles of the Treaty of Waitangi are taken into account. In giving effect to the principles of the Treaty of Waitangi, this application has assessed effects of the Clutha River / Mata-Au Statutory Acknowledgement Area, and proposed mitigation in the form of setbacks to protect values associated with the river. Assessment of the proposal against the NRMP has been undertaken and the Applicant has sought to engage with Kā Rūnaka and Aukaha. Consultation remains an ongoing process.

For the reasons outlined in this report, the proposal is consistent with the purpose and principles under Section 5, and the associated matters under Part 2 of the RMA. The proposal represents an efficient use of natural and physical resources, and will be undertaken in a manner which avoids, remedies and mitigates adverse effects on the environment. It is considered that the proposal is consistent with the purpose and principles of the RMA and accords with the definition of sustainable management.

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**OT18C/235**
Land Registration District	**Otago**
Date Issued	10 October 1997

Estate	Fee Simple
Area	3.7620 hectares more or less
Legal Description	Section 3 Survey Office Plan 24438
Registered Owners	
Alan Thomas Parker	

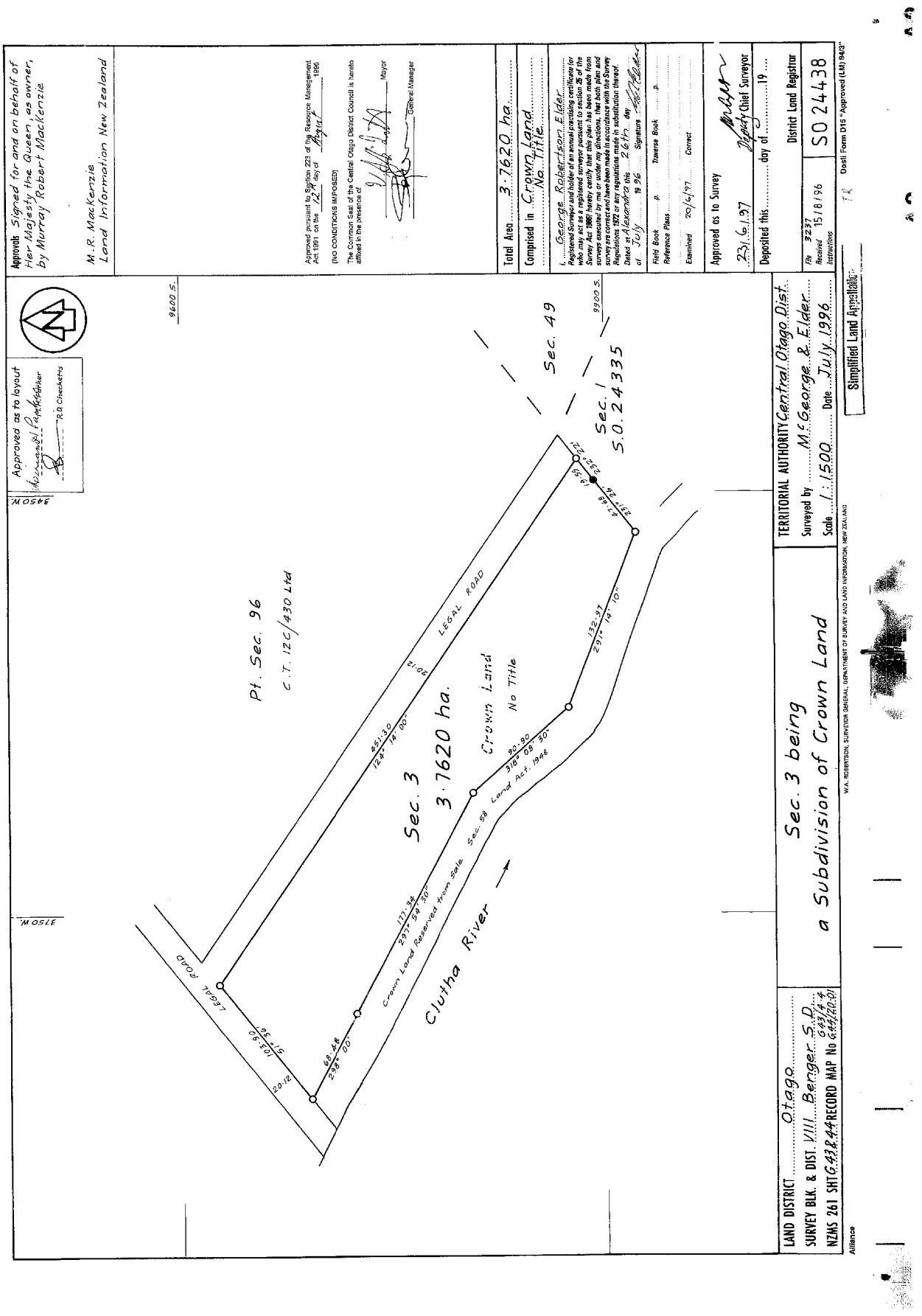
Interests

Subject to Section 8 Mining Act 1971

Subject to Section 5 Coal Mines Act 1979

Subject to Part IV A Conservation Act 1987

10132653.2 Mortgage to Heartland Bank Limited - 30.7.2015 at 11:54 am


Approved Signed for and on behalf of Her Majesty the Queen, as owner, by Murray Robert Mackenzie
M.R. Mackenzie
Land Information New Zealand
Approved as to layout
Total Area 3.7620 ha.
Comprised in Crown Land No Title
Approved as to Survey
23.6.97
Deposited this day of 19
District Land Registrar
File 3237
Received 15/8/96
SO 24438
Dosli Form D15 "Approved (LM) 9423"
Simplified Land Appellation
TERRITORIAL AUTHORITY Central Otago Dist.
Surveyed by Mc George & Elder
Scale 1:1500 Date July 1996
LAND DISTRICT Otago
SURVEY BLK. & DIST. VIII Benger S.D.
NZMS 261 SHT G43 & 44 RECORD MAP No 6441 & 6442
Sec. 3 being a Subdivision of Crown Land
W.A. ROBERTSON, SURVEYOR GENERAL, DEPARTMENT OF SURVEY AND LAND INFORMATION, NEW ZEALAND
Pt. Sec. 96
C.T. 12C/430 Ltd
Sec. 3
3.7620 ha.
Crown Land
No Title
Sec. 49
Sec. 1
S.O. 24335
LEGAL ROAD
Clutha River
Crown Land Reserved from Sale Sec. 58 Land Act 1948
451.30
124° 14' 00"
21.02
171.34
297° 58' 30"
68.48
298° 00'
20.12
105.98
91° 58'
90.90
318° 08' 30"
132.97
297° 14' 10"
47.48
291° 28'
9600 S.
9900 S.
3450W.

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **OT380/99**

Land Registration District **Otago**

Date Issued 07 July 1955

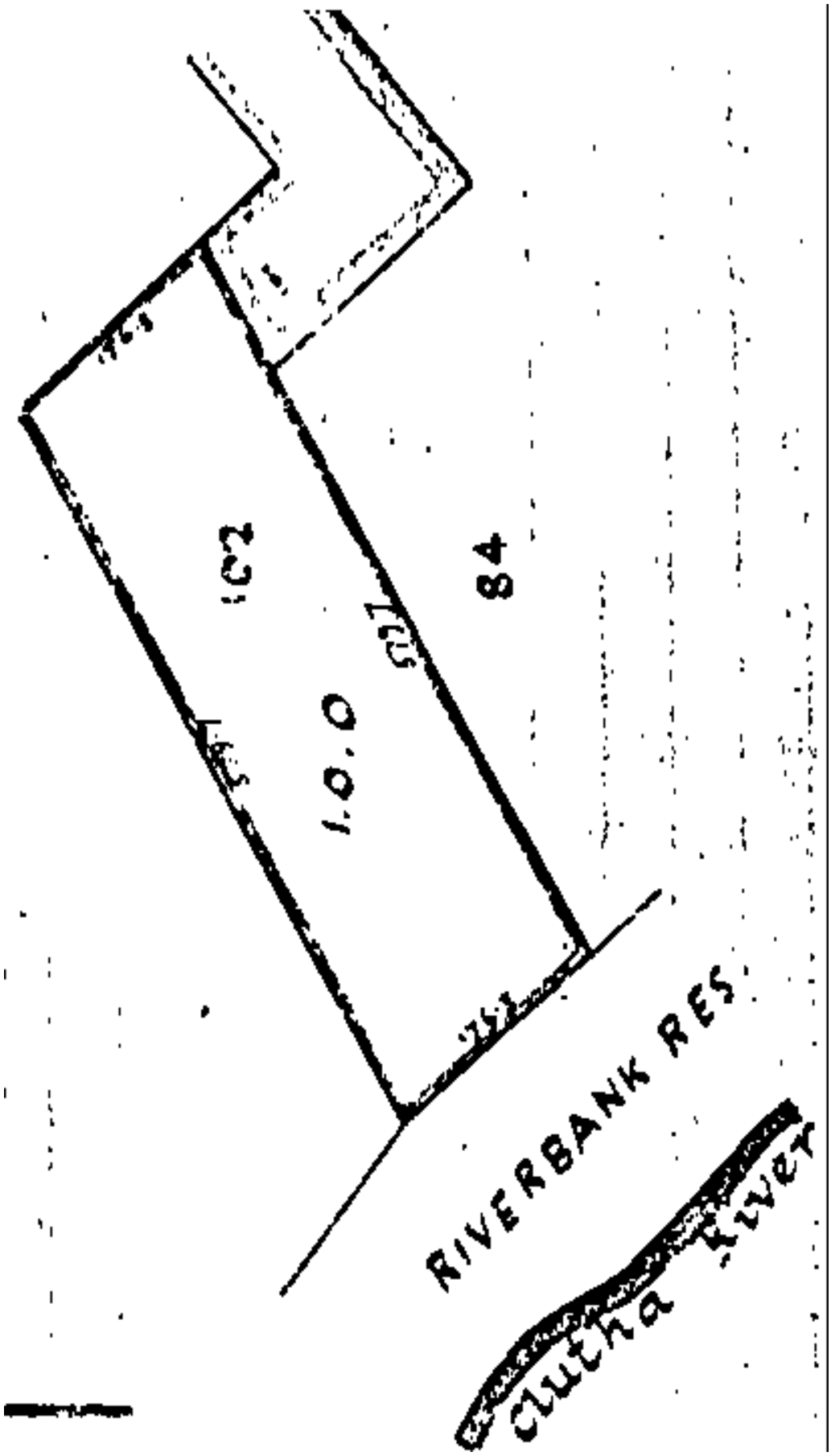
Prior References
OTPR25/245

Estate	Fee Simple
Area	4047 square metres more or less
Legal Description	Section 102 Block VIII Benger Survey District

Registered Owners
Jacks Ridge Limited

Interests

Subject to Section 59 Land Act 1948


84
1,032
1,010
RIVERBANK RES
Clutha River

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**OT360/183**
Land Registration District	**Otago**
Date Issued	08 October 1952

Prior References
OTPR24/1

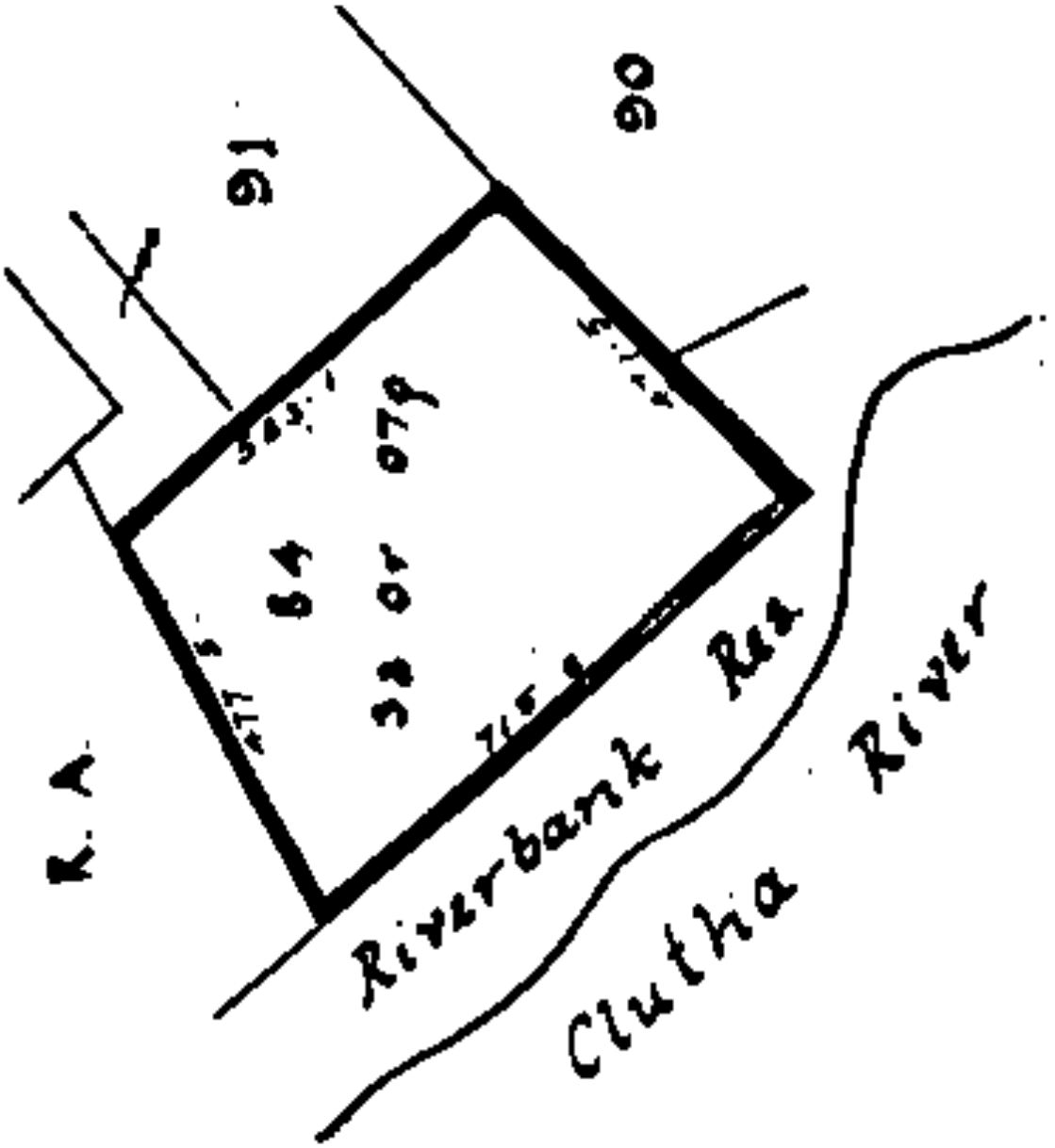
Estate	Fee Simple
Area	1.2318 hectares more or less
Legal Description	Section 84 Block VIII Benger Survey District

Registered Owners
Jacks Ridge Limited

Interests

Saving and excepting all minerals within the meaning of the Land Act 1924 on or under the land and reserving always to Her Majesty the Queen and all persons lawfully entitled to work the said minerals a right of ingress egress and regress over the said land

Subject to Section 315 Land Act 1924


90
91
Riverbank Rd
Clutha River

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**241193**
Land Registration District	**Otago**
Date Issued	08 September 2005

Prior References
OT8C/1327

Estate	Fee Simple
Area	9.7036 hectares more or less
Legal Description	Section 110, 118 Block VIII Benger Survey District

Registered Owners
Alan Thomas Parker

Interests

Subject to Section 59 Land Act 1948

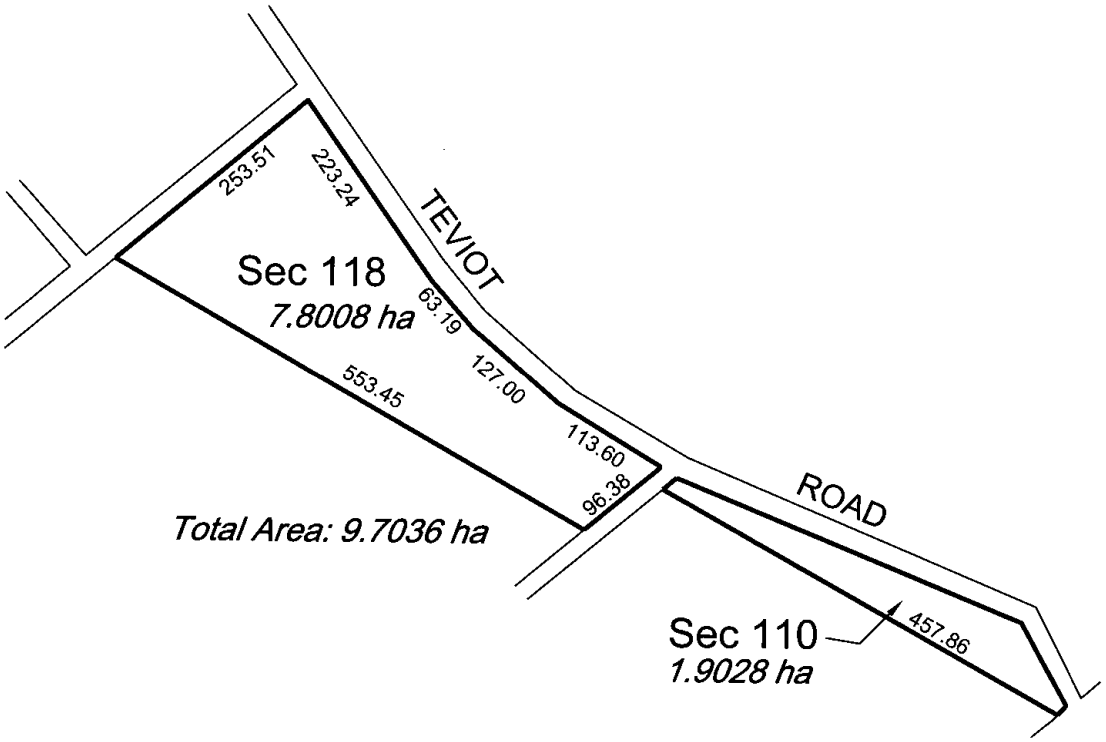
Subject to Section 241(2) Resource Management Act 1991 (affects DP 356314)

10132653.2 Mortgage to Heartland Bank Limited - 30.7.2015 at 11:54 am

Title Diagram CT 341193

Cpy – 01/01, Pgs – 001, 09/09/06, 09:53

DocID 1106664954



RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Limited as to Parcels
Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **OT12C/430**
Land Registration District **Otago**
Date Issued 30 March 1989

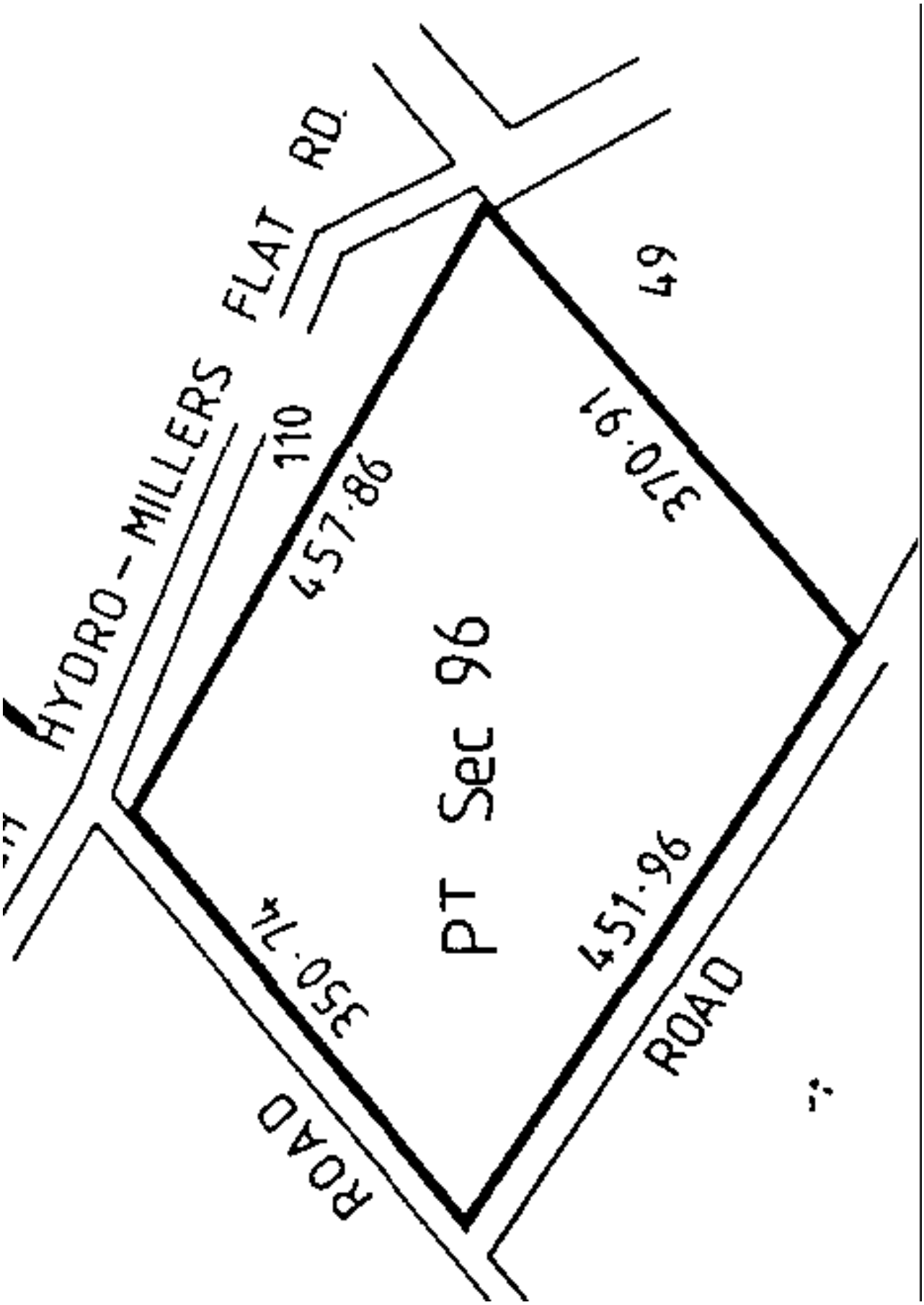
Prior References
OT304/59

Estate Fee Simple
Area 15.5602 hectares more or less
Legal Description Part Section 96 Block VIII Benger Survey District

Registered Owners
Georgia Rose Parker and Matthew Ross Hunter

Interests

12255482.3 Mortgage to ANZ Bank New Zealand Limited - 8.11.2021 at 3:40 pm


FLAT RD.
HYDRO - MILLERS
110
457.86
370.91
69
PT Sec 96
350.74
451.96
ROAD
ROAD

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **OT230/94**

Land Registration District **Otago**

Date Issued 07 August 1928

Prior References

OTPR20/73 WA 5/61

Estate Fee Simple

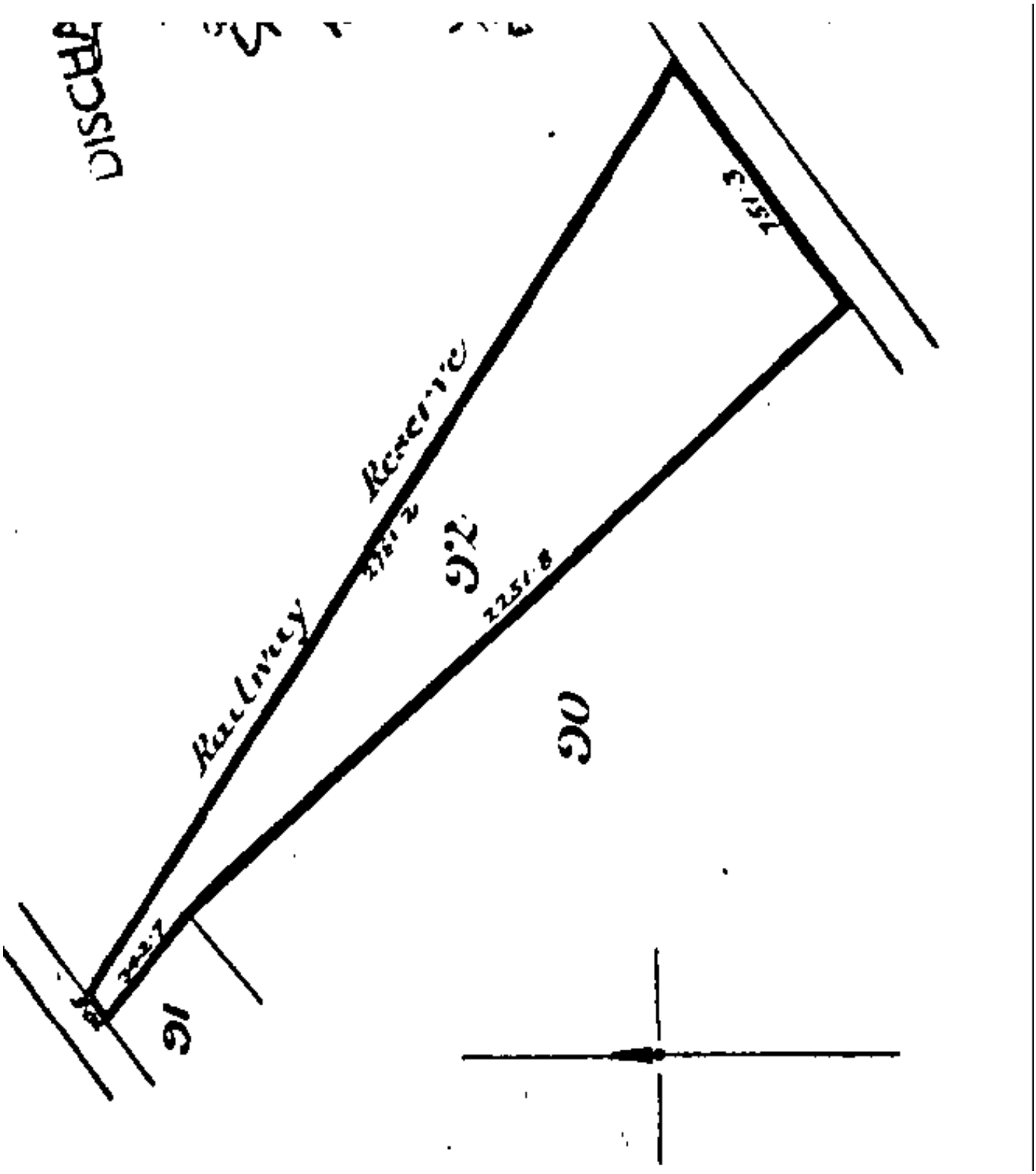
Area 4.0646 hectares more or less

Legal Description Section 92 Block VIII Benger Survey District

Registered Owners

Central Otago District Council

Interests


DISCHA
Reserve
Railway
90
91

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**OT374/110**
Land Registration District	**Otago**
Date Issued	07 October 1954

Prior References
OTPR25/69

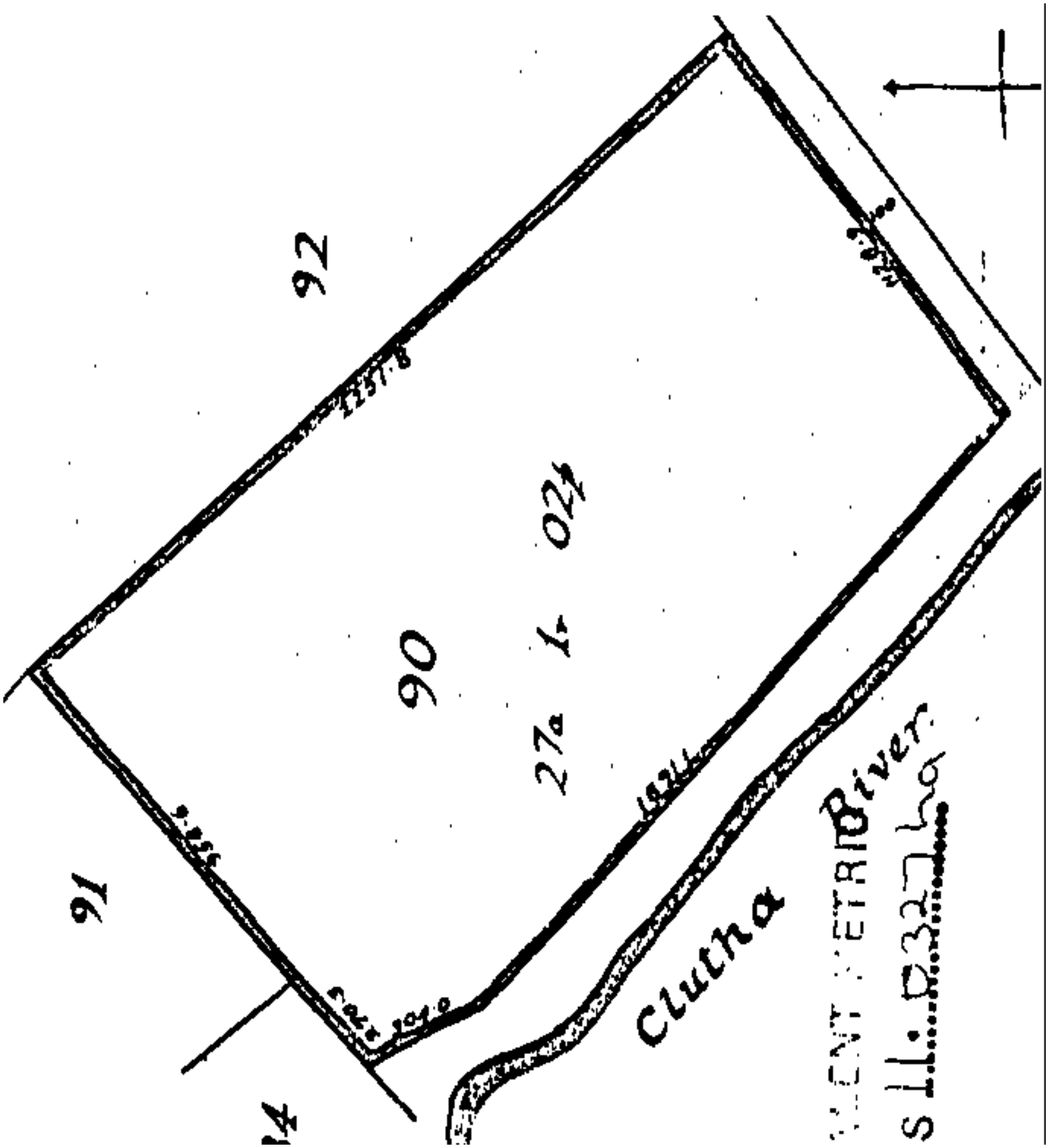
Estate	Fee Simple
Area	11.0327 hectares more or less
Legal Description	Section 90 Block VIII Benger Survey District

Registered Owners
Jacks Ridge Limited

Interests

Saving and excepting all minerals within the meaning of the Land Act 1924 on or under the land and reserving always to Her Majesty the Queen and all persons lawfully entitled to work the said minerals a right of ingress egress and regress over the said land

Subject to Section 315 Land Act 1924


92
91
90
Clutha River

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **OT360/184**

Land Registration District **Otago**

Date Issued 08 October 1952

Prior References
OTPR24/2

Estate Fee Simple

Area 1.3658 hectares more or less

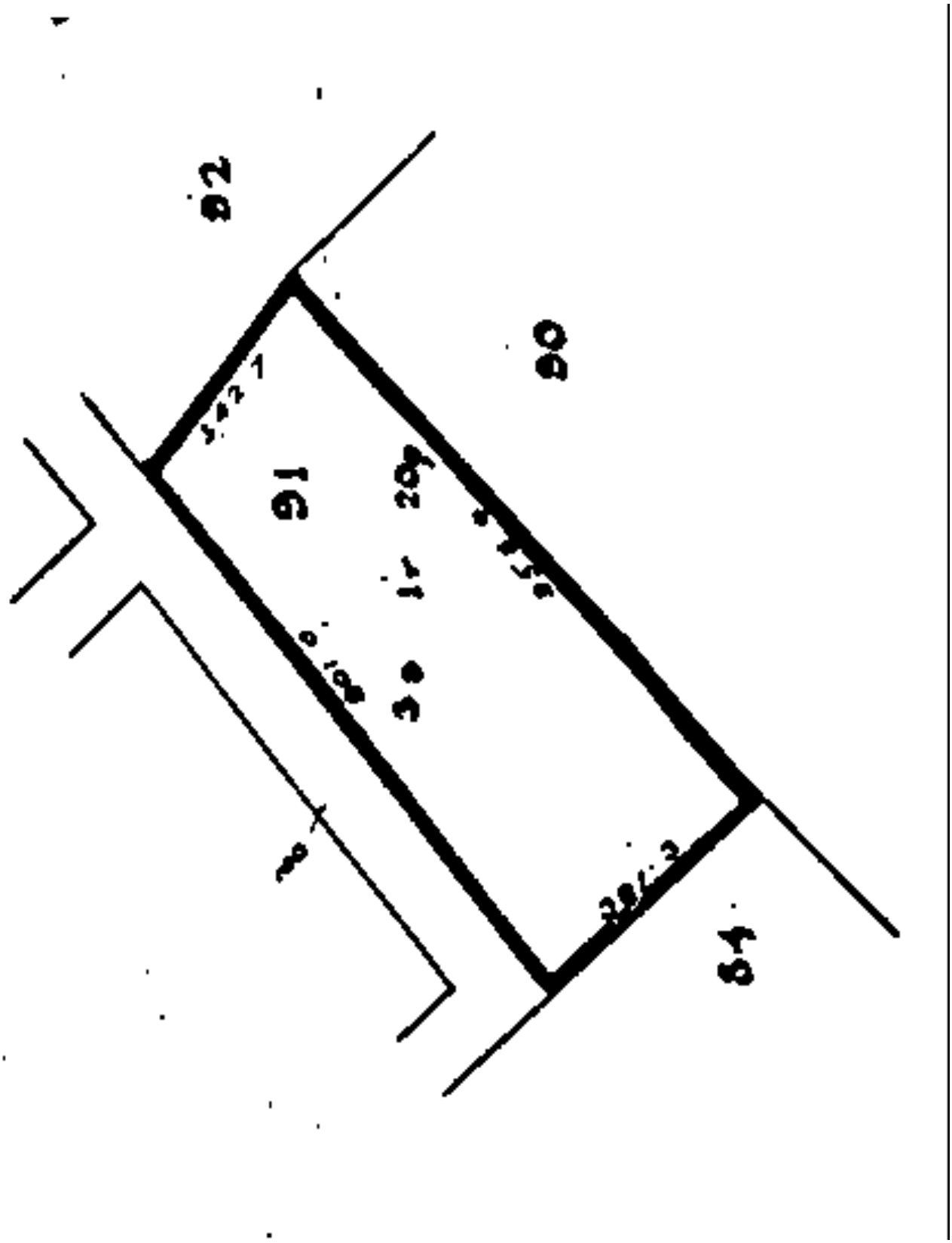
Legal Description Section 91 Block VIII Benger Survey District

Registered Owners
Jacks Ridge Limited

Interests

Saving and excepting all minerals within the meaning of the Land Act 1924 on or under the land and reserving always to Her Majesty the Queen and all persons lawfully entitled to work the said minerals a right of ingress egress and regress over the said land

Subject to Section 315 Land Act 1924


92
90
91
84

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Limited as to Parcels
Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **OT12C/572**
Land Registration District **Otago**
Date Issued 21 March 1989

Prior References
OT1D/1456

Estate Fee Simple
Area 4047 square metres more or less
Legal Description Section 106 Block VIII Benger Survey District

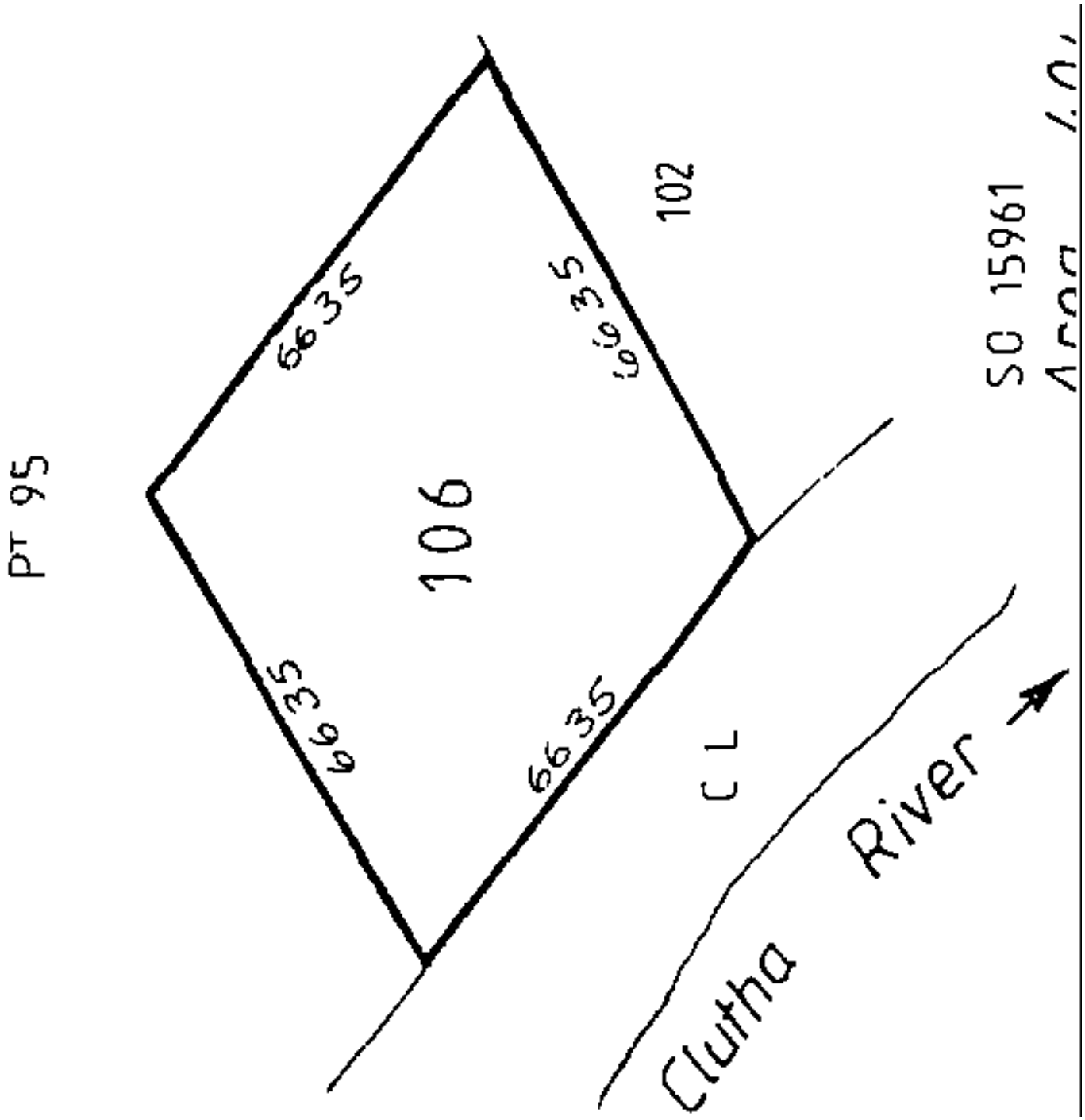
Registered Owners
Jacks Ridge Limited

Interests

Subject to Section 8 Mining Act 1971

Subject to Section 5 Coal Mines Act 1979

Appurtenant hereto is a right of way created by Easement Instrument 6982721.1 - 10.8.2006 at 9:00 am


PT 95
106
102
SO 15961
66 35
66 35
66 35
66 35
C L
Clutha River

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

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R.W. Muir
Registrar-General
of Land

Identifier **304420**
Land Registration District **Otago**
Date Issued 05 July 2007

Prior References
229533

Estate Fee Simple
Area 8.7379 hectares more or less
Legal Description Lot 2-3 Deposited Plan 375668
Registered Owners
Gareth David Wilson and Gabrielle Claire Campbell-Lloyd

Interests

Subject to Part IV A Conservation Act 1987 (affects parts formerly Section 94 and Part Section 95)

Subject to Section 11 Crown Minerals Act 1991(affects parts formerly Section 94 and Part Section 95)

Subject to Section 59 Land Act 1948 (affects part formerly Lot 1 DP 356314)

Subject to a right of way over part marked B on DP 375668 created by Easement Instrument 6982721.1 - 10.8.2006 at 9:00 am (affects Lot 3 DP 375668)

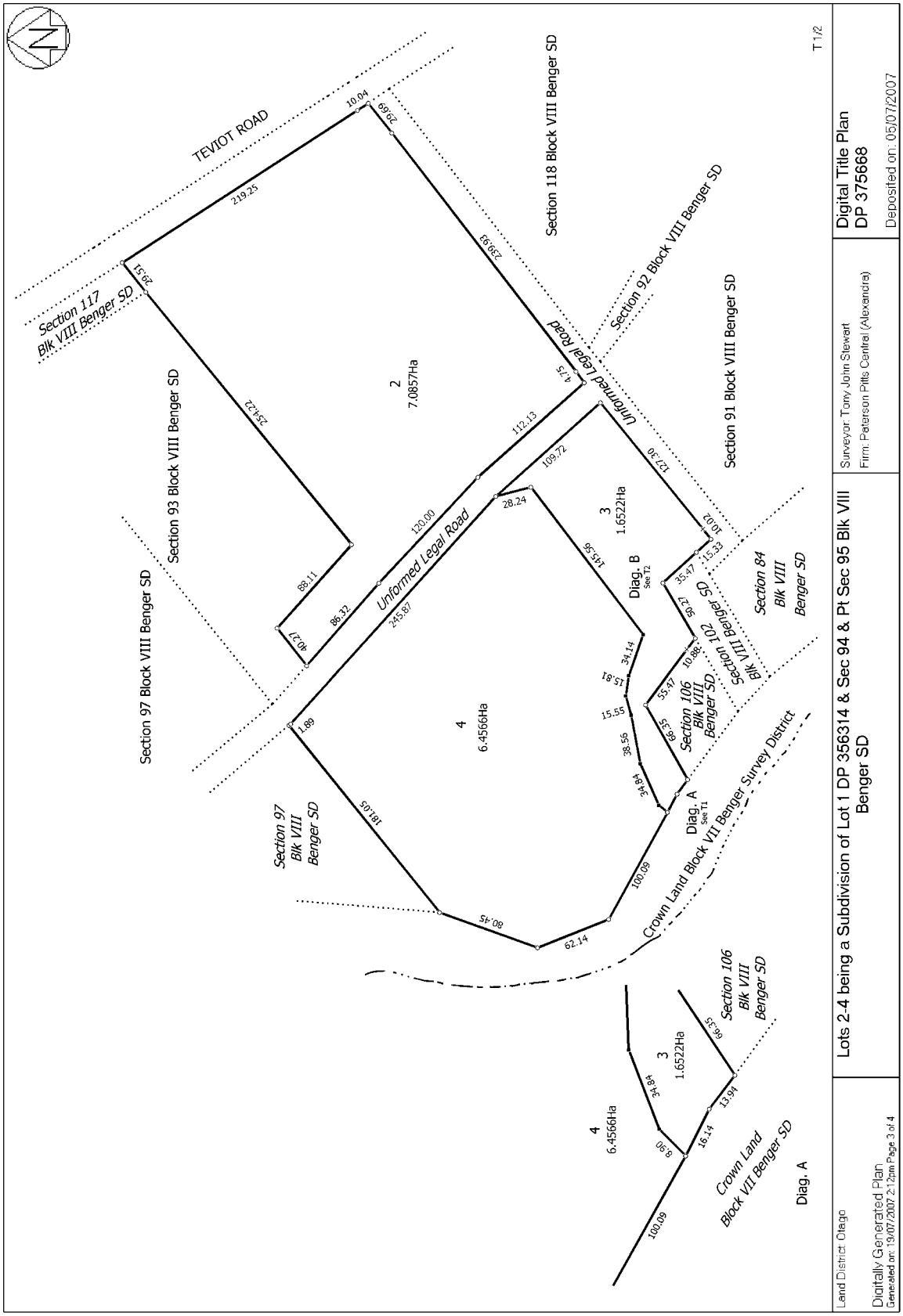
Subject to Section 241(2) Resource Management Act 1991 (affects DP 375668)

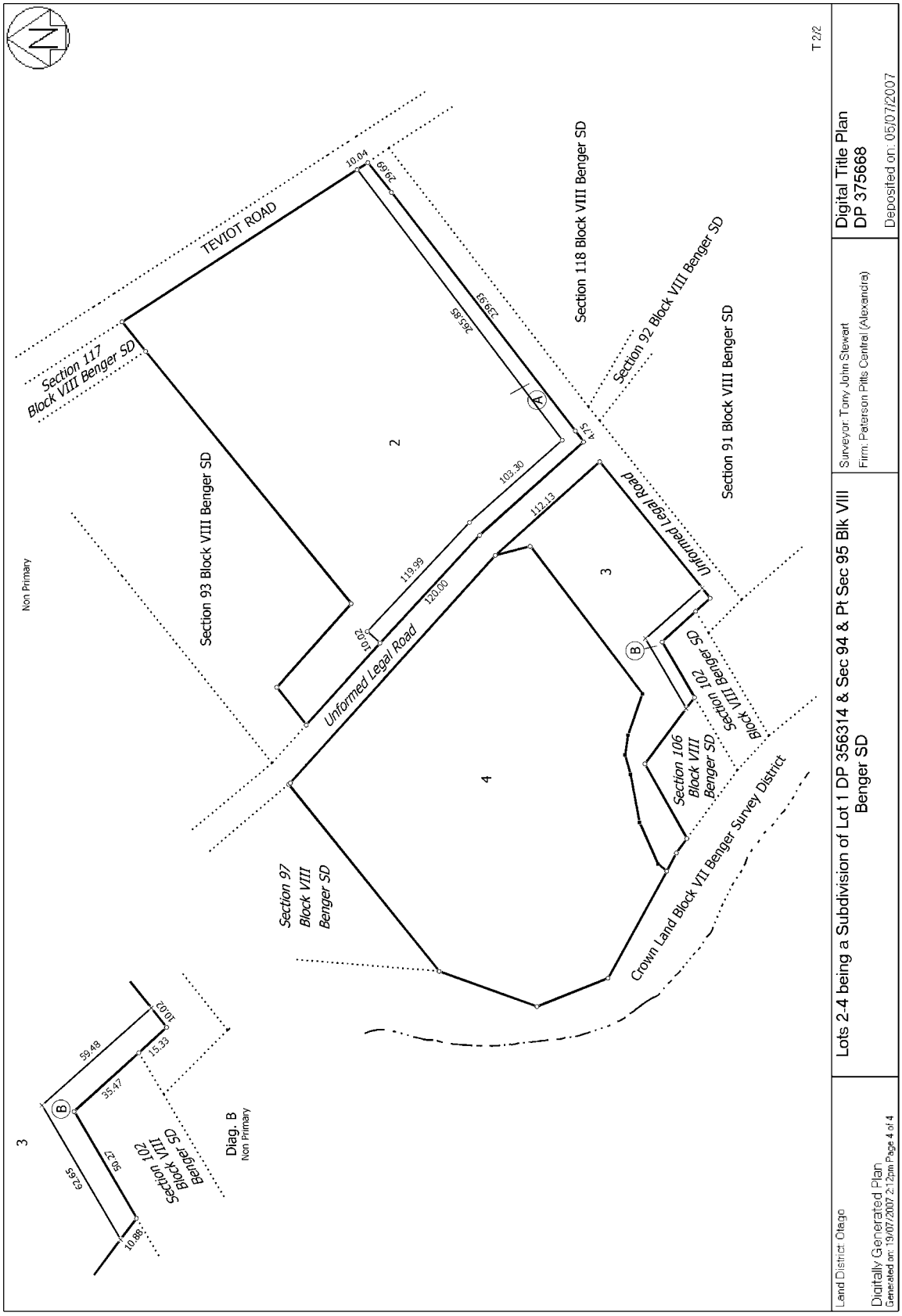
7449112.4 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 5.7.2007 at 9:00 am

Subject to a right of way over part marked A on DP 375668 created by Easement Instrument 7449112.5 - 5.7.2007 at 9:00 am (affects Lot 2 DP 375668)

The easements created by Easement Instrument 7449112.5 are subject to Section 243 (a) Resource Management Act 1991

7991225.3 Mortgage to Westpac New Zealand Limited - 28.11.2008 at 1:18 pm


T 1/2
TEVIOT ROAD
Section 118 Block VIII Benger SD
Section 92 Block VIII Benger SD
Section 91 Block VIII Benger SD
Section 117 Blk VIII Benger SD
Section 93 Block VIII Benger SD
Section 97 Block VIII Benger SD
Unformed Legal Road
Section 97 Blk VIII Benger SD
Section 106 Blk VIII Benger SD
Section 84 Blk VIII Benger SD
Section 101 Blk VIII Benger SD
Crown Land Block VII Benger Survey District
Diag. A See T1
Diag. B See T2
2 7.0857Ha
3 1.6522Ha
4 6.4566Ha
Digital Title Plan DP 375668
Deposited on: 05/07/2007
Surveyor Tony John Stewart
Firm: Paterson Pitts Central (Alexandra)
Lots 2-4 being a Subdivision of Lot 1 DP 356314 & Sec 94 & Pt Sec 95 Blk VIII Benger SD
Land District Otago
Digitally Generated Plan
Generated on: 13/07/2007 2:12pm Page 3 of 4


T 2/2
TEVIOT ROAD
Section 117 Block VIII Benger SD
Section 93 Block VIII Benger SD
Section 118 Block VIII Benger SD
Section 92 Block VIII Benger SD
Section 91 Block VIII Benger SD
Unformed Legal Road
Unformed Legal Road
Section 97 Block VIII Benger SD
Section 106 Block VIII Benger SD
Section 102 Block VIII Benger SD
Crown Land Block VII Benger Survey District
Non Primary
Diag. B
Non Primary
10.04
69.62
239.93
265.85
4.75
103.30
112.13
119.99
120.00
10.02
59.48
15.33
35.47
50.27
62.65
10.88
10.02
2
3
4
3
Lots 2-4 being a Subdivision of Lot 1 DP 356314 & Sec 94 & Pt Sec 95 Blk VIII Benger SD
Land District Otago
Digitally Generated Plan
Generated on: 13/07/2007 2:12pm Page 4 of 4
Surveyor Tony John Stewart
Firm: Paterson Pitts Central (Alexandra)
Digital Title Plan
DP 375668
Deposited on: 05/07/2007

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

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R.W. Muir
Registrar-General
of Land

Identifier **304421**
Land Registration District **Otago**
Date Issued 05 July 2007

Prior References
229533

Estate Fee Simple
Area 6.4566 hectares more or less
Legal Description Lot 4 Deposited Plan 375668
Registered Owners
Gareth David Wilson and Gabrielle Claire Campbell-Lloyd

Interests

Subject to Section 11 Crown Minerals Act 1991

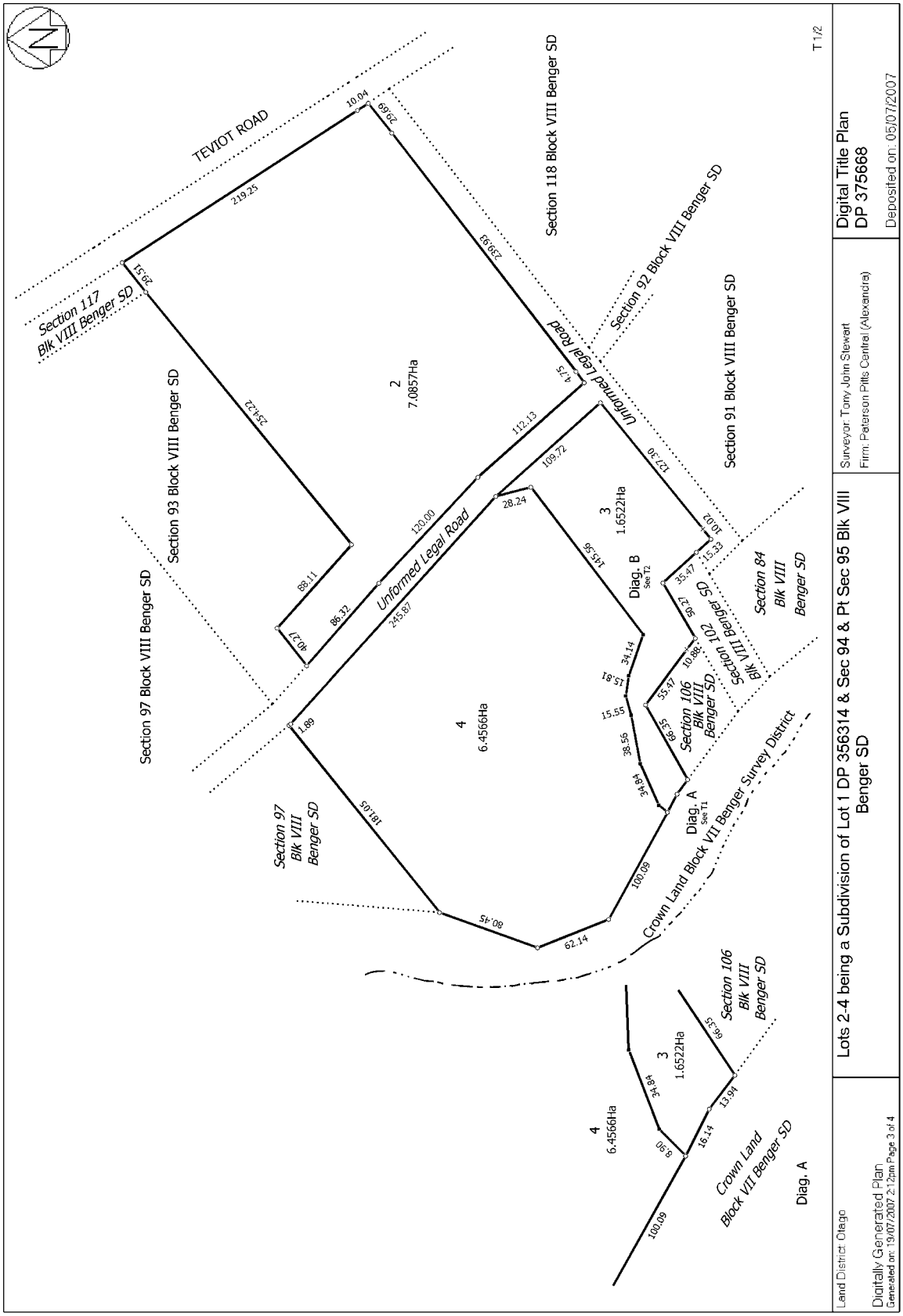
Subject to Part IV A Conservation Act 1987

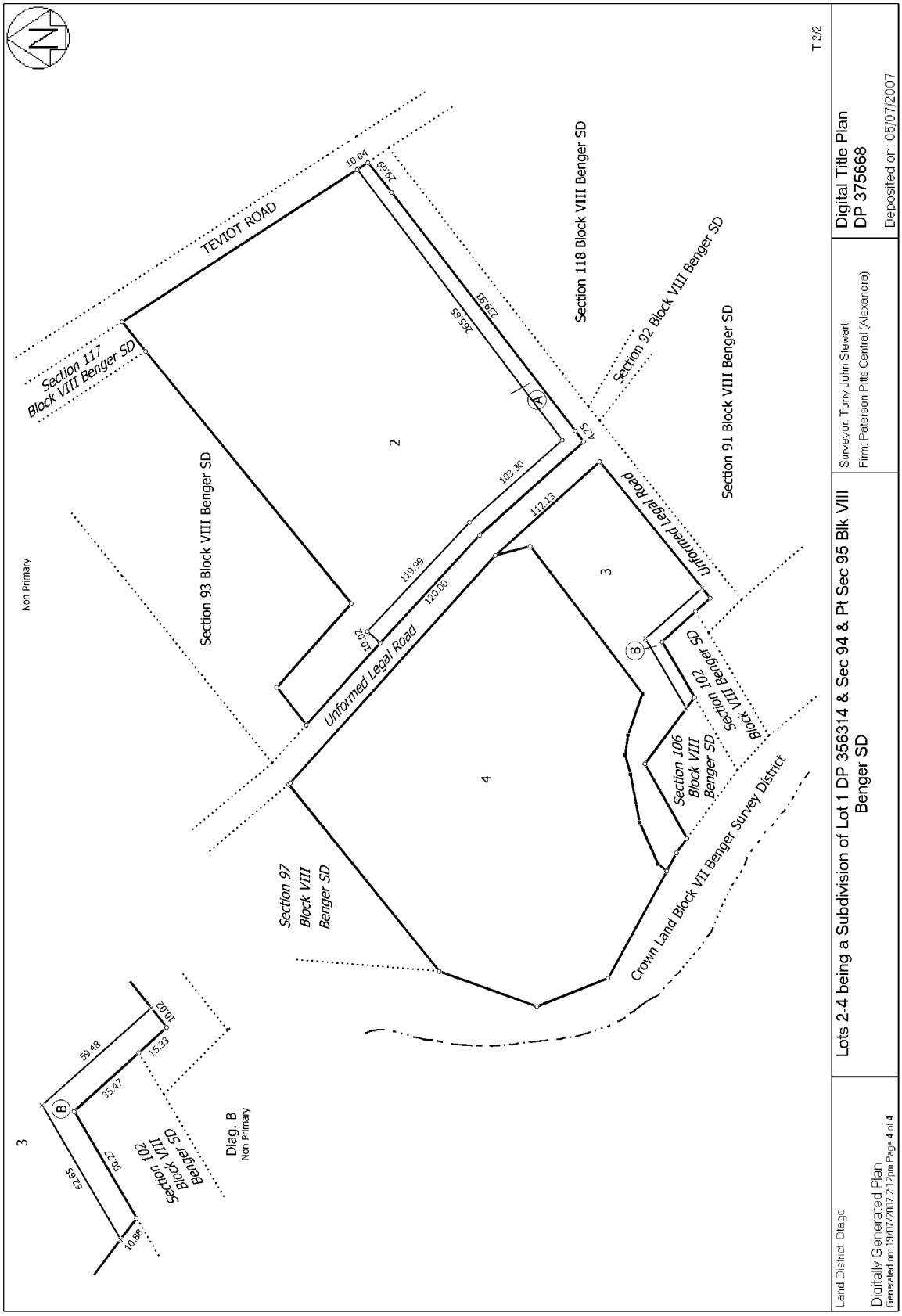
7449112.4 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 5.7.2007 at 9:00 am

Appurtenant hereto is a right of way created by Easement Instrument 7449112.5 - 5.7.2007 at 9:00 am

The easements created by Easement Instrument 7449112.5 are subject to Section 243 (a) Resource Management Act 1991

7991225.3 Mortgage to Westpac New Zealand Limited - 28.11.2008 at 1:18 pm


T 1/2
TEVIOT ROAD
Section 118 Block VIII Benger SD
Section 92 Block VIII Benger SD
Section 91 Block VIII Benger SD
Section 117 Blk VIII Benger SD
Section 93 Block VIII Benger SD
Section 97 Block VIII Benger SD
Unformed Legal Road
Section 97 Blk VIII Benger SD
Section 106 Blk VIII Benger SD
Section 84 Blk VIII Benger SD
Section 101 Blk VIII Benger SD
Crown Land Block VII Benger Survey District
Diag. A See T1
Diag. B See T2
2 7.0857Ha
3 1.6522Ha
4 6.4566Ha
Lots 2-4 being a Subdivision of Lot 1 DP 356314 & Sec 94 & Pt Sec 95 Blk VIII Benger SD
Digital Title Plan DP 375668
Deposited on: 05/07/2007
Surveyor Tony John Stewart
Firm: Paterson Pitts Central (Alexandra)
Land District Otago
Digitally Generated Plan
Generated on: 13/07/2007 2:12pm Page 3 of 4


T 2/2
TEVIOT ROAD
Section 117 Block VIII Benger SD
Section 93 Block VIII Benger SD
Section 118 Block VIII Benger SD
Section 92 Block VIII Benger SD
Section 91 Block VIII Benger SD
Unformed Legal Road
Unformed Legal Road
Section 97 Block VIII Benger SD
Section 106 Block VIII Benger SD
Section 102 Block VIII Benger SD
Crown Land Block VII Benger Survey District
Non Primary
Diag. B
Non Primary
10.04
69.62
239.93
265.85
4.75
103.30
112.13
119.99
120.00
10.02
59.48
15.33
35.47
50.27
62.65
10.88
10.02
2
3
4
3
Lots 2-4 being a Subdivision of Lot 1 DP 356314 & Sec 94 & Pt Sec 95 Blk VIII Benger SD
Surveyor Tony John Stewart
Firm: Paterson Pitts Central (Alexandra)
Digital Title Plan
DP 375668
Deposited on: 05/07/2007
Land District Otago
Digitally Generated Plan
Generated on: 13/07/2007 2:12pm Page 4 of 4

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

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R.W. Muir
Registrar-General
of Land

Identifier **OT374/111**

Land Registration District **Otago**

Date Issued 07 October 1954

Prior References
OTPR/25/70

Estate Fee Simple

Area 3.5536 hectares more or less

Legal Description Section 93 Block VIII Benger Survey District

Registered Owners
Laurie Allan Crawford and Pamela Fay Crawford

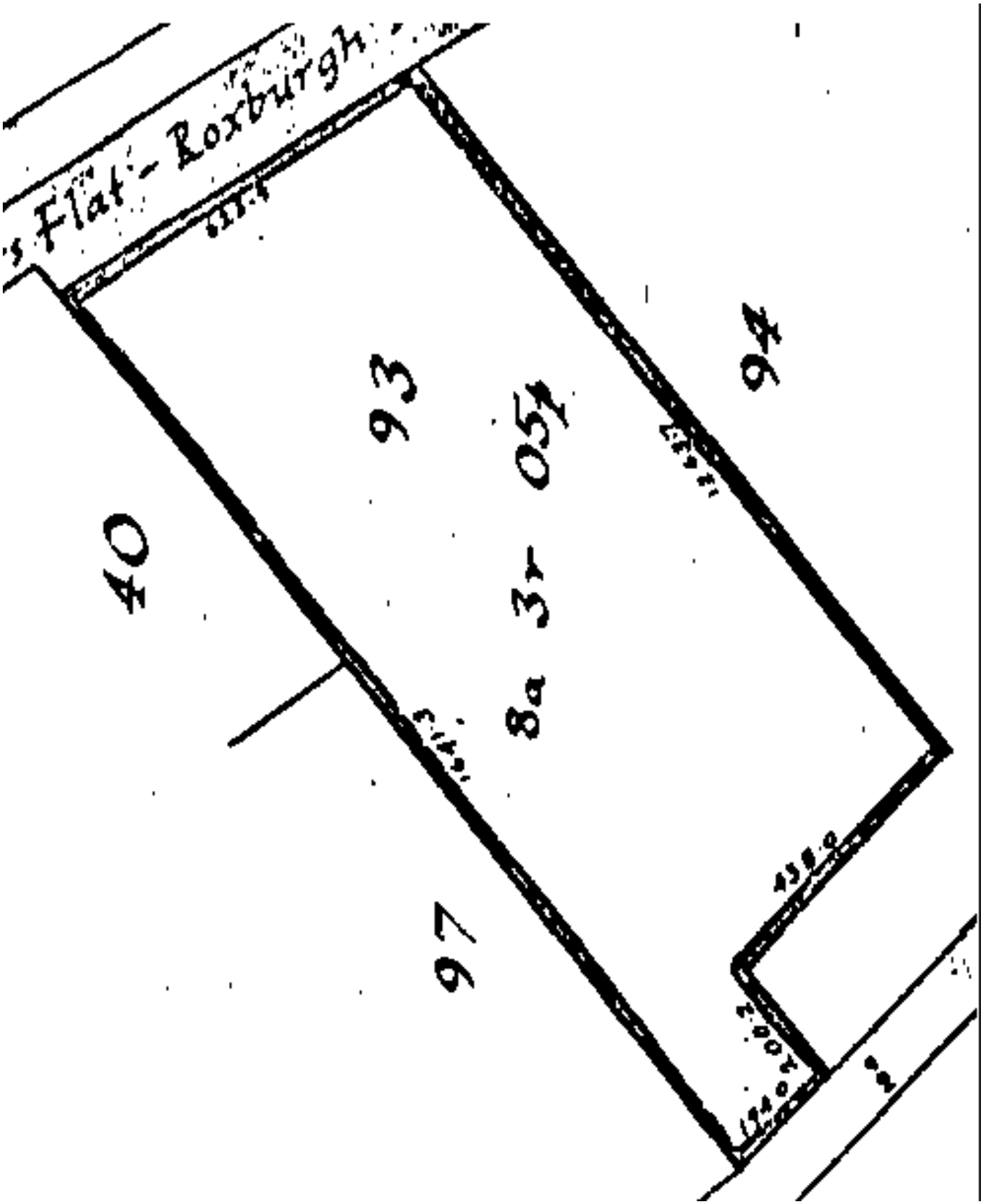
Interests

Subject to Section 59 Land Act 1948

463568 Electricity Agreement pursuant to Section 50 Electricity Act 1968 - 10.8.1976 at 12.27 pm

5008390.1 Mortgage to (now) Westpac New Zealand Limited - 6.9.2000 at 9:00 am

6751681.1 Variation of Mortgage 5008390.1 - 14.2.2006 at 9:00 am


Flat - Roxburgh
93
94
40
97
8a 3r 05p
438.9
200.2

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Limited as to Parcels
Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **OT270/85**
Land Registration District **Otago**
Date Issued 21 September 1935

Prior References
DI T674

Estate Fee Simple
Area 4.6539 hectares more or less
Legal Description Section 97 Block VIII Benger Survey District

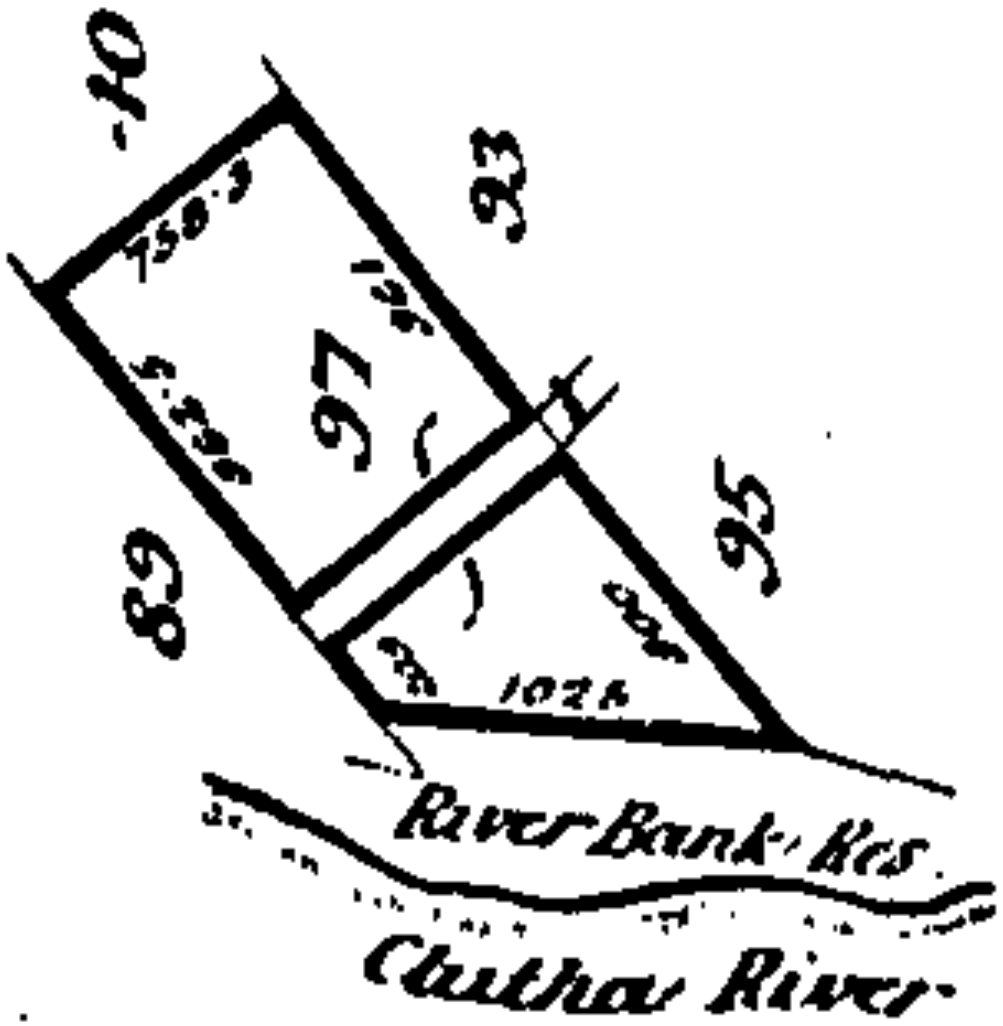
Registered Owners
Laurie Allan Crawford and Pamela Fay Crawford

Interests

463568 Electricity Agreement pursuant to Section 50 Electricity Act 1968 - 10.8.1976 at 12.27 pm

5008390.1 Mortgage to (now) Westpac New Zealand Limited - 6.9.2000 at 9:00 am

6751681.1 Variation of Mortgage 5008390.1 - 14.2.2006 at 9:00 am


-10
93
750·3
97
89
95
1024
River Bank Res.
Clutha River

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **OT117/72**

Land Registration District **Otago**

Date Issued 06 September 1897

Prior References
WA 3/38

Estate Fee Simple

Area 2.3371 hectares more or less

Legal Description Section 40 Block VIII Benger Survey District

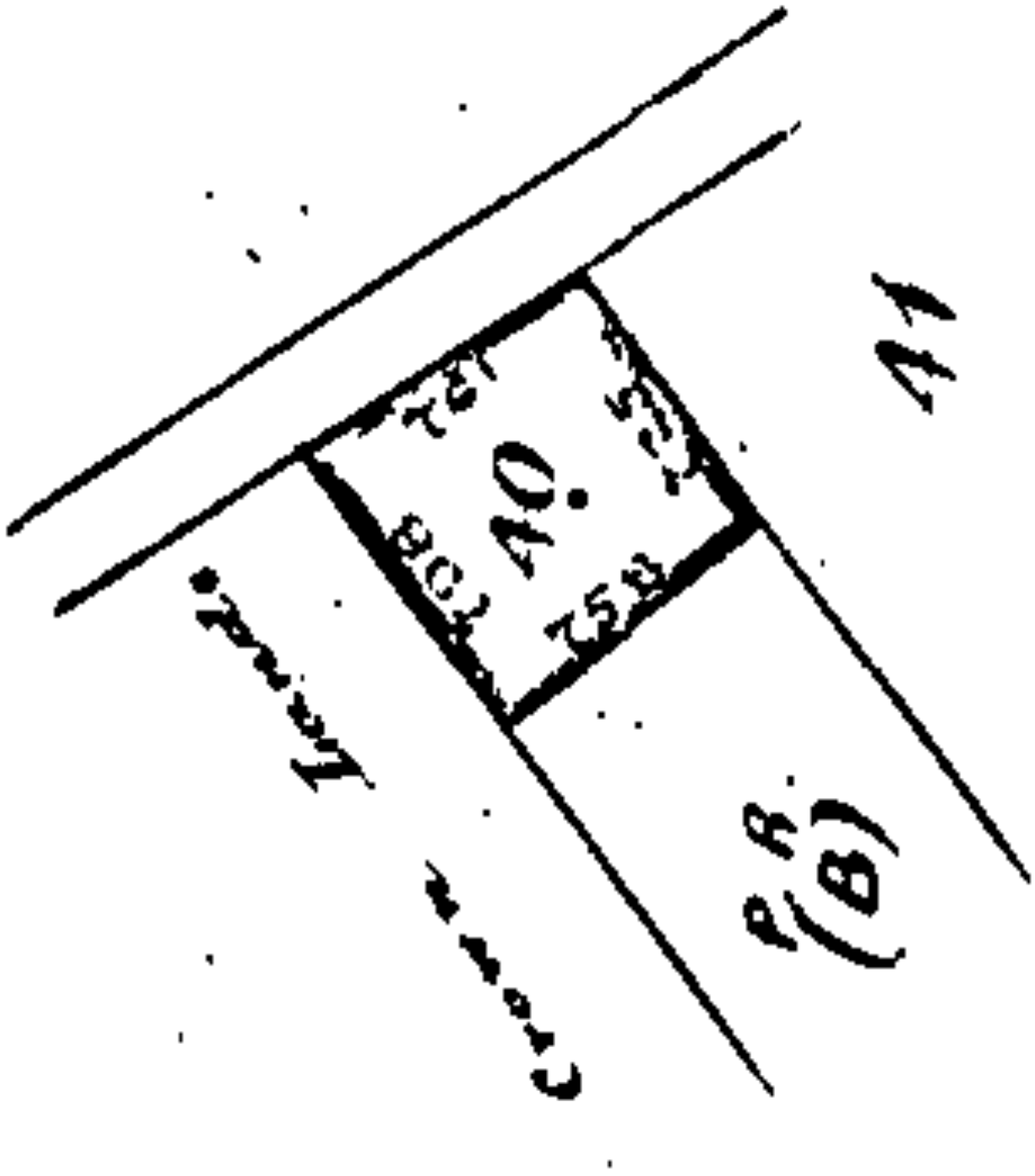
Registered Owners
Laurie Allan Crawford and Pamela Fay Crawford

Interests

463568 Electricity Agreement pursuant to Section 50 Electricity Act 1968 - 10.8.1976 at 12.27 pm

5008390.1 Mortgage to (now) Westpac New Zealand Limited - 6.9.2000 at 9:00 am

6751681.1 Variation of Mortgage 5008390.1 - 14.2.2006 at 9:00 am


LOT 10
P.R. (8)

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**OTB1/707**
Land Registration District	**Otago**
Date Issued	18 July 1962

Prior References
OT204/281

Estate	Fee Simple
Area	9.0624 hectares more or less
Legal Description	Part Section 89 Block VIII Benger Survey District

Registered Owners
Laurie Allan Crawford and Pamela Fay Crawford

Interests

Subject to Section 29 of The Land Laws Amendment Act 1913

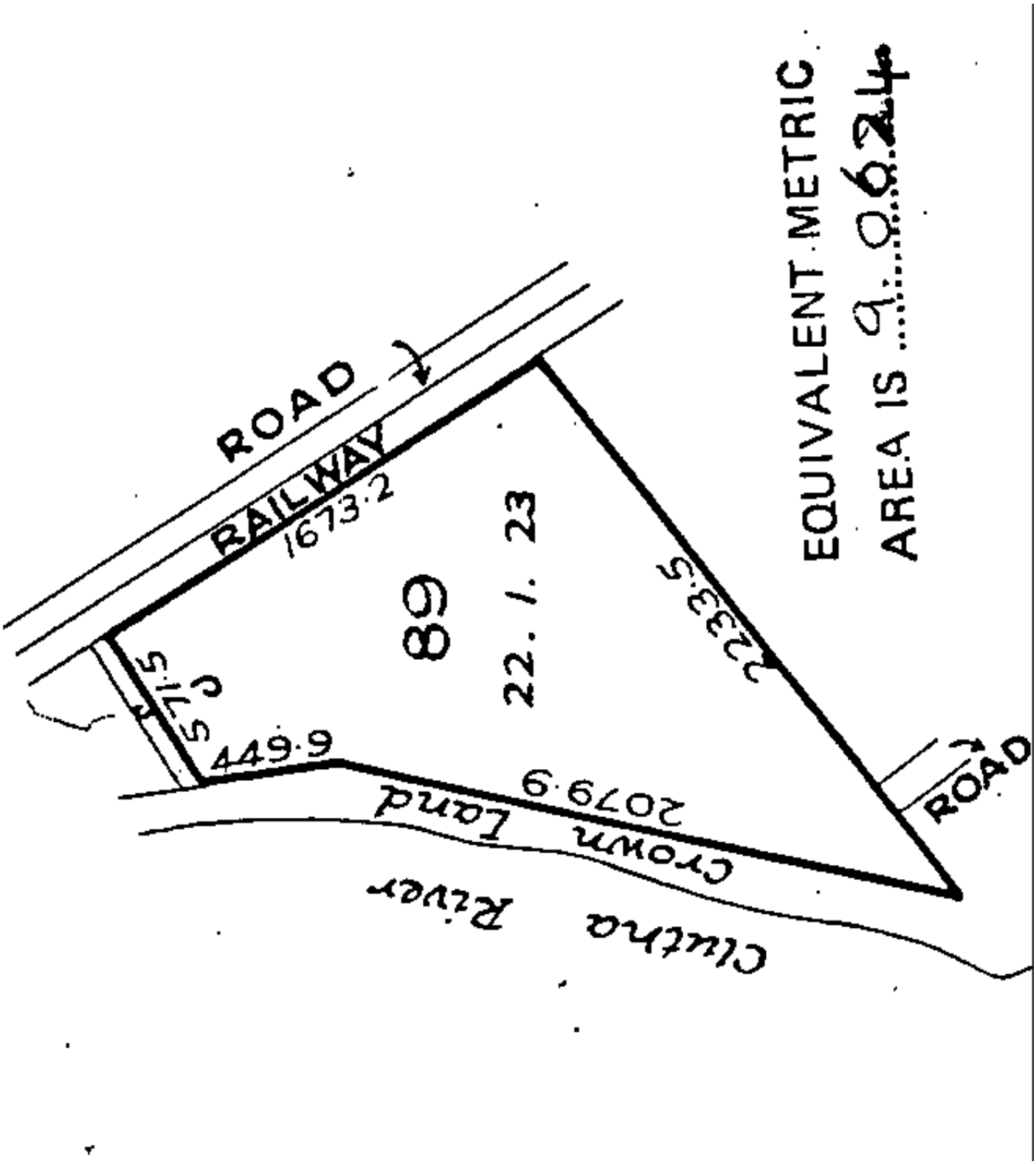
Excepting any metals, precious stones, minerals, coal and oil on and under the said land.

463568 Electricity Agreement pursuant to Section 50 Electricity Act 1968 - 10.8.1976 at 12.27 pm

5008390.1 Mortgage to (now) Westpac New Zealand Limited - 6.9.2000 at 9:00 am

6751681.1 Variation of Mortgage 5008390.1 - 14.2.2006 at 9:00 am

Subject to a right (in gross) to convey electricity over part marked A on DP 430607 in favour of Talla Burn Generation Limited created by Easement Instrument 8685658.1 - 28.1.2011 at 2:08 pm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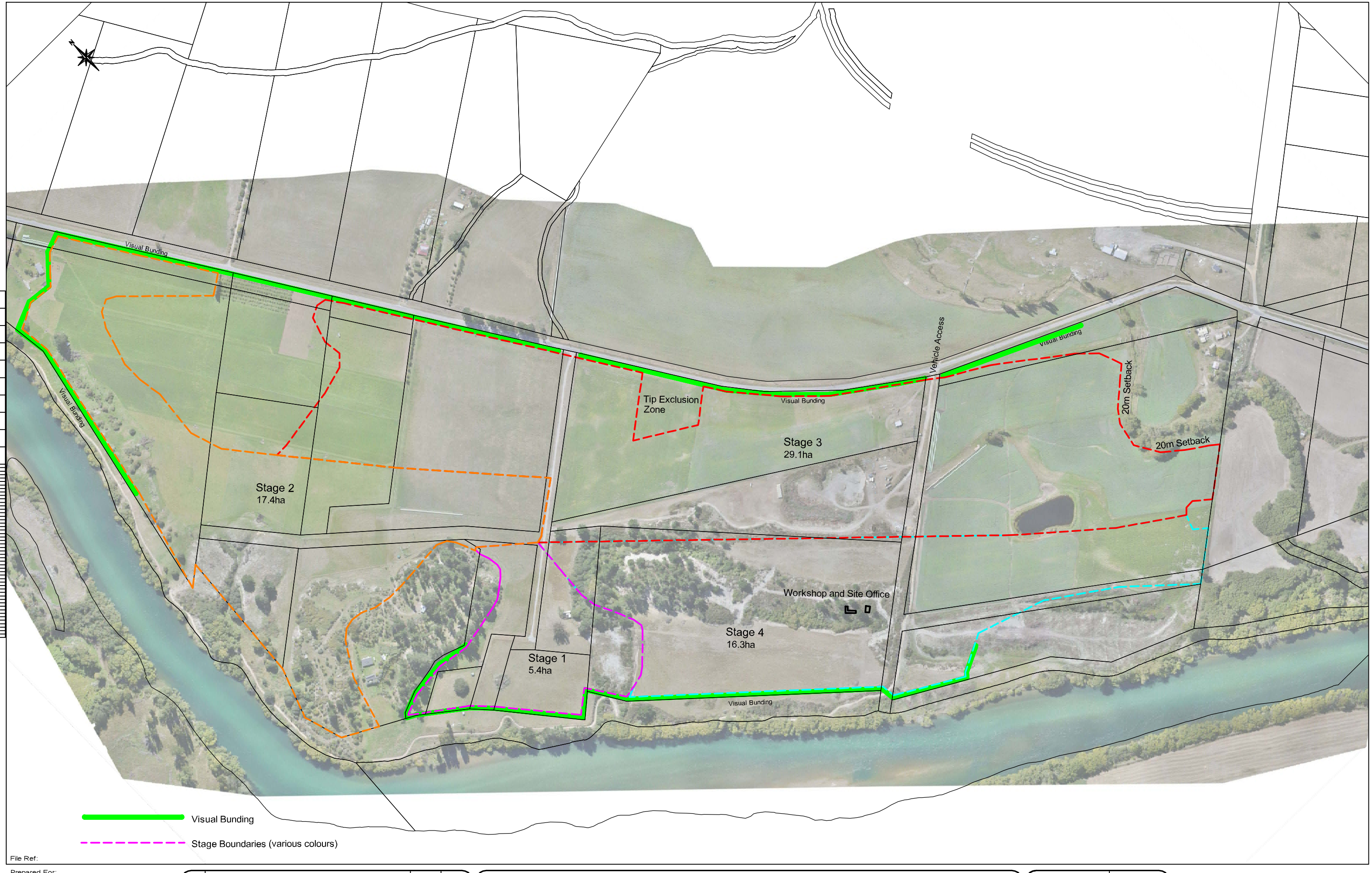
89
22. 1. 23
2233·5
EQUIVALENT METRIC
AREA IS 9.0.624
571·5
449·9
2079·9
ROAD
Crown Land
Clutha River



File Ref:

Prepared For:

Hawkeswood Mining

No.	Amendments	Drawn	Date

Stage Plan

Millers Flat

Project No.: .	Surveyed: JR
Scale: 1:5000	Designed:
Date: 17/10/23	Drawn: JR
Sheet: 1	Checked: JR

Overview SURVEYING

Mining Methodology

Overview:

The Project is located 2km northwest of Millers Flat Township and comprises approximately 68 hectares of current farmland and old dredge tailings.

The resource is located between 13 - 18 m below surface and is found in a layer of cemented graywacke pebble cobbles and sands averaging 3.2m thickness.

This document discusses:

- The Brief History of the Area
- Basic Geology
- Site Layout Plan
- Earthworks
- Dewatering
- Gold Extraction Processing
- Glossary and Abbreviations

Brief History:

The Clutha River had been dredged extensively from the late nineteenth century through to the current day. Select areas of river terrace had also been dredged where the depth to basement and thickness of gravel above the mine pond level did not exceed the capabilities of the dredge.

The riverbanks have also been subjected to sluicing, although this appears to have been sporadic. Dredge records show a substantial amount of gold was won by dredges in the permit area from 1891 to the mid-1910s. However, the dredge records and mine inspectors' reports do not always make it clear whether the dredge was working in the river or the river terrace, thus making deductions of recovered grade from the river terraces difficult.

Basic Geology:

The mining permit covers the lower glacial outwash terraces of the true left bank of the Clutha River (identified as Oxygen Isotope stage 2 of Turnbull (2000)). These terrace surfaces are approximately 10 – 18 m above the mean Clutha River level.

The gravels which lie beneath the terraces are predominantly clast supported greywacke/schist sandy gravels. The drilling does not provide a precise record of grainsize, as there is some comminution during drilling. However, there is good outcrop along the riverbank and exposed dredge tailings, which are assumed to be similar to the sections drilled.

The gravels consist of pebble to cobble sized greywacke clasts (with minor schist and minor quartz clasts) set in a sandy matrix. The drill encountered impenetrable rocks in a number of holes, and these are presumed to be quartzite cobbles or boulders, which are observed in the dredge tailings and along the riverbanks. While not frequently encountered by the drill, they are, however, regarded as a significant rock type in the local stratigraphy.

The greywacke pebbles/cobbles are well rounded and predominantly unweathered. The low degree of weathering made for very hard drilling at times, as the rotary bit experienced problems penetrating the cobbly layers.

Lenses of sand appear from time to time in the drilling, although generally confined to the upper layers beneath the terrace and were not observed to be more than 80 cm thick. Basement underlying the outwash gravels is commonly the quartzo-feldspathic schist (Haast Schist Group, Caples Terrane, Textural Zone III.

There are hearsay reports of elevated schist ridges existing in the area which the historical dredges could not penetrate.

Lithology Codes	
Ts	Topsoil
Z	Silt
grG	granular gravel
pG	pebbly gravel
cG	cobbly gravel
bG	bouldery gravel
B	Tertiary basement
Bs	Schist basement

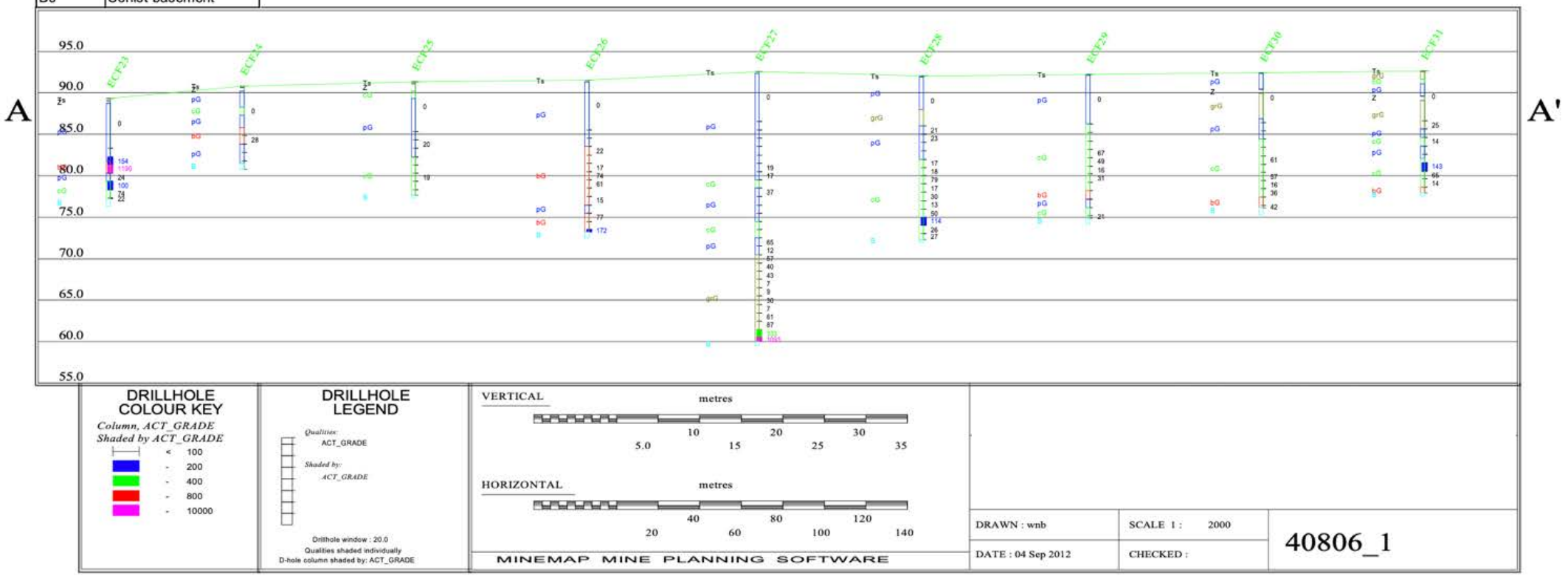


Figure 1 *Drill log cross section*

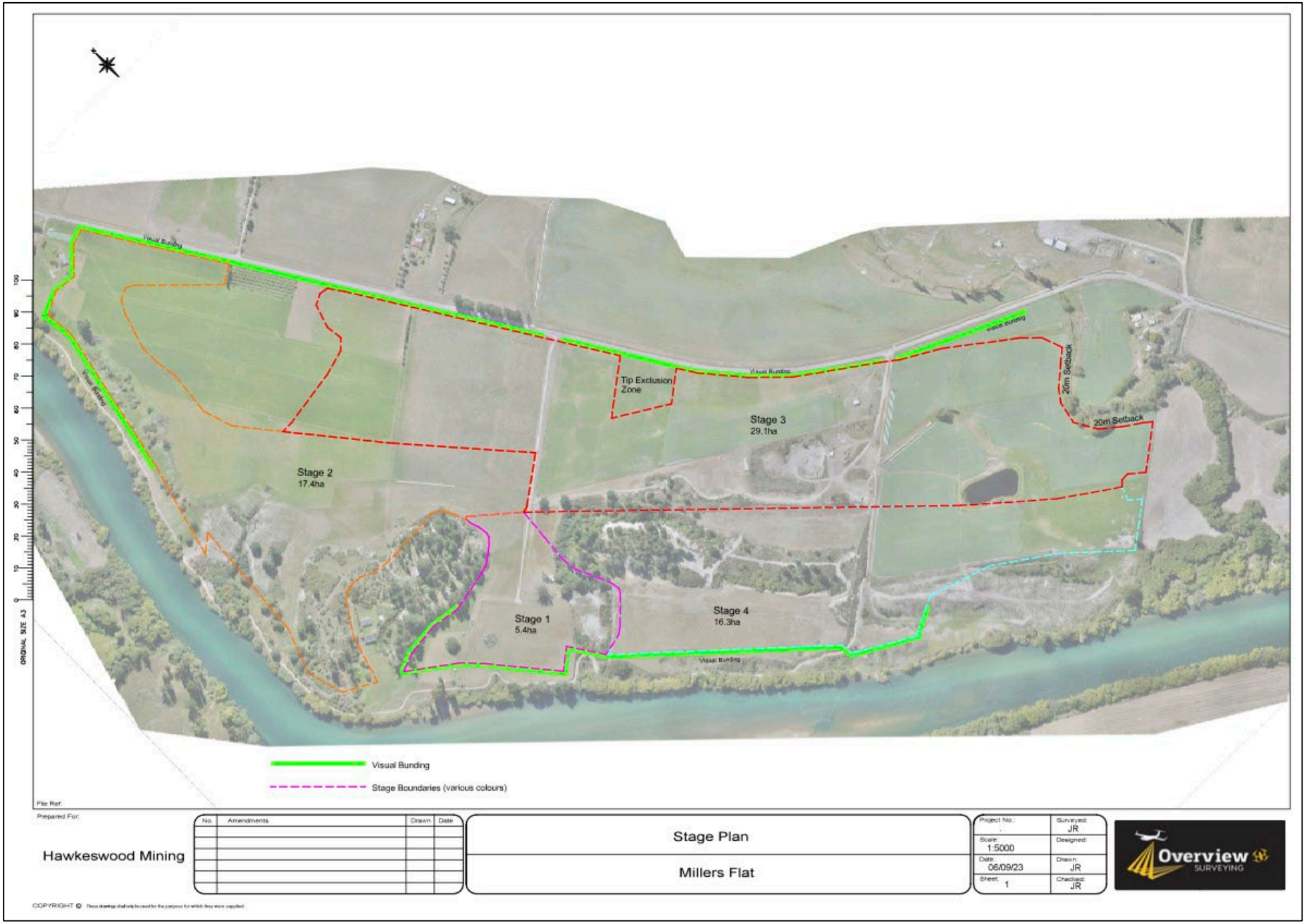


Figure 2 *Site plan showing indicative staging*

Mine Plan:

The following generalised wash mining parameters have been selected:

Parameter	Unit	Quantity
Weeks per year	Weeks pa	50.0
Days per week	Days/week	5.5
Hours/day	Hours/day	12
Theoretical hours	Hours pa	3300
Hours lost to Public Holidays	Hours pa	132
Available Hours	Hours pa	3168
Availability	%	85.0%
Operating hours	Hours pa	2693
Operating hours	Hours/week	54
Operating hours	Hours/day	10
GRP Productivity	bcm per hr	180
Bulk density	t/bcm	1.85
GRP Productivity	tph	330
GRP weekly throughput	bcm per week	9720
GRP annual productivity	bcm p a	486,000
Assume average wash width	m	160.0
Assume average wash thickness	m	3.2
Average advance per week	m	26.4

The surface projection of the resource is 51 hectares. Batters, haul roads and ancillary activities will increase the project area to around 68 hectares.

The mining will proceed in four stages, though each stage will blend to the next due to the moving mine cell methodology. For example, backfilling and rehabilitation of Stage 1 may be underway while mining is occurring in Stage 2.

Stage 1 will take approximately 3-4 months to complete. The mining of Stage 2 will be a continuation of Stage 1 subject to upgrading of inferred resources to reserve status. Scheduling of mineable resources reasonably inferred from drilling indicates Stage 2 will be completed approximately 1 to 1.5 years after mine start up. Currently it is proposed that Stages 3 and 4 will follow sequentially to give a total mine life of 5-7 years.

Mining and processing of wash per year to be estimated 486,000 bcm. Overburden will be mined at an average rate of around 2 M bcm per annum. Overburden rates are predicted to be highest in the first year of operations when the starter pit is established. Stage areas and earthworks volume estimates are shown in the table below. These are modelled estimates.

Stages Areas and Earthworks Volumes*							
			Overburden		Wash		
Stage	Area (ha)	Area (m2)	Average depth (m bgl)	Estimated volume (m3)	Average thickness (m)	Estimated volume (m3)	Overburden + wash volume (m3)
1	5.4	54,000	13.5	729,000	3.1	167,400	896,400
2	17.4	174,000	14	2,436,000	3.4	591,600	3,027,600
3	29.1	291,000	14.5	4,219,500	3.5	1,018,500	5,238,000
4	16.3	163,000	13.5	2,200,500	3.3	537,900	2,738,400
Total	**68.2**	**682,000**		**9,585,000**		**2,315,400**	**11,900,400**

*All volumes in this table are modelled estimates

Site Layout:

The active work area will progress through the four stages sequentially and generally consist of the following areas:

Active Pit (including roading and area being rehabilitated)	12 ha
Stockpiles (temporary, not vegetated)	7 ha
Settling Ponds and water discharge area	3 ha
Workshop/ laydown (stabilised with a metalled surface)	3 ha
Bunding (stabilised with vegetation)	2 ha
Total work area	**27 ha**

Earthworks:

Topsoil's

The topsoil will be stripped from each "cell" footprint. The stripping of topsoil may be extended up to 3 months in advance over winter months when the soils may be too wet to be handled, or traversed over, with heavy mobile plant.

The topsoil (averaging 0.4 m deep) will be bulldozed to either side of the mine path by a low-ground pressure bulldozer and formed into a windrow some 20 m wide at the base and 2.0 m high. At times it may be necessary to bulldoze the topsoil into windrows and load the

windrowed material into dump trucks by excavator for cartage to the stockpiles alongside the mining area.

Silt

The silt, (averaging 0.9 m deep) will be excavated from within the “cell” and hauled for placement over the returned gravels in the mined-out area utilizing a fleet of trucks loaded by a 50t excavator. Initially, this silt will be stockpiled nearby on site until the gravel backfill has advanced sufficiently to permit the silt placement. Some of this silt will be utilized to form the primary water treatment settling ponds. These ponds approximately 100 m long and 50 m wide with walls 2.5 m high will provide the primary water retention period to settle out the suspended solids from the dirty water. These ponds will be formed as the mine path advances and the redundant ponds containing the settled slimes allowed to dry and then bulldozed out to form the sub-soil for the return of the topsoil. The test pit is the beginning of our starter pit in stage 1.

Gravels

The main overburden consists of two gravel layers – the Upper Gravels averaging 7.4 m deep and the Middle Gravels averaging 6.4 m deep. These horizons will be excavated in three equal-height benches of nominally 4.6 m height and hauled to the mined-out area behind the plant to progressively rehabilitate the mined area. Batter angles of 45^0 have been taken for the stripping faces. The highly permeable Upper Gravel material will be mixed with the low permeable Middle Gravel material to produce a low to moderate permeable horizon behind the mined-out area.

Two gravel stripping truck sizes have been considered, 60t and 100t, operating as two plant groups with each plant group loaded by an excavator. The use of nominal 100t trucks has been selected as less units will be needed which would be preferable in the confined area created by the cell configuration. Thus, two plant groups each consisting of two 100t trucks loaded by a 125 t or 200 t excavator has been selected. A haul road for the cartage of the material from in front of the mining to the mined-out area behind will be maintained within the “cell” and has been taken as a width of 17.5 m with a 5.0 wide windrow along the open side. This windrow is a safety barrier to prevent trucks inadvertently falling over the high wall on the open side of the haul road. The haul road width is based on employing 65t rigid dump truck at 3.5 x truck width (4.91 m) and is the minimum feasible haul road width. However, after truck analysis it was decided to employ the larger 100t truck units which have a width

of 5.5 m, calculating an optimum haul road width of 19.25 m, though the planned 17.5 m haul road width will be sufficient for this larger truck size. An indication of the haul road configuration can be seen from the drawing below:

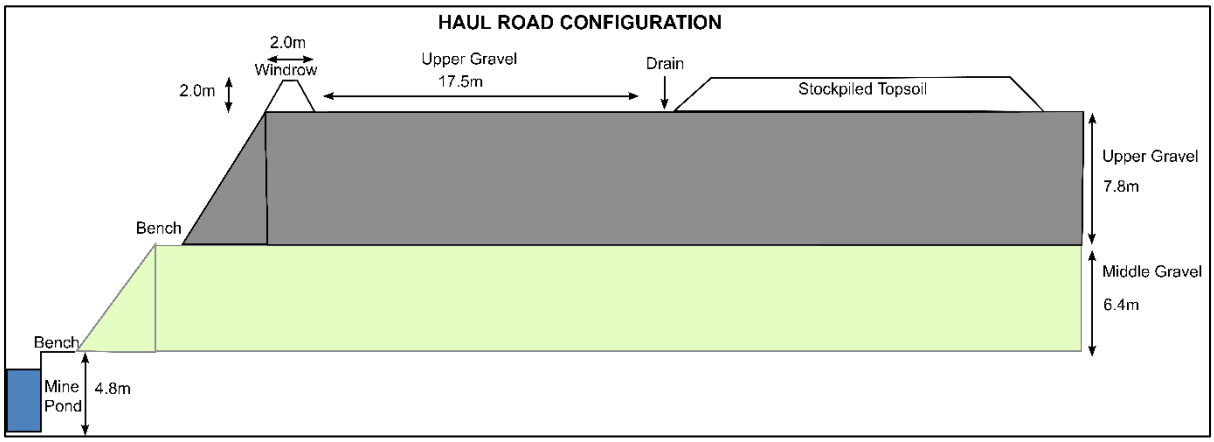


Figure 3 *Haul road construction diagram*

Grade control drilling on 50 x 50 m pattern will take place in a series of campaigns 6 – 12 months ahead of the mining. Based on these results there may be minor adjustments to the mine path and configuration of the mine faces. Any changes will be within the overall mine footprint.

To accommodate access for the stripping trucks from the top of the Upper Gravels to the intermediary bench at least one ramp at 1:10 gradient and 10 m wide will be required. The final access onto the wash mining bench will be via a steeper 1:5 ramp as it only has to service the plant and not act as a haul road. Benches 2.0 m wide have been incorporated at the top of the intermediary bench level to provide a safety buffer should slope failure occur and access around the mining area for dewatering pipelines.

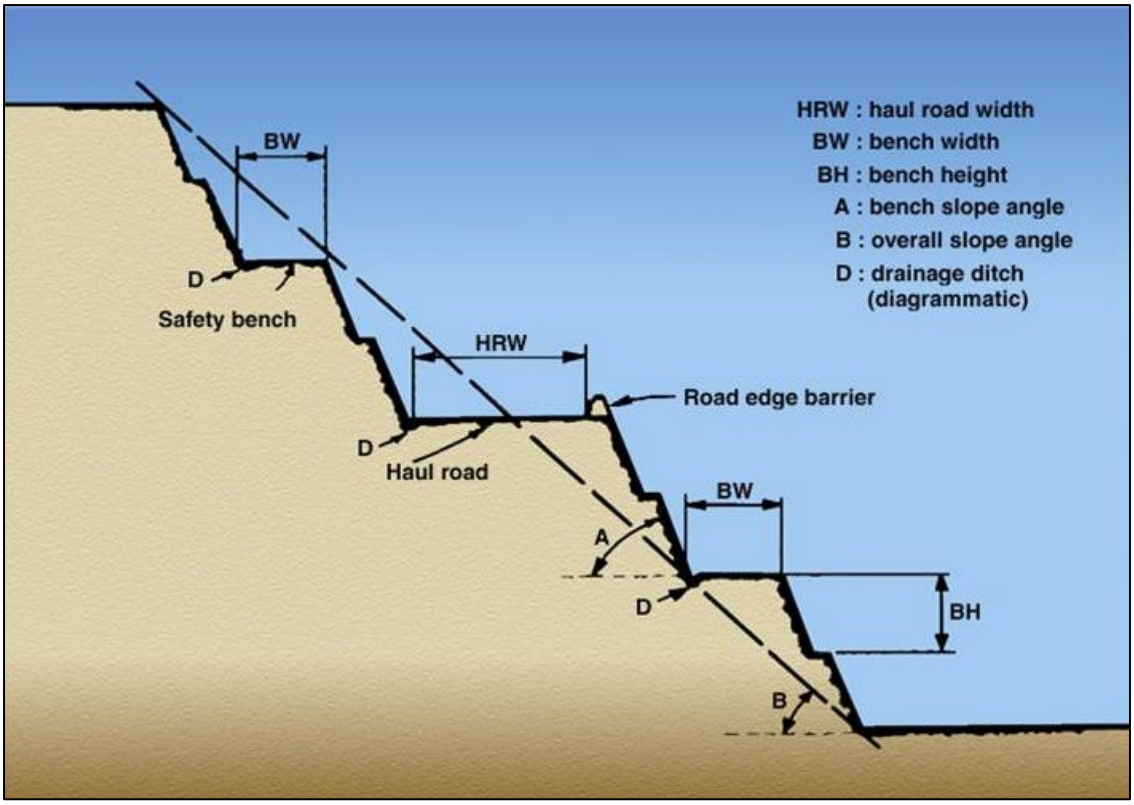


Figure 4 *Benching diagram*

Dewatering:

The mine pit will be dewatered beginning at around 9m below surface level down to 13m at an estimated rate of 30 - 50 L/s. The water will be pumped from the mine pit using an electrically driven pump and pumped into settling ponds that run adjacent to the mine pit. The settling ponds will be utilized to settle the suspended solids from the water. Once the suspended solids have settled out the water is then discharged back to ground a minimum of 50m from the Mata-au. It is planned that the dewatering pump will be powered by the Talla Burn power scheme.

Gold Extraction Processing:

The wash mining width averages 150 m and x 3.2m depth and will be mined by an excavator sitting on a bench some 0.5 m above the pond level and feeding the gold bearing wash excavated from below its track level into a floating gold recovery plant which will be located in the mine pond. The pond will progress forward up the mine path as the mining progresses. The mine pond will have dimensions of approximately 150 m by 100 m.

The gold recovery plant will float in the mine pond on pontoons and have a feed capacity of 180 bcm/hr (330 tph). Gold is recovered by screening and gravity concentration processes. No chemicals are used in the process.

The wash feed averages 64% +10mm oversize fraction. This oversize fraction will be rejected by means of a high-energy vibrating screen and report onto a stacker conveyor for discharge into the mine pond behind the plant. The excavator will feed the screening device via a hopper with the possible incorporation of a feeder to ensure continuous and regular feed rate. The screen undersize (-10mm) will report to a bin and be pumped at a fixed pulp density (Concentrations of solids by weight = CW 35%) to the primary jig gravity circuit.

To process the 120 tph of gold bearing 10m minus material, a circuit of 12 flowlines of 42” x 42” Pan Am jigs will be employed. These jigs are specialized heavy mineral separators consisting of a bed of heavy ball bearing like ragging sitting on a 4 mm mesh. The ragging is pulsed up and down by a diaphragm of set stroke and frequency to permit the heavy mineral to pass through the ragging and allow the lighter gangue mineral to flow across the top of the ragging into a tailings launder. The gold bearing heavy mineral passes through the ragging into a collection chamber and is discharged into a sump.

Assuming a 10:1 reduction ratio, the secondary jig circuit would receive 12 tph and require 2 flowlines of 42” x 42” Pan Am jigs with final concentration on 2 x Knudsen Bowls with streaming-down tables. The larger gold will be entrapped in the jig ragging, if greater in size than the mesh supporting the ragging, but mainly the gold will be collected with the other heavier mineral fraction in the streaming down tables and Knudsen bowls. The streaming down tables and Knudsen bowls will be cleaned out every shift and the gold bearing heavy mineral transported to the Gold Room for the final gold extraction.

The tailings, from both primary and secondary jigs and the Knudsen bowls, will report to a tailings bin and be pumped to a dewatering cyclone mounted above the oversized stacker conveyor belt. This will ensure the tailings mixes with the oversize fraction and allows the dirty water produced in the circuit to be discharged to the pond below water level to encourage settlement.

Based on this circuit and utilizing a 2.5 m wide x 6.0 m long vibrating screen, the plant would require a pontoon footprint of 27 m long x 13m wide. The oversize stacker conveyor at 18^0-15^0 would discharge the oversized material 6.0 m high from pond bottom and some 5.0 m from the stern of the plant. All plant items (screen, conveyor, jig, and pumps) will be

electrically powered with power provided by an on-board generator set of approximately 600 kVA. Once the 2nd stage of the project is reached it is planned that the gold recovery plant will be powered by the Talla Burn power scheme and the generator will be removed. Suitable lighting will be provided for safe night activities. The plant will be fed by a 90-t excavator located on a mining bench.

Water will be pumped from the mine pond for use in the process. The quantity of water required has been assessed at 258 litres per second which will, in turn, be returned to the mine pond. The water use for gold processing is non-consumptive.

It is proposed that vegetable-based hydraulic oils be used by the excavator to minimize environmental risk from accidental leaks into the mine pond. In order to sustain the mine pond water level, diesel-powered pump sets located at ground level adjacent to the mine pond will be provided which will deliver the “dirty” mine pond water at up to 30 - 50 L/s via pipelines to dewatering ponds on the surface and hence to the settling or treatment ponds.

Staffing:

The total number of people employed by the project will be 20, generally made up of the following:

Role	Number of employees
Management and administration	3
Technical roles (geologist, etc.)	1
Operators and labourers	12
Mechanics	2
Engineers	2

Glossary and abbreviations:

BCM – Bank cubic metre – one cubic metre of material in situ, before it is excavated.
GRP – Gold recovery plant

ECOtago

Environmental Consultants Otago Ltd

Preliminary Site Investigation

1484 Teviot Road
Millers Flat

for
Hawkeswood Civil Limited

June 2022

Environmental Consultants Otago Ltd
Environmental and Contaminated Site Assessments
PO Box 6 Hampden 9442 ▪ www.ecotago.co.nz

Task	Responsibility	Signature
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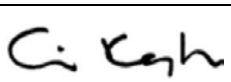
Prepared By:	Ciaran Keogh, MBA, MRRP	
Reviewed By:	Bernice Chapman, CEnvP, PhD, MEIANZ	
Approved For Issue By:	Ciaran Keogh, MBA, MRRP	

Prepared By:
Environmental Consultants Otago Ltd

PO Box 6
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Client: Hawkeswood Civil Ltd
Job Ref.: 361-22 Millers Flat
Date: 28 June 2021

Executive Summary

Environmental Consultants Otago Limited (EC Otago) was commissioned by Hawkeswood Civil Limited to undertake a Preliminary Site Investigation (PSI) over part of the property at 1484 Teviot Road Millers Flat, in accordance with the *Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011* (NES). Part of the property, defined as the site, is proposed to be mined for alluvial gold. A section of the site was used for historical landfilling activity (Millers Flat Landfill). The purpose of this report is ascertain whether any Hazardous Activities and Industries List (HAIL) activity other than the one identified has occurred within the site, to determine the extent of the HAIL activity, and if contamination is present within the site.

The property consists of 9.7036 ha that is presently used for pasture and cropping. The site consists of 8.02 ha, part of which historically has been quarried for gravel with part subsequently used as a landfill which is now closed. The purpose of this PSI is to identify the extent of the HAIL activities within the site so that this area may be excluded from the proposed mining activity.

The information reviewed, and the sampling undertaken, confirmed that HAIL Category G3 (*Landfill Sites*) applies to part of the land. No other HAIL activities were identified within the site. The investigation has identified a mining perimeter, the boundary of which was shown to be unaffected by the HAIL activity with contaminant levels at or below background concentrations. As a result, the provisions of the NES do not apply to the part of the site outside the mining perimeter. The mining perimeter has been determined to ensure that the landfill contents are not disturbed during the proposed mining activity.

The investigation indicates it is highly unlikely that the soils outside the mining perimeter present a risk to human health or the environment in its current state or during the proposed mining operations, based on the preliminary sampling undertaken.

Based on this investigation, EC Otago finds the following:

- Based on the information examined during this investigation, no evidence was found that HAIL activities have historically been, or are currently being, undertaken on the part of the site outside of the identified mining perimeter. Consequently, the provisions of the NES do not apply to these parts of the site.
- Soil sampling and analysis did not identify any contaminants that exceed the natural background levels along the mining perimeter.
- There is highly unlikely to be a risk to human health or the environment from soil contamination due to past historical activities outside the mining perimeter.
- If waste materials, or other visual or olfactory indicators of potential contamination are observed during earthworks, a Contaminated Land Advisor must be consulted, and further sampling and analysis is required.
- The NES does apply to the former landfill site, contained within the mining perimeter (HAIL.00338.01). Any proposed disturbance of this land, contained within the mining perimeter, will require a full site investigation and consents to disturb a HAIL site / contaminated land from both Central Otago District Council and Otago Regional Council.

Table of Contents

Abbreviations

CODC	Central Otago District Council
HAIL	Hazardous Activities and Industries List
NES	Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011
OCP	Organochlorine Pesticides
ORC	Otago Regional Council
PAH	Polycyclic Aromatic Hydrocarbons
PSI	Preliminary Site Investigation
SCS	Soil Contaminant Standards
SGV	Soil Guideline Values

1 Introduction

Environmental Consultants Otago Limited (EC Otago) was commissioned by Hawkeswood Civil Limited to undertake a Preliminary Site Investigation (PSI), with limited soil sampling and analysis for contamination, at 1484 Teviot Road, Millers Flat. Investigation is required to facilitate assessment of the extent of past activities, to provide information as to the property's contamination status outside of the known landfill activity, and to ascertain suitability of the bulk of the land for the proposed mining activity. This PSI was undertaken in accordance with the proposal submitted by EC Otago on 10 May 2022. A statement of EC Otago's experience is attached as Appendix A.

1.1 Background and Objectives

If an activity or industry described in the Ministry for the Environment's Hazardous Activities and Industries List (HAIL) is being, has been or is more likely than not to have been undertaken on a property, then the *Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011* (NES)[1] apply when five specific activities (including soil disturbance, subdivision or change of use) take place on the property. The HAIL is a compilation of activities and industries that are considered to have the potential to cause land contamination as a result of hazardous substance use, storage or disposal. The presence of such activities on a property does not automatically mean contamination is actually present on the property.

A specific trigger for this PSI is the known historical landfilling activity (Millers Flat Landfill) that occurred on a part of the property. The proposed future development of the property comprises the excavation to bedrock of the alluvial gravel deposits for screening for the removal of gold and subsequent reinstatement of the gravels, requiring soil disturbance. The purpose of this study is to define a boundary between the HAIL site and the proposed mining activity, and to review the site history to ascertain whether any HAIL activity other than the one identified has occurred within the site.

The main objectives of a PSI are to gather information about a designated land area in order to determine whether it may potentially be contaminated, to assess the suitability of the land for its current or intended future land use, and to determine whether a detailed site investigation is required. This PSI has been undertaken in order to establish what current and historic activities have occurred at the property, the extent of the activity, and the potential for these activities to have resulted in contamination.

1.2 Scope of Work

Consistent with the Ministry for the Environment guidelines[2] for reporting on contaminated land, the following scope of work was undertaken:

- Source and review of all available relevant information, including any previous reports. Sources as follows:
    - Central Otago District Council (CODC) property files.
    - Otago Regional Council (ORC) HAIL database and property records.

[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 (Revised 2011)*.

  - Historical and recent photographs.
  - Other sources of information as cited herein.
- Carry out a walkover to verify site conditions and inspect for indicators of potential contamination.
- Excavation of auger holes to 2.5 metres with soil sampling from selected auger holes. Analyse soil samples for heavy metals, pesticides and hydrocarbon contaminants.
- Prepare this report, which summarises our findings and assesses the following:
  - Whether previous and/or current on-site activities or adjoining land uses had or have the potential to cause contamination.
  - The likely nature of any contamination.
  - The risks to future users from any contamination.
  - The disposition of the property with respect to the NES.
  - The requirement for further investigations to define the degree or extent of any contamination.
  - Any conclusions and/or recommendations specifically pertinent to the objectives of this investigation.

2 Site Environment

2.1 Site Identification

The general location is shown in Figure 1, and the relevant property details are given in Table 1. The extent of the property is shown shaded lilac in Figure 2. The property has a total area of 9.7036 ha of which approximately 2.4 ha is identified as a Verified HAIL site (HAIL.00338.01). The ORC site records note that the location and extent of the identified HAIL site on the ORC database may not be accurate. The identified HAIL site is shown outlined in Figure 2 in turquoise.

The title includes two blocks of land separated by an accessway as shown in Figure 2. The larger of the two blocks (Sec 118 BLK VIII BENGER SD), outlined in yellow, is defined as the site for the purposes of this investigation. It consists of 8.02 ha that is proposed to be subject to mining. The smaller block (Sec 110 BLK VIII BENGER SD) is excluded from the mining area.

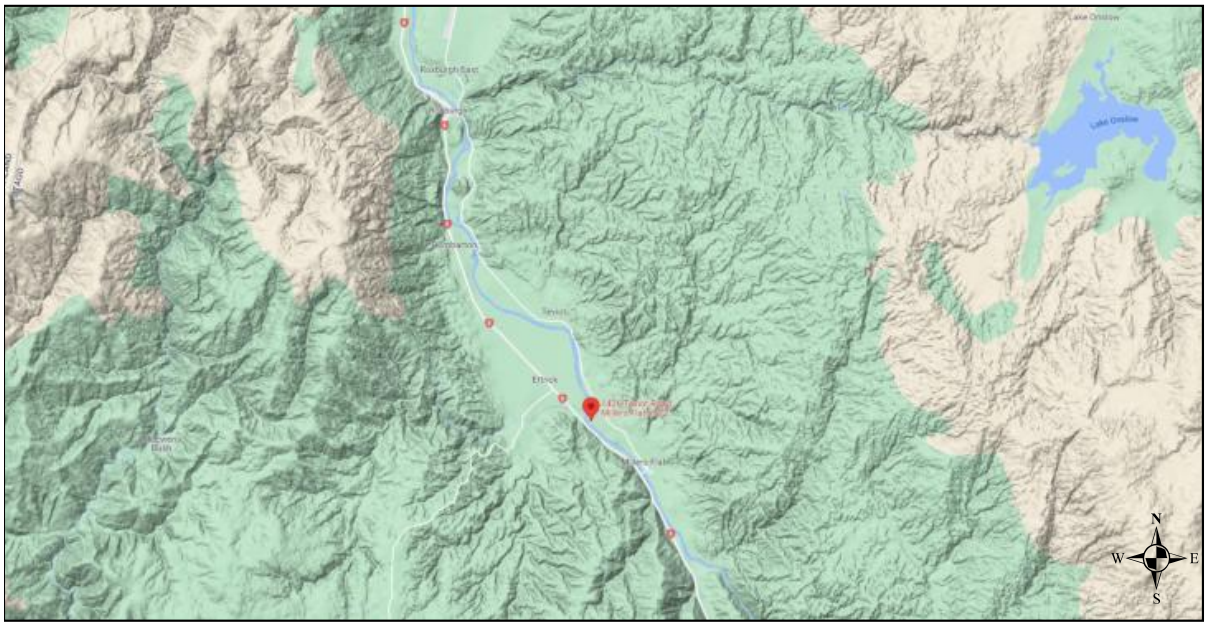


Figure 1: General location of the property, shown with a red tag (Map Data ©2022; Google Terrain).

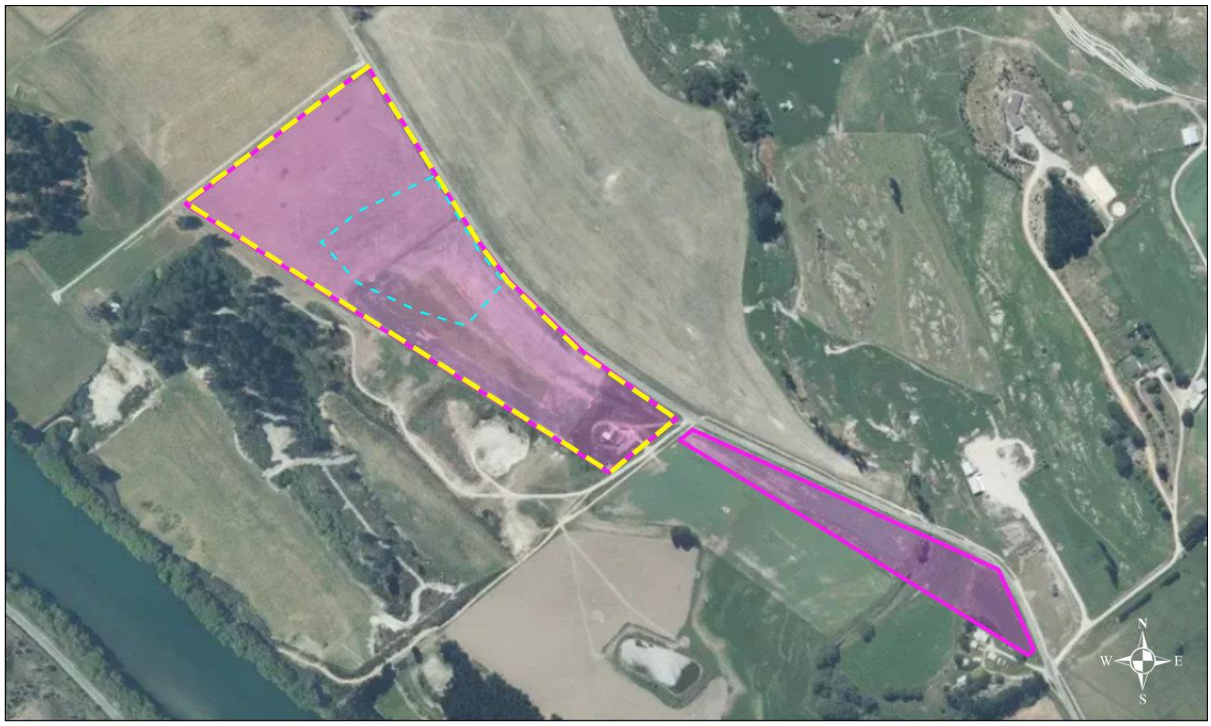


Figure 2: The extent of the property shaded lilac with the site outlined in yellow and the land identified on the ORC HAIL database as a Verified HAIL site outlined in turquoise (Central Otago District Council Geographic Information System, CC BY 4.0 NZ).

Table 1: Property details.

Owner	Alan Thomas Parker
Address	1484 Teviot Road
Legal description	SECS 110 118 BLK VIII BENGER SD
Certificate of Title	241193
Area	9.7036 ha
District Plan / zoning	Rural

2.2 Topography

The property is located on a terrace adjacent to the left bank of the Clutha River, 2.3 Kilometres upstream (to the northwest of) the township of Millers Flat. The property is generally flat to gently rolling sloping to the south and west. Elevation is around 70 m above sea level and the land is between five and ten metres above the Clutha River which lies between 400 and 500 metres to the west and south of the property.

2.3 Site Access

Teviot Road is located at the north-eastern boundary of the site with access from a formed driveway at the site southern boundary.

2.4 Geology

The site is formed of late Pleistocene river deposits bedded, locally derived, unweathered to slightly weathered sandy gravel in low terraces in non-glaciated catchments overlying undifferentiated Caples terrane schist[3]. The shallow geology is characterised in more detail by the bore log from the monitoring well (G43/0112) within the property as set out in Table 2.

[3] https://data.gns.cri.nz/geology/

Table 2: Bore log well G43/0112

Depth (m)	Description
0.00-4.00	Loose Sandy Gravels
4.00-8.00	Boulders
8.00-10.00	Loose Sandy Gravels
10.00-12.00	Sandy Gravels Wet
12.00-14.00	Sand Wet

The site is described by the ORC Hazards Database[4] as having has a low to no liquefaction potential (Domain A) being predominantly underlain by rock or firm sediments with Ground Class D (Deep or Soft Soil).

2.5 Hydrology

2.5.1 Surface Water

No surface water was visible on the site at the time of the inspection, and review of the ORC Hazards Database indicates that the site is not at risk of flooding. Tima Burn runs through the eastern part of the property and the ORC Hazards Database identifies a flood risk in this part of the property associated with the Clutha River. The CODC District Plan identifies this portion of the property as flood prone.

2.5.2 Groundwater

No groundwater was encountered during excavation of auger holes and the site is not located over any identified aquifer; however it lies approximately 650 m to the southeast of the Ettrick Basin Aquifer[5]. The bore records held by the ORC[6] identify one bore located on the site for groundwater investigation purposes. While the depth to groundwater is not reported on the database, a Landfill Monitoring Report[7] shows depth to groundwater during six annual inspections between September 2016 and November 2021 was within a range of 10.8 and 11.62 m.

One bore used for domestic water supply is located within 0.5 km of the centre of the site as shown in Table 3.

Table 3: Bore locations within a 0.5km radius of the centre of the property.

Well Number	Distance/Direction	Owner	Usage	Depth to Water
G43/0112	-	CODC	Groundwater Investigation	-
G43/0142	470 m NW	Liyawarachahi G	Domestic	-

3 Site History

3.1 Site Ownership

Three historical certificates of titles have been found for the site. The earliest of these, dated 10th March 1970 (OTA 5A/514, formerly Lands and Survey DPF 382), records Stanley N Parker (school teacher) as the License Holder pending sale of the land by the Crown. DPF Record 382 was not accessible but relates to Crown Ownership of the land formerly part of the Roxburgh railway line.

[4] https://maps.orc.govt.nz/portal/apps/MapSeries/index.html?appid=b24672e379394bb79a32c9977460d4c2
[5] https://data.mfe.govt.nz/layer/52675-location-and-extent-of-nzs-aquifers-2015/
[6] https://maps.orc.govt.nz/portal/apps/MapSeries/index.html?appid=052ba04547d74dc4bf070e8d97fd6819
[7] ENGEO Limited, 2021. *Annual Report Closed Landfills, Central Otago*.

Title OT8C/1327, issued 19th February 1981, notes transfer of the land to Miriam Helen Parker (widow) and Russell Douglas Checketts (solicitor) as Executors on the 24th April 1996. This title was cancelled and CT 241193 issued on 8th September 2005 with ownership transferred to the present owner Alan T Parker.

The titles note that the property is subject to Section 59 Land Act 1948 and a number of now expired mining exploration permits have been registered against the site.

3.2 Site Use History

The site history is well represented by the historical photographic record with the earliest image from 1903 and aerial images covering the site dating 1944, 1959, 1963, 1968, 1969, 1974, 1975, 1980 and 1983 from the Retrolens website, from 1951, from the VC Browne collection, and images from 2005 to 2020 from Google Earth, from 2008 and 2012 from Google Maps Street view, and undated more recent photography from the CODC GIS.

The earliest image of the property, in Figure 3, shows the site in 1903. At this date the site is in pasture. This image is one of a four-part panorama with the adjacent photo (not shown) showing gold dredging of the gravel deposits adjacent to the Clutha River occurring to the northwest of the property.

Figure 3: The property located in the centre of the image, and its surrounds in 1903 (Source Hocken Collections, Uare Taoka o Hākena, University of Otago; Title: CLUTHA RIVER - Goldmining Dredging c1903 (left) from near Ettrick to (right) Miller's Flat [Part 3 of 4 part panorama]).

The former Roxburgh Railway line was located along the road boundary of the site. Historical records relating to the construction indicate that the section of the line between Millers Flat and Roxburgh was constructed between 1925 and 1928[8].

"The Roxburgh Branch railway used to pass through the town; it was opened to Millers Flat in 1925 and was the terminus for approximately two and a half years, until the section to Roxburgh was

[8] https://en.wikipedia.org/wiki/Roxburgh_Branch

opened. The line was closed in 1968, though the town's station platform and some of the railway formation still exist"[9].

Gravel was quarried from within the site during construction of the railway with the gravel quarry forming a long trench adjacent to the north-eastern site boundary. This long, curved trench has the appearance of an access road that terminated in a quarried area extending roughly three quarters of the way across the site. The quarry and trench are visible in the image in Figure 4 showing the site in 1951. In this image the majority of the site remains bare of distinctive features and the disused quarry appears undisturbed from the earlier image in 1944 (not shown) with no evidence of landfilling or vehicle access being evident. The railway is present along the road boundary of the property.

Figure 4: The property in 1951, with the approximate property boundary outlined in yellow and the HAIL site outlined in turquoise (V.C. Browne and Son NZ Aerial Photograph Collection).

The image from 1963 (Figure 5) shows the site and the HAIL site in considerable detail. There is no evidence of significant landfilling at this date. A substantial gravel pit has been excavated adjacent to (outside of) the site southwestern boundary.

The next image of the site from 1980 in Figure 6 shows active landfilling occurring at the head of the former quarry closer to Teviot Road with the western part of the quarry already filled and covered over. The landfill area is served by a short access track. The railway formation remains present but appears less well defined. A further image from 1983 (not shown) show no change within the site from the 1980 image.

There is an interval of 22 years between the 1983 image and the first Google Earth Image of the site from 2005 shown in Figure 7. By this date the landfill area is no longer in use and appears to have been covered over and the railway formation is no longer visible. The entire head of the quarry has been filled and all that remains of the old quarry appears as a long narrow pit adjacent to the road boundary of the site. This remnant part of the quarry otherwise appears largely unchanged from the earliest image. By 2011 (Figure 8) the pit appears to have been "recontoured". The reshaping

[9] https://en.wikipedia.org/wiki/Millers_Flat

appears to have involved trimming and shaping the upper edges of the pit with the material derived from that being placed in the bottom of the pit as the contour of the pit reduced to a broad swale enabling the land to be integrated into the irrigated cropping regime presently occurring on the site. At present the site appears unchanged from the 2011 image.

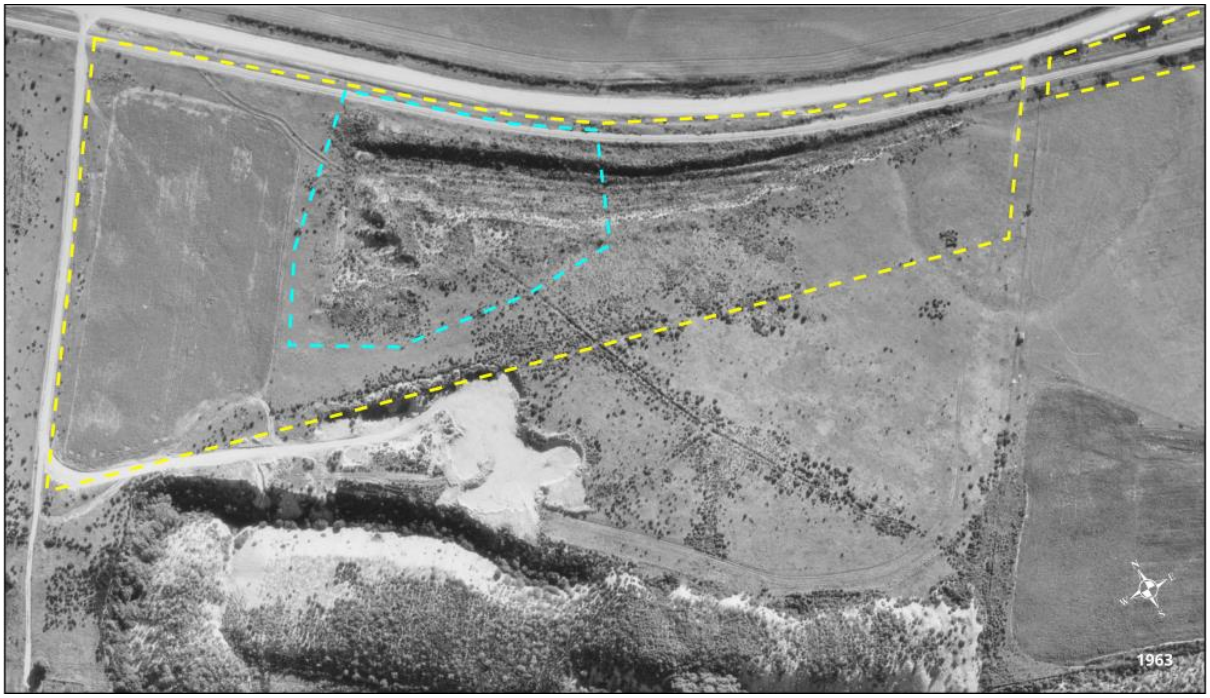


Figure 5: The site in 1963, with the HAIL site boundary outlined in turquoise and the property outlined in yellow (Sourced from http://retrolens.nz and licensed by LINZ CC-BY 3.0).

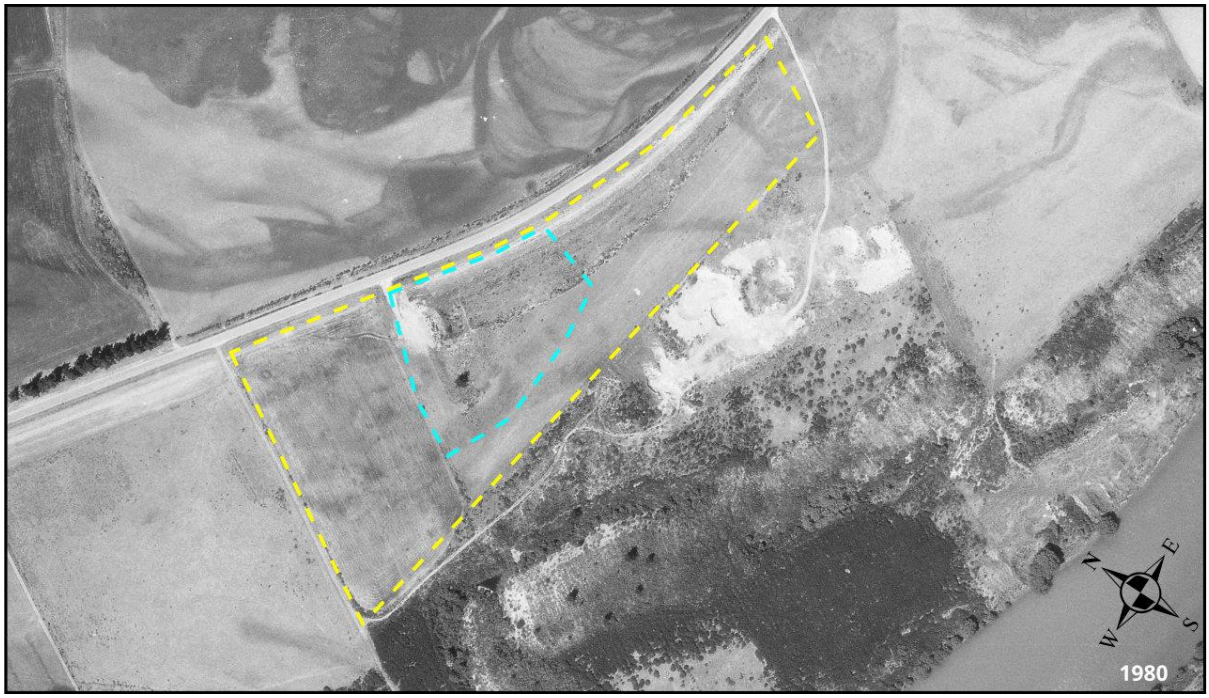


Figure 6: The site in 1980, with the HAIL site boundary outlined in turquoise. The landfilling activity is clearly present at this date with a short access track from Teviot Road. The western part of the gravel quarry appears to have been filled (Sourced from http://retrolens.nz and licensed by LINZ CC-BY 3.0).

Figure 7: The site in 2005, outlined in yellow and the landfill site outlined in turquoise. The landfilling activity evident in the image from 1980 is no longer occurring and the landfill access road has been removed. The parts of the former gravel quarry not used for landfilling remain otherwise unchanged (Image @ 2022 Maxar Technologies, Google Earth).

Figure 8: The site in 2011 showing the area formerly occupied by the quarry has been recontoured to remove the abrupt edges to the pit and to raise the lower parts such that the feature now forms a gentle swale in the paddock (Image @ 2022 Maxar Technologies, Google Earth).

3.3 Regulatory Matters

3.3.1 District Council Records, Consents and Licenses

The CODC provided a copy of the council's records relating to the site. The records all relate to the closed landfill (Millers Flat Landfill) and include excerpts from the site closure plan, 2021 Annual Report on Closed Landfills, Central Otago; 2022 Compliance Monitoring Report (by the ORC); Discharge Permit 95233 (discharge of leachate to land, expiring 2026); Discharge Permit 95234 (discharge of landfill gas, odour and dust to air, expiring 2026); and an ORC File Note on the HAIL extent for the Millers Flat Closed Landfill.

The records include note that a resource consent application by Duffill Watts & King Limited in February 1997 states that it is unknown exactly how long the landfill had been operating, but it is expected to be greater than 10 years. It estimates that waste filling occurred over an area of 10,000 m^2 in a long narrow pit that was created when gravel was taken for the construction of the local rail line.

The closure plan was prepared by Montgomery Watson in November 2000. The excerpts contain minimal information on the landfill but note that filling occurred over an area of approximately 10,000 m^2, that the nature of the waste was not recorded however is likely to comprise domestic waste with components of commercial and agricultural waste, and that the landfill was closed and covered in June 1997. A contour plan shows the possible landfill extent, monitoring well location and extent of the tip face.

The 2022 Compliance Monitoring Report by the ORC dated 1 June 2022 notes that there is moderate non-compliance with the conditions of the discharge consents:

"During the 2022 audit it was found that most of the site was covered in green crop for overwintering cattle. Furthermore, under section 2.3 'Future Use' the plan states that future uses of a closed landfill 'may include use for grazing (by owner or leased to adjacent land owners). This would be limited to grazing sheep to prevent damage to the landfill cap.' The Millers flat site is therefore not managed in accordance with this plan. There was no damage to the cap noted in the 2021 site inspections conducted by ENGEO nor during the ORC 2022 audit. However, the accumulative impact of using the Millers flat closed landfill for agricultural purposes has not been assessed. The carrying capacity for the site it not know and nor are the chemical interactions that are taking place at this site. Groundwater sample results were the highest they have ever been for Nitrate which was reported above the NPS value for freshwater in November 2021. This indicates that the agricultural use on this closed landfill site may be influencing groundwater quality."

The compliance report conclusions are as follows

- *There is a risk to the cap & groundwater by allowing overwintering of cattle on a closed landfill.*
- *Grazing cattle is also not in accordance with the closed landfill management plan.*
- *The accumulative impact of using the Millers flat closed landfill for agricultural purposes has not been assessed. The carrying capacity for the site it not known and nor are the chemical interactions that are taking place at this site.*
- *Groundwater sample results were the highest they have ever been for Nitrate which was reported above the NPS value for freshwater in November 2021.*
- ***Consents 95233 & 95234 will both expire in 2026.***
- *The 2019 annual report was submitted over 6 months late.*

- *There is no closed landfill sign for this site.*
- *Nitrate was reported above the NPS value for freshwater in 2021. It has been high historically too.*

The compliance report also notes an updated closed landfill management plan will be required for consent renewal.

The ORC Consent Decision Report observed

The small amounts of landfill gas produced will permeate through the cap and disperse into the air. The surface of the closed landfill is such that no dust should be generated from it and unless the waste is disturbed no odour should be produced[10].. Interaction with groundwater is not evident from the limited information contained in the ORC consent compliance monitoring report[11]. The base of the fill material also appears, from the bore monitoring data, to be isolated from groundwater as the depth to water measures indicate that ground water level is more than 6 metres below the base of the fill.

The CODC GIS also notes a 2005 S224c Certification for a subdivision boundary adjustment and a 2009 Code of Compliance Certificate for a new shed.

The land where the site is located is zoned Rural Resource Area in the CODC District Plan. The present land use (pasture) is consistent with the zone provisions and the proposed use is a discretionary activity under rule 4.7.4 and 4.7.6.

3.3.2 Regional Consent Records

The ORC database notes Discharge Permit 95233 (discharge of 1,020 m^3 per year of landfill leachate to land, expiring 2026) and Discharge Permit 95234 (discharge of landfill gas, odour, and dust to air, expiring 2026) in addition to Discharge Permit 95232 (discharge of contaminants to land resulting from the operation of the Millers Flat Landfill) and Consent 96420 (bore construction consent, expiring 1998).

3.2.3 HAIL/Contaminated Land Databases

The ORC HAIL database identifies a part of the site as a Verified HAIL site (HAIL.00338.01) due to HAIL activity G3 (Landfill Sites) noting that the site is managed through CODC consents (Figure 9).

[10] ORC Report No: 2002/366 Decision on Applications 95233 and 95234 s5.4

[11] ORC CONSENT AUDIT REPORT Inspection # 593722 & 593723 for consents 95233 and 95234 01 June 2022

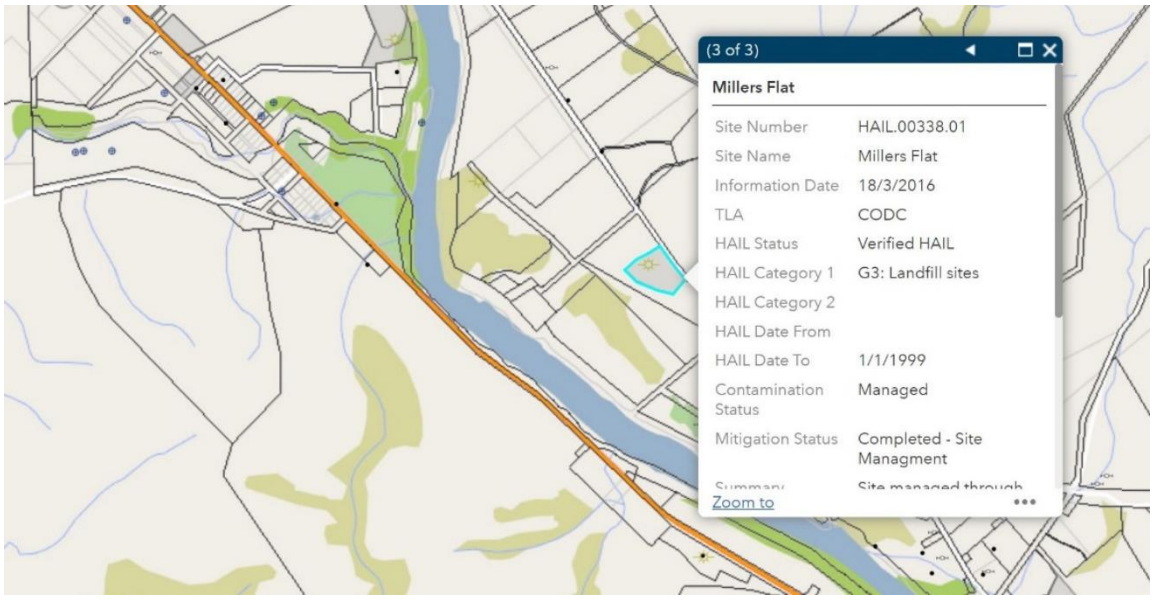


Figure 9: Extract from ORC Contaminated Land Database showing the recorded location of verified HAIL site HAIL.00338.01 recorded as being a managed site.

3.4 Use of Land Adjacent to Site

The site is bordered by rural land used for grazing and cropping. A now closed green waste landfill is located in a disused gravel quarry adjacent to the site's southwestern boundary. The photographic record of the site from 1903 to the present show that the surrounding areas to the west and south have been in pasture with dredging of alluvial gravels for gold occurring between the site and the Clutha River in the late 1800's through to the early 1900's. The Teviot Road runs along the site north-eastern boundary and from the mid 1920's the Millers Flat - Roxburgh rail line occupied the north-eastern site boundary until it was removed in the 1968.

3.5 Previous Investigations

No previous investigations on the site were found. However several reports are available for the landfill. The landfill closure plan encompasses 12 CODC landfills closed following the opening of the Victoria Flats landfill. The site plan contained within the landfill closure plan noted the presence of one monitoring bore located to the south of the landfill site. The closure plan notes that an estimated 1,020 m^3 of leachate will be generated per year (2.8 m^3 per day) however this discharge will be substantially influenced by weather events. The closure plan does not record any investigations relating to gaseous discharge but the ORC Staff recommending report[12] makes a general statement that "*Gases arising from the decomposition of solid waste, such as methane and carbon dioxide, will migrate through the soil matrix to the surface and be dissipated in the atmosphere. The soil matrix will act as a natural 'biofilter' and remove much of the odour. Quantities of gases are expected not to be significant from these landfills. In addition, the high porosity of the soils will defuse the gases evenly dissipating them to the atmosphere without concentrating them.*"

The 2021 annual report[13] on annual monitoring of groundwater nitrate, chloride, pH and conductivity from 2016-2021. The 2022 ORC Compliance Monitoring Report notes the nitrate levels are elevated and highly variable and the agricultural activity on the land may be impacting

[12] ORC File No: 95233 and 95234 Report No: 2002/366

[13] ENGEO Limited, 2021. *Annual Report Closed Landfills, Central Otago*.

groundwater quality rather than the residual impacts from the landfill. Current and Proposed Future Use

The site is currently operated as a farm and the land is planted in winter feed crops. The proposed mining activity will be undertaken progressively over the site as a temporary activity with the land being restored to pasture on completion of the mining activity. The mining will comprise the progressive excavation of the alluvial gravels over the entire river terrace excluding the landfill area, for processing for extraction of gold with the excavated material being reinstated following processing.

4 Site Condition and Surrounding Environment

4.1 Site Inspection

A site inspection with soil sampling was undertaken by an EC Otago Senior Environmental Consultant on 20th May 2022. The site inspection included a walk-over and the excavation of thirteen auger holes outside the perimeter of the closed landfill, with collection of six soil samples for analysis.

The site is in open pasture with brassica crops for winter feed over the parts outside of the closed landfill. Part of the landfill area is sown in grass, but the bulk of the former landfill is covered with a winter turnip and kale crop.

The HAIL site is shown in Figure 10. The landfill occupies the lower lying parts of the land in the central and more distant parts of the land shown in this image. The landfill monitoring bore G43/0112 is visible in the foreground at lower left in the image. A farm fence crosses the HAIL site and irrigation sprinklers on pipe upstands are spread across the site in lines parallel with the Teviot Road boundary.

Figure 10: The site looking north with landfill area occupying the area from the depression at upper left of image to Teviot Road at right. The ground water monitoring bore is within the wooden structure at lower left (20 May 2022).

4.2 Conditions at Site Boundaries

The HAIL site boundaries are not distinctly identifiable within the site. The site is flat to slightly undulating with cropping occurring across both the site and the surrounding farmland. `. No erosion or instability is evident within or adjacent to the site.

4.3 Signs of Contamination

The site showed no indication of potential sources of contamination. There were no visible signs of spills or leaks, surface or soil staining or areas where the surface vegetation appeared to be damaged by gas emissions or toxic soil conditions. There were no visible or olfactory indicators of contamination evident during the augering.

5 Soil Sampling and Analysis for Contamination

5.1 Overview

According to the Ministry for the Environment's guidelines for contaminated land investigations, sampling and analysis are optional in a PSI, with information on this to be provided "as available". Ultimately, however, the disposition of any contamination can only be confirmed with results from field sampling and analysis for contaminants. The primary purpose of this site investigation was to establish a mining perimeter by confirming the absence of landfill in the land surrounding the landfill, effectively defining the boundary of the HAIL site. The mining perimeter is to be established as a margin to the mining operation where it is proximate to the landfill such that the mining activity can be assured of being able to be conducted without disturbance to the landfill and its contents

5.2 Sampling and Analysis Plan

The approximate landfill extent was established by measuring distances on Google Earth from fence lines and roads that were present when the landfill was in operation and that remain on site now. The perimeter has been based on establishing a minimum of 10 m separation between the landfill as indicated by the maximum extent of the gravel quarry in the 1963 aerial view in Figure 5 and recent Google Earth imagery with the fill area as shown in the closure plan overlaid as a guide (Figure 12). The boundaries forming the approximated perimeter were located in the field using a hand-held GPS unit with an accuracy to 2-5 m. Thirteen holes were augered to a depth of 2.5 metres along the identified perimeter as shown in Figure 11, to confirm that undisturbed ground was present at each location and that no visible or olfactory evidence of landfilling was observed. The site plan contained within the Landfill Closure plan showing the full extent of the landfill is overlain on this image so that the relationship with the sampling points to the surveyed location of the landfill can be seen. The location of the auger holes were recorded with a handheld Garmin InReach GPS with an accuracy of 2-5 m.

Figure 11: Location and dimensions of the HAIL site as measured on 2020 Google Earth imagery and with landfill extent as documented in the CODC Landfill Closure Plan overlaid with auger holes as recorded with handheld GPS (Image © 2022 CNES/Airbus, Google Earth).

Clothing and a plastic bag were brought to the surface from a depth of more than 1 m at the first auger hole as shown on Figure 12. While these items did not appear to be associated with other landfill material, the location was closer to the toe of the landfill and the perimeter holes at this end of the fill area were moved 15 metres to the south.

Four holes were augered along the south-eastern end of the HAIL site and a further eight holes were located along the western and northern sides. Soil samples were collected by hand selection from the soil extracted with the auger at six locations as shown in Figure 12 to determine the contamination status of the soil at each location.

The sampling plan was developed to provide an indication of the contaminant levels along the identified mining perimeter in the areas surrounding the landfill. The sampling plan is shown in Figure 14. A total of six samples were collected labelled MF1-MF6. Two samples (MF1, MF2) were collected from the augur holes across the down slope margin within the former quarry trench and four samples were collected on the upslope end of the fill area. The samples were analysed as two composites consisting of three subsamples each. Samples were not collected from auger holes 10-13 as these were all in undisturbed natural soils and are represented by samples MF4-6.

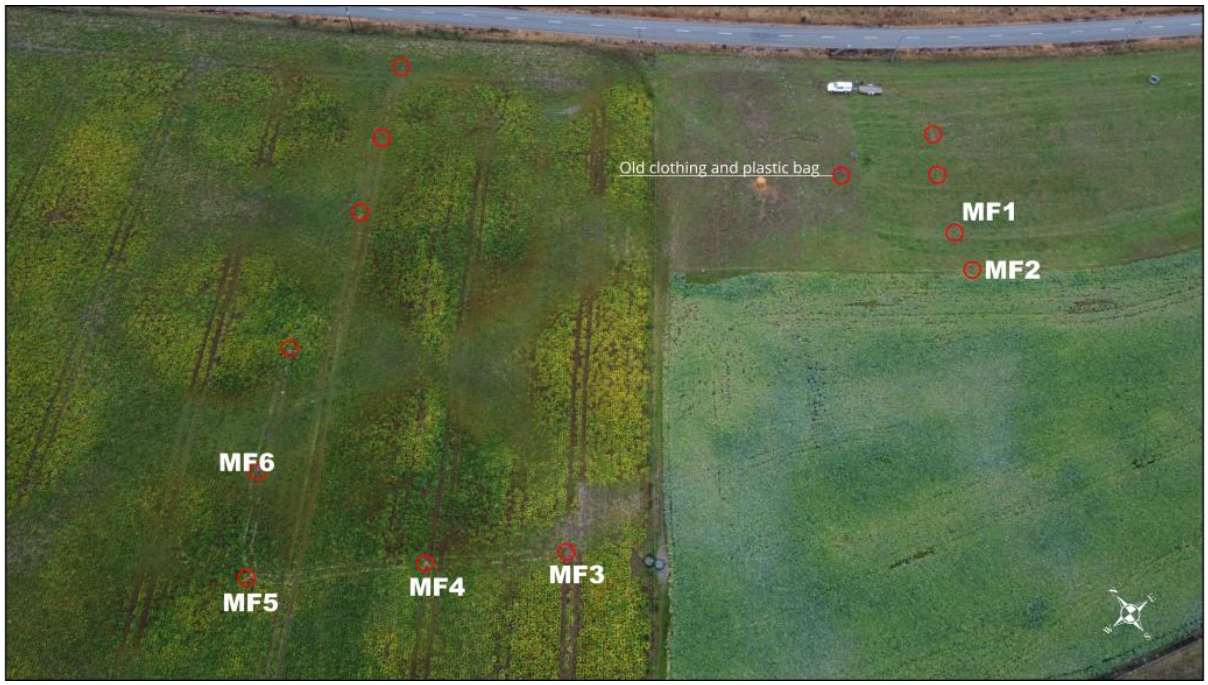


Figure 12: Aerial drone image showing auger locations circled in red and sample locations annotated MF1-MF3 and MF4-MF6. The first auger hole encountered some items of clothing and a plastic supermarket bag as shown. All of the remaining auger holes were observed to be in undisturbed or unmodified natural material (20 May 2022).

5.3 Sampling Methods

Samples from the auger holes were collected by hand selection of material representative of the full 2.5 m depth of each hole, using freshly gloved hands.

Samples were transferred into clean, contaminant-free containers provided by the testing laboratory and placed into a chilly bin cooled with icepacks. During sampling, the date and time of collection was recorded, and the location was recorded. Containers were labelled with sample name, date and time on both label and lid as the samples were taken, and the location was recorded with a handheld Garmin InReach GPS unit with a locational accuracy of ±5 m. The chain of custody form was completed during field operations, and samples were immediately dispatched to the analytical laboratory by courier. The samples were received and analysed by RJ Hill Laboratories Limited, an International Accreditation New Zealand (IANZ) accredited laboratory.

6 Results from Sampling and Analysis

6.1 Soil Acceptance Criteria

As part of the process of determining the risk to human health from potential contaminants, results from analysis must be compared to Soil Contaminant Standards (SCSs) which reflect acceptable risk levels of contamination in soil for the appropriate use scenarios[14]. For some analytes, the Ministry for the Environment has not established SCSs, in this case, Soil Guideline Values (SGVs) from other sources may be used according to an established hierarchy[15]. For contaminants without an SCS in the NES, the Australian National Environment Protection (Assessment of Site Contamination) Measure (NEPM)[16] were applied.

The soils are also compared to the Canadian Council of Ministers of the Environment (CCME) Soil Guidelines for the Protection of Environmental and Human Health[17] as an indication of the environmental risk from potential contaminants.

The land where the site is located is zoned Rural in the District Plan. The nature of the proposed activity is commercial, however for assessment purposes the *Rural residential* SCS/SGV are shown as a conservative assessment.

6.2 Results of Analysis

The full analysis report is provided in Appendix C and the results are summarised in Table 4.

The results show that contaminant concentrations across the site are consistent with the predicted background concentrations based on the underlying geology for heavy metals. Results for organochlorine pesticides and polycyclic aromatic hydrocarbons were below the laboratory limits of detection.

The results confirm that the perimeter identified has not been affected by landfill activity and the contaminant levels are at or below background concentrations.

[14] Ministry for the Environment, 2011. *Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health*.

[15] Ministry for the Environment, 2011. *Contaminated Land Management Guidelines No. 2: Hierarchy and application in New Zealand of environmental guideline values (revised 2011)*.

[16] National Environment Protection Council (Australia), 2013. *National Environment Protection (Assessment of Site Contamination) Measure 1999.*

[17] Canadian Council of Ministers of the Environment, 2021. *Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health*.

Table 4: Summary results of soil analysis.

Sample [A]	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	DDT[B]	BAP_{eq}[C]
MF1, MF2 & MF3	6	< 0.10	7	15	19.7	6	32	< 0.07	< 0.03
MF4, MF5 & MF6	4	< 0.10	4	6	16.6	4	18	< 0.07	< 0.03
Average	*5*	*< 0.10*	*6*	*11*	*18*	*5*	*25*	*< 0.07*	*< 0.03*
Soil Acceptance Criteria (Human Health) – Rural residential									
NES[C] SCS	17	0.8	290	>10,000	160	-	-	45	6
NEPM[D] SGV	-	-	-	-	-	400	7,400	-	-
Soil Quality Guidelines (Environmental Health)									
CCME [E]	17	3.8	64	63	70	45	250	0.7	20
Predicted Background [F]									
Median	2.38	0.065	11.76	11.23	7.11	6.24	23.61	0.024	0.052
95th Quantile	9.97	0.33	56.88	48.14	25.83	35.15	97.97	0.245	0.64
Landfill Screening Acceptance Criteria [G]									
Class A	100	20	100	100	100	200	200	500	300
Class B	10	2	10	10	10	20	20	50	30
Burnside	100	20	400	400	400	200	800	500	300

[A] Results for total concentration analysis, average, 95% upper confidence limit (UCL) and SCSs/SGVs in mg/kg dry weight; relative standard deviation (RSD) in %. Sample numbers are as marked in Figure 17. Cells highlighted yellow exceed the predicted background concentration and red cells exceed the Soil Acceptance Criteria for Human Health.

[B] The total DDT isomers is reported.

[C] The benzo(a)pyrene equivalent (BAP_{eq}) is calculated as the sum of each of the detected concentrations of nine carcinogenic PAHs (benzo(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluoranthene and indeno(1,2,3-cd) pyrene), multiplied by their respective potency equivalency factors from Table 40 in the *Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health* (Ministry for the Environment, 2011. Wellington).

[D] Ministry for the Environment, 2012. *Users' Guide, National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.* Wellington. Cr SCS is reported as Cr(VI). Rural residential scenario applied.

[E] National Environment Protection Council (Australia), 2013. *National Environment Protection (Assessment of Site Contamination) Measure 1999.* The values applied represent a Health Investigation Level (HIL) for Low Density Residential land use (HIL A).

[F] Canadian Council of Ministers of the Environment, 2021. *Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health*. Soil quality guideline for environmental health for agricultural land use quoted. Orange cells indicate the site average exceeds the guideline.

[G] Landcare Research, 2015. *Background soil concentrations of selected trace elements and organic contaminants in New Zealand*. Predicted median and 95th Quantile reported for the site (Chemical4 Factor: mudstone Pakihi). Also refer: https://lris.scinfo.org.nz/layer/48470-pbc-predicted-background-soil-concentrations-new-zealand/. BAP_{eq} and DDT for provincial land applied.

[H] Ministry for the Environment, 2004. *Module 2: Hazardous Waste Guidelines - Landfill Waste Acceptance Criteria and Landfill Classification.* And Burnside Landfill in Dunedin (RM17.198.01.V2). Blue cells indicate Landfill Acceptance Criteria that are exceeded by the average.

7 Site Characterisation

7.1 Type and Extent of Environmental Contamination

The limited sampling described above found contaminant levels along the established perimeter are at or below background concentrations. The results for polycyclic aromatic hydrocarbons and organochlorine pesticides were found to be below the levels of detection.

Based on these results, it is highly unlikely that the part of the site beyond the perimeter (outside of the defined HAIL site) presents a risk to human health or the environment in its current state or during development works.

The GPS coordinates of the perimeter are given in Table 5.

Table 5: GPS Coordinates of Perimeter

GPS Location	Latitude	Longitude
3	45.647511	169.392919
5	45.647729	169.392594
6	45.647431	169.391360
8	45.647127	169.390958
13	45.646570	169.392198

7.2 HAIL Activities

The information reviewed during this PSI and the site inspection have confirmed that HAIL Category G3 (*Landfill Sites*) applies to part of the land. No other HAIL activities were identified within the site. The investigation has identified a mining perimeter, the boundary of which was shown to be unaffected by the HAIL activity with contaminant levels at or below background concentrations.

Any proposed disturbance of the land within the mining perimeter will require a full site investigation and consents to disturb a HAIL site / contaminated land from both CODC and ORC.

7.3 Conceptual Site Model

Based on the results of the soil sampling presented in this report, it is highly unlikely that there will be a risk to human health from the proposed mining of the land surrounding the landfill and there are no contaminants upon which to base a conceptual site model.

7.4 Integrity Assessment

The site historical record spans a period of almost 120 years and is fairly continuous from 1944. The proposed mining area (excluding the site of the quarry and subsequent landfill) has been rural land for the duration of the historical record.

Based on the continuity and amount of evidence, the information available provides a reasonable record of activity at the site, which reflects data integrity. Whether all activities at the site have been discovered cannot be answered with confidence.

A preliminary programme of investigative sampling and analysis was undertaken as a part of this PSI. Sampling and analysis provide a reliable indicator of the presence of contamination that might arise from prior and/or present land use. This provides an evidentiary basis from which to assess the site's status with respect to the HAIL and associated potential risks for human exposure.

8 Conclusions and Recommendations

EC Otago has undertaken a PSI on the site at 1484 Teviot Road, Millers Flat. The PSI included undertaking historical research, a site inspection and preliminary soil sampling. During this investigation, 6 soil samples were collected and analysed for heavy metals, organochlorine pesticides and polycyclic aromatic hydrocarbons. Twelve auger holes were excavated to a depth of 2.5 metres along the identified mining perimeter to confirm the absence of landfill material.

The information reviewed, and the investigation undertaken, confirmed that HAIL Category G3 (*Landfill Sites*) applies to part of the land. No other HAIL activities were identified within the site. The investigation has identified a mining perimeter, the boundary of which was shown to be unaffected by the HAIL activity with contaminant levels at or below background concentrations. As a result, the provisions of the NES do not apply to the part of the site outside the mining perimeter.

The investigation indicates it is highly unlikely that the soils outside the mining perimeter present a risk to human health or the environment in their current state or during the proposed mining works, based on the preliminary sampling undertaken.

Based on this investigation, EC Otago finds the following:

- Based on the information examined during this investigation, no evidence was found that HAIL activities have historically been, or are currently being, undertaken on the part of the site outside the mining perimeter. Consequently, the provisions of the NES do not apply to these parts of the site.
- Soil sampling and analysis did not identify any contaminants that exceed the predicted natural background levels along the mining perimeter.
- There is highly unlikely to be a risk to human health or the environment from soil contamination due to past historical activities outside the mining perimeter.
- If waste materials, or other visual or olfactory indicators of potential contamination are observed during earthworks, a Contaminated Land Advisor must be consulted, and further sampling and analysis is required.
- The NES does apply to the former landfill site, contained within the mining perimeter (HAIL.00338.01). Any proposed disturbance of this land, contained within the mining perimeter, will require a full site investigation and consents to disturb a HAIL site / contaminated land from both CODC and ORC.

9 References

ENGEO Limited, 2021. *Annual Report Closed Landfills, Central Otago*. Project Number #13716.000.005.

Landcare Research, 2015. *Background soil concentrations of selected trace elements and organic contaminants in New Zealand*. Landcare Research Contract Report: LC2440.

Ministry for the Environment, 2012. *Users' Guide - National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*. Publication number: ME 1092; ISBN 978-0-478-37281-6 (print); 978-0-478-37282-3 (electronic).

Ministry for the Environment, 2011. *Contaminated Land Management Guidelines No. 1 - Reporting on Contaminated Sites in New Zealand (Revised 2011)*. Publication number: ME 1071; ISBN 978-0-478-37258-8.

Ministry for the Environment, 2011. *Contaminated Land Management Guidelines No. 2 – Hierarchy and Application in New Zealand of Environmental Guideline Values (Revised 2011)*. Publication number: ME 1072; ISBN 978-0-478-37259-5.

Ministry for the Environment, 2011. *Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health*. Publication number: ME 1055; ISBN 978-0-478-37237-3.

National Environment Protection Council (Australia), 2013. *National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013)*. (https://www.legislation.gov.au/Details/F2013C00288).

10 Limitations

Services for this project have been performed in accordance with current professional standards for environmental site assessments. No guarantees are either expressed or implied. This report meets the requirements of the NES as it has been undertaken in accordance with the *Contaminated Land Management Guidelines (No. 1 and No. 5)* and is certified by a suitably qualified and experienced practitioner. A statement of EC Otago's experience is attached as Appendix A. This report does not attempt to fulfil the requirements of legal due diligence.

There is no investigation that is thorough enough to preclude the presence of materials at the site that presently, or in the future, may be considered hazardous. As regulatory criteria are subject to change, a status with respect to contamination that is presently considered to be acceptable may, in the future, become subject to different regulatory standards that cause the site to become unacceptable for existing or proposed land use activities. Any recommendations, opinions or findings stated in this report are based on circumstances, facts and assessment criteria as they existed at the time that we performed the work and on data obtained from the investigations and site observations as detailed in this report.

Opinions and judgments expressed in this report, which are based on an understanding and interpretation of assessment standards, should not be construed as legal opinions. This report and the information it contains have been prepared solely for the use of Hawkswood Civil Limited. Any reliance on this report by other parties shall be at such party's own risk without prior agreement to the contrary.

Appendix A - EC Otago Statement of Experience

Environmental Consultants Otago Limited (EC Otago) was established in Dunedin in 2014 when the principal, Ciaran Keogh, recognized the need for a dedicated environmental consultancy in the region. The company is particularly focused on contaminated land issues. EC Otago undertakes the preparation of Preliminary and Detailed Site Investigation Reports, Assessments of Environmental Effects, Site Remedial Action Plans, Soil Disposition Reports and Site Validation Reports, working together with other environmental consultancies when a broader range of experience is required.

Ciaran Keogh - Principal and Senior Environmental Consultant
Master of Regional and Resource Planning, Master of Business Administration.

Ciaran has over 11 years' experience focussing specifically on contaminated land investigations in Otago with more than 200 site investigations completed, and over 30 years' experience in environmental and RMA planning, and executive management in regional and local government. His experience includes feasibility, planning and visual assessments, site rehabilitation projects for landfills, mines and transmission lines and switchyards, and management of the preparation of regional and district plans and the supporting policy.

Ciaran has previously worked as the Director of Planning with Taupo District Council, CEO of Clutha District Council, General Manager of Wakool Shire Council (Australia) and CEO of Environment Southland.

Bernice Chapman - Senior Contaminated Land Consultant
CEnvP, PhD in Biochemistry, Member of the Environment Institute of Australia and New Zealand.

Berni is a Certified Environmental Practitioner (Certification Number 1376) who has worked in small consultancy firms for 20 years in the waste management, waste-to-energy and contaminated land sectors. She has a strong ethos of waste minimisation, containment and management, the effective operation of existing resources with beneficial reuse where possible, protection of the environment and overall sustainability coupled with a pragmatic approach from direct involvement in day-to-day operations. Her experience includes preliminary and detailed site investigations, sampling and analysis, site remediation, feasibility studies, problem solving and process design. This work includes the management of a range of environmentally polluting industrial effluents, contaminated land investigations and site remediation.

Berni has previously worked as Laboratory Manager for Waste Solutions Ltd, an Associate for CPG New Zealand Ltd, and a Wastewater Treatment Specialist for ADI Systems.

Aleasha King – Contaminated Land Consultant
Graduate diploma in Geology, Master in Geophysics.

Aleasha is a Contaminated Land Consultant with a background in geology and geophysics and a strong commitment to the environment. Her experience in contaminated land investigations includes preliminary and detailed site investigations, sampling, data analysis and site remediation.

Aleasha has previously worked in Engineering Geology with experience in site soils investigations and bearing capacity assessments. For her master's degree, she studied the structure of the Alpine Fault at a formerly unmapped location on the West Coast of New Zealand.

Appendix B – CODC Landfill Closure Plan (Extracts)

Appendix C - Hill Laboratories Analysis Report

2.6 Millers Flat

2.6.1 Location and Ownership

The Millers Flat site is located on the south side of Roxburgh Hydro Milers Flat Road, approximately 1.5 kilometres east of Millers Flat.

Grid Reference:	NZMS G43 287 006
Legal Description:	Section 118, Block VIII, Benger Survey District

The site is owned by [redacted]

Access to the site is via the Roxburgh Hydro-Millers Flat Road.

2.6.2 Site Description

The Millers Flat site is located on a river terrace on the true left bank of the Clutha River. The river terrace containing the landfill site extends approximately 700m from the edge of the Clutha River to the toe of hills which rise above the river. Waste filling occurred over an area of approximately 10,000m^2 in a long narrow pit running parallel with Roxburgh Hydro- Millers Flat Road.

The surrounding land is rural.

3. Waste Present at the Sites

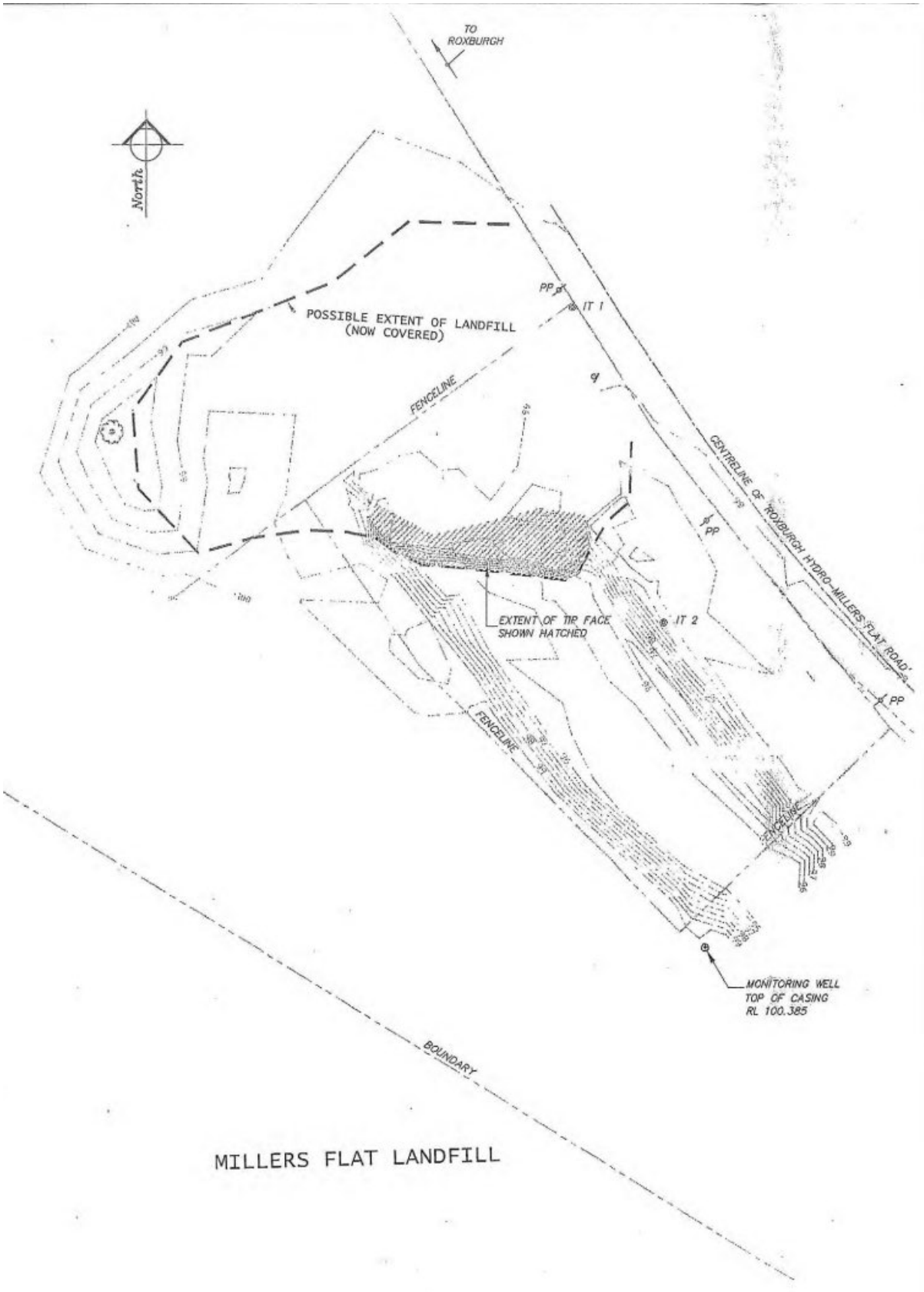
No records of the nature of waste at the site have been kept for any of the closed landfills. However the surrounding waste catchments suggest that waste will primarily comprise domestic waste with components of commercial and agricultural waste.

Generally exposed refuse at the former tip faces comprised domestic waste, plastic, scrap metal, car components, corrugated iron, glass and garden waste.

1.6 Millers Flat

This landfill was closed and covered in June 1997. It now has pasture established on it.

Millers Flat Closed Landfill – After Covering



MILLERS FLAT LANDFILL

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
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Private Bag 3205
Hamilton 3240 New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

Client:	Environmental Consultants Otago Limited	**Lab No:**	2994809	SPv1
Contact:	Ciaran Keogh	**Date Received:**	23-May-2022	
	C/- Environmental Consultants Otago Limited	**Date Reported:**	26-May-2022	
	PO Box 5522	**Quote No:**	86979	
	Dunedin 9058	**Order No:**		
		Client Reference:	1426Teviot	
		Submitted By:	Bernice Chapman	

Sample Type: Soil

Sample Name:		Composite of MF1, MF2 & MF3	Composite of MF4, MF5 & MF6			
Lab Number:		2994809.7	2994809.8			
Individual Tests						
Dry Matter	g/100g as rcvd	95	93	-	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	6	4	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	-	-	-
Total Recoverable Chromium	mg/kg dry wt	7	4	-	-	-
Total Recoverable Copper	mg/kg dry wt	15	6	-	-	-
Total Recoverable Lead	mg/kg dry wt	19.7	16.6	-	-	-
Total Recoverable Nickel	mg/kg dry wt	6	4	-	-	-
Total Recoverable Zinc	mg/kg dry wt	32	18	-	-	-
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.011	< 0.011	-	-	-
alpha-BHC	mg/kg dry wt	< 0.011	< 0.011	-	-	-
beta-BHC	mg/kg dry wt	< 0.011	< 0.011	-	-	-
delta-BHC	mg/kg dry wt	< 0.011	< 0.011	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.011	< 0.011	-	-	-
cis-Chlordane	mg/kg dry wt	< 0.011	< 0.011	-	-	-
trans-Chlordane	mg/kg dry wt	< 0.011	< 0.011	-	-	-
2,4'-DDD	mg/kg dry wt	< 0.011	< 0.011	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.011	< 0.011	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.011	< 0.011	-	-	-
4,4'-DDE	mg/kg dry wt	< 0.011	< 0.011	-	-	-
2,4'-DDT	mg/kg dry wt	< 0.011	< 0.011	-	-	-
4,4'-DDT	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Total DDT Isomers	mg/kg dry wt	< 0.07	< 0.07	-	-	-
Dieldrin	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Endosulfan I	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Endosulfan II	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Endrin	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Endrin aldehyde	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Endrin ketone	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Heptachlor	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Methoxychlor	mg/kg dry wt	< 0.011	< 0.011	-	-	-

Sample Type: Soil						
Sample Name:		Composite of MF1, MF2 & MF3	Composite of MF4, MF5 & MF6			
Lab Number:		2994809.7	2994809.8			
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.3	< 0.3	-	-	-
1-Methylnaphthalene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Acenaphthylene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Acenaphthene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Anthracene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Benzo[e]pyrene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Chrysene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Fluoranthene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Fluorene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Naphthalene	mg/kg dry wt	< 0.06	< 0.06	-	-	-
Perylene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Phenanthrene	mg/kg dry wt	< 0.011	< 0.011	-	-	-
Pyrene	mg/kg dry wt	< 0.011	< 0.011	-	-	-

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 Laboratories, 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%.	-	7-8
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	7-8
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	7-8
Organochlorine Pesticides Screening in Soil	Sonication extraction, GC-ECD analysis. Tested on as received sample. In-house based on US EPA 8081.	0.010 - 0.06 mg/kg dry wt	7-8
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.002 - 0.05 mg/kg dry wt	7-8
Dry Matter (Env)	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	7-8
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.	0.002 mg/kg dry wt	7-8

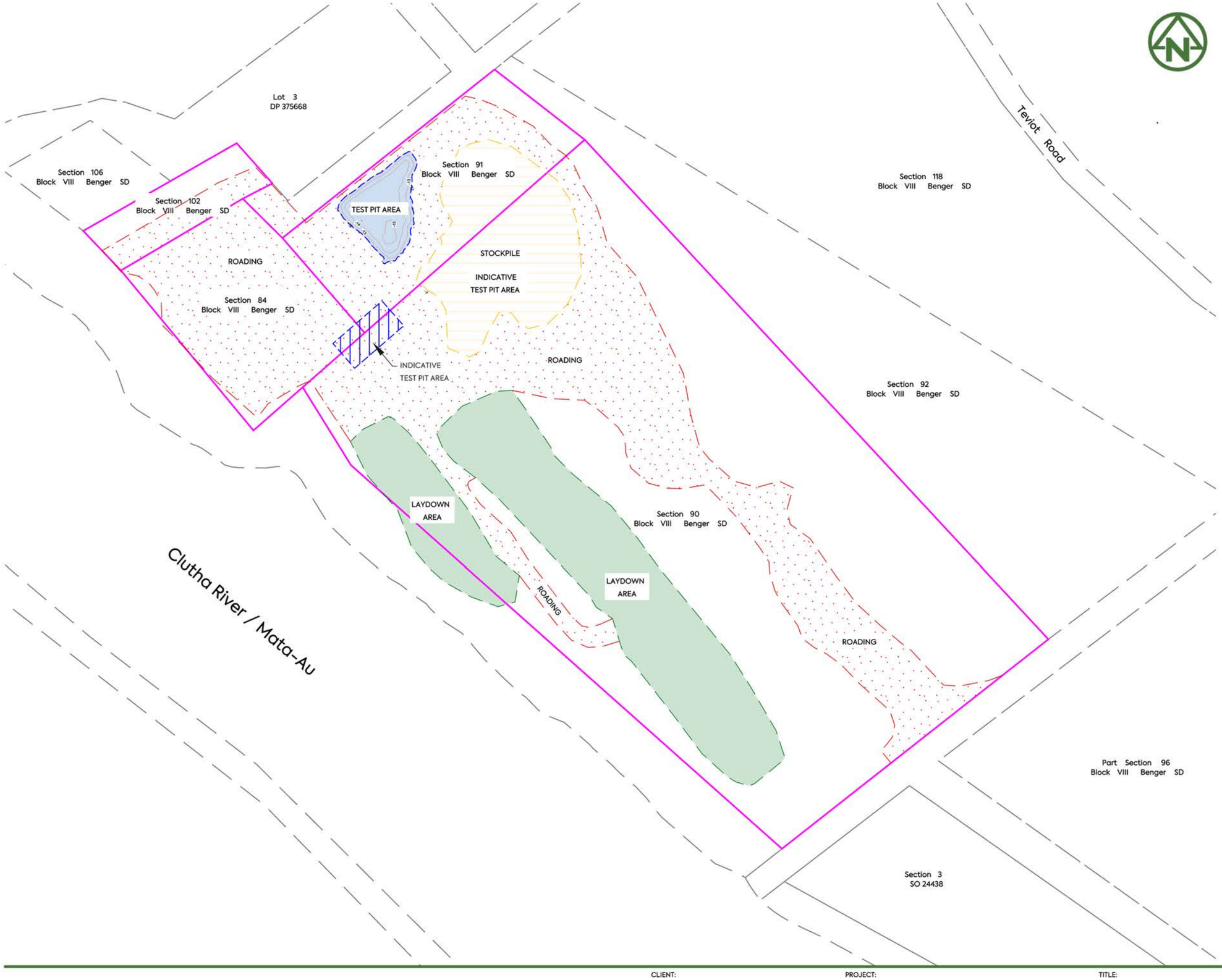
Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene 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).	0.002 mg/kg dry wt	7-8

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

Testing was completed between 25-May-2022 and 26-May-2022. 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.

Ara Heron BSc (Tech)
Client Services Manager - Environmental



NOTES

1. COORDINATES ARE IN TERMS OF NZGD2000 / NORTH TAIERI 2000
   ORIGIN OF COORDINATES
   MARK: B492
   822079.722 m N
   331297.058 m E
2. LEVELS ARE IN TERMS OF NEW ZEALAND VERTICAL DATUM
   ORIGIN OF LEVELS
   MARK: B492
   R.L.: 7.53 m
3. BOUNDARIES SHOWN ON THIS PLAN HAVE BEEN EXTRACTED FROM LAND INFORMATION NZ DCDB AND HAVE NOT BEEN SURVEYED. A BOUNDARY RETRACEMENT (REDEFINITION) SHOULD BE CARRIED OUT TO ESTABLISH EXACT BOUNDARY POSITIONS ON SITE.
4. SOME LAYERS MAY HAVE BEEN SWITCHED OFF FOR CLARITY.
5. DATA SUPPLIED BY LAND INFORMATION NEW ZEALAND IS LICENSED UNDER CC BY 3.0 NZ.
6. THIS PLAN IS ISSUED FOR A SPECIFIC PROJECT AND MAY NOT BE ALTERED OR USED FOR ANY OTHER PURPOSE WITHOUT PRIOR CONSENT OF MCKENZIE & CO. CONSULTANTS LTD.
7. LEGAL DESCRIPTION
   SECTION 84 BLOCK VIII BENGER SD, SECTION 90 BLOCK VIII BENGER SD, SECTION 91 BLOCK VIII BENGER SD, SECTION 102 BLOCK VIII BENGER SD.
8. AS INSTRUCTED BY THE CLIENT ONLY INFORMATION INSIDE THE LEGAL BOUNDARY HAS BEEN SHOWN THE PLAN.
9. THESE NOTES ARE AN INTEGRAL PART OF THIS PLAN.
10. UAV SURVEY UNDERTAKEN AND DATA SUPPLIED BY EXTERNAL CONTRATOR (OVERVIEW SURVEYING DATED 21/04/2023)

LEGEND

- BOUNDARY (EXTRACT FROM LANDONLINE)
- ABBUTTALS (EXTRACT FROM LANDONLINE)
- CUT CONTOUR
- ZERO CUT / FILL CONTOUR
- FILL CONTOUR
- TEST PIT EXTENTS
- ROADING AREA
  TEST PIT AERA
- LAYDOWN AREA
  STOCKPILE AREA

EARTHWORKS VOLUMES

TEST PIT

CUT VOLUME= 5,118m^3

REV	DESCRIPTION	DRN BY	CHK BY	APP BY	DATE
B	DRAWING AMENDMENTS	EL	PC	CB	03/05/23
A	FIRST ISSUE	EL	CB	CB	02/05/23

MCKENZIE & CO.

CLIENT: HAWKESWOOD CIVIL LIMITED

PROJECT: MILLERS FLAT GOLDMINE
TEVIOT ROAD
MILLERS FLAT
OTAGO

TITLE: UAV SURVEY
21/04/2023
TEST PIT VOLUME

PURPOSE OF ISSUE: FOR INFORMATION ONLY

SCALE: 1:2500
DO NOT SCALE

DRAWING NO: 1040-012

REV: B

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E: hegley@acoustics.co.nz

PROPOSED ALLUVIAL MINING

MILLERS FLAT

ASSESSMENT OF NOISE EFFECTS

Report No 22048

Prepared for:

Hawkeswood Civil
Auckland
20 March 2023

Prepared by: .....

Nevil Hegley

CONTENTS

1 INTRODUCTION

It is proposed to mine an alluvial deposit at 1346 Teviot Road, Roxburgh which is located approximately 3km north of Millers Flat township as shown on Figure 1. This report considers the noise[1] aspects of the proposal and how the project will be managed to control the noise to within a reasonable level for the rural neighbours.

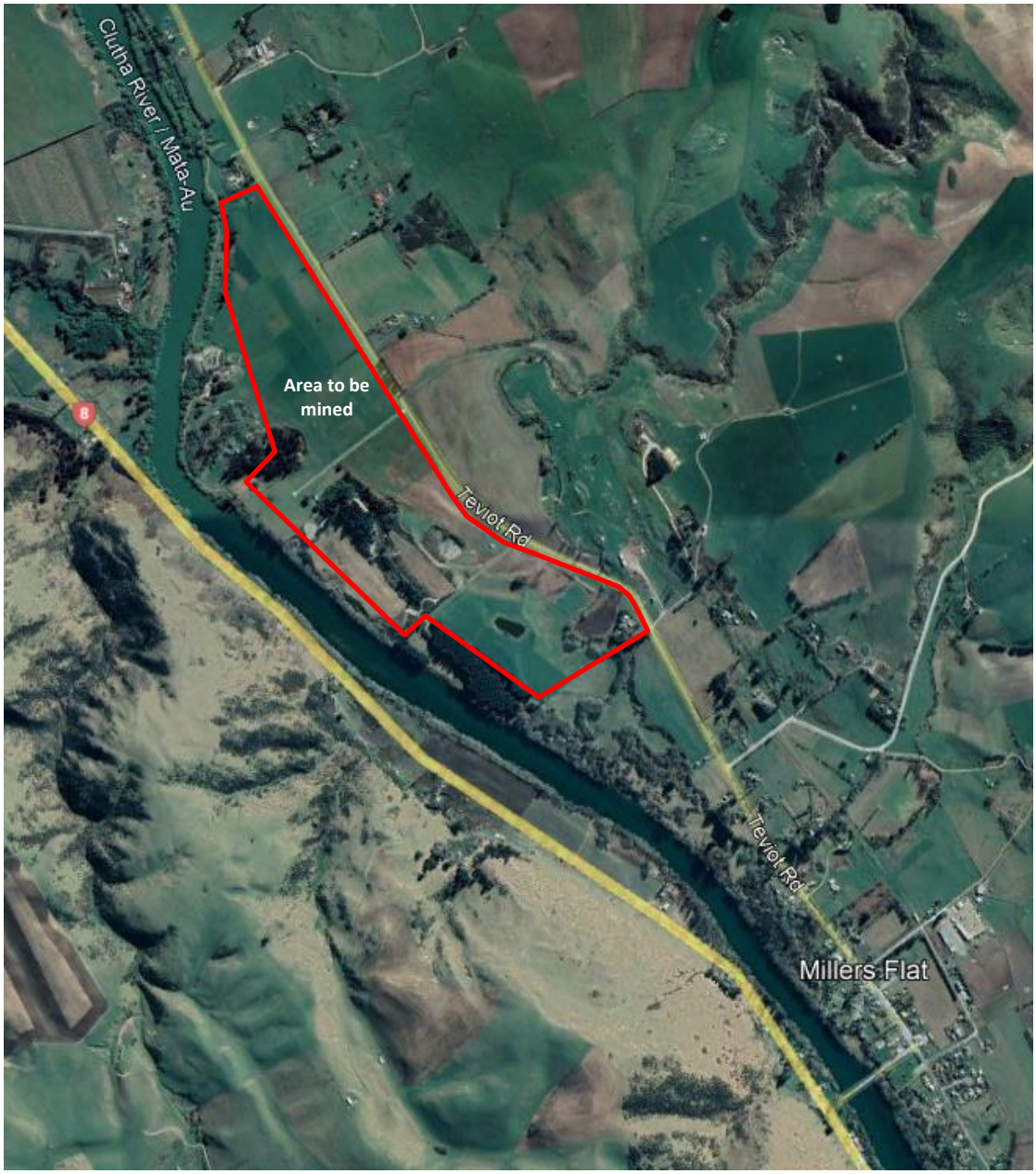


Figure 1. Location of the Site

[1] See Appendix A for a Glossary of Noise Terms used in this report.

2 DISTRICT PLAN REQUIREMENTS

The proposed mining area and all the closer neighbours are located in a Rural Resource Area in the Central Otago District Plan. Rule 4.7.6 E. Noise of the District Plan requires:

> *(a) All activities shall be conducted so as to ensure the following noise limits are not exceeded at any point within the notional boundary of any dwelling, rest home or hospital, or at any point within any Residential Resource Area or any Rural Settlements Resource Area:*
>
> | | |
> |---|---|
> | *On any day 7:00am to 10:00pm* | *55dBA L_{10}* |
> | *10:00pm to 7:00am the following day* | *40dBA L_{10}* |
> | | *70dBA L_{max}* |

Rule 12.7.4(i) of the District Plan requires the noise to be measured in accordance with the provisions of NZS 6801:1991 Measurement of Sound and assessed in accordance with the provisions of NZS 6802:1991 Assessment of Environmental Sound.

Rule 12.7.4(ii) sets the limits for construction noise at:

> *Construction noise within the district which is ancillary to the principal use of the site shall not exceed the recommended limits in and shall be measured and assessed in accordance with the provisions of NZS 6803P:1984 The Measurement and Assessment of Noise from Construction, Maintenance, and Demolition Work. Discretionary adjustments provided in Clause 6.1 shall be mandatory within the district.*

Table 1 of NZS 6803P:1984 The Measurement and Assessment of Noise from Construction, Maintenance, and Demolition Work referred to in Rule 12.7.4(ii), sets the following construction noise levels that must be complied with at a point 1m from any residential building where the construction noise is present for more than 15 days but less than 18 weeks (which is the case for this project).

Time	Weekdays			Saturdays		
	L_{10}	L_{95}	L_{max}	L_{10}	L_{95}	L_{max}
0630-0730	60	45	70	-	-	-
0730-1800	75	60	90	75	60	90
1800-2000	70	55	85	-	-	-

For all periods not specified NZS6802 shall apply. This means a level of 45dBA L_{10} should be adopted.

3 THE PROPOSAL

It is proposed to mine the alluvial material using a conventional gold recovery plant that will be either land based or on a floating dredge and hydraulic excavator between 7:00am – 7:00pm Monday to Friday plus 7:00am – 1:00pm on Saturdays. The first stage of the works will be to remove the silt and then excavate the gravel to form a pond area where the barge will operate. The silt will be removed with a Cat 330 excavator or similar such as shown on Figure 2. A noise trace of the excavator operating is shown on Figure 3.

Figure 2. Cat 330D Excavator

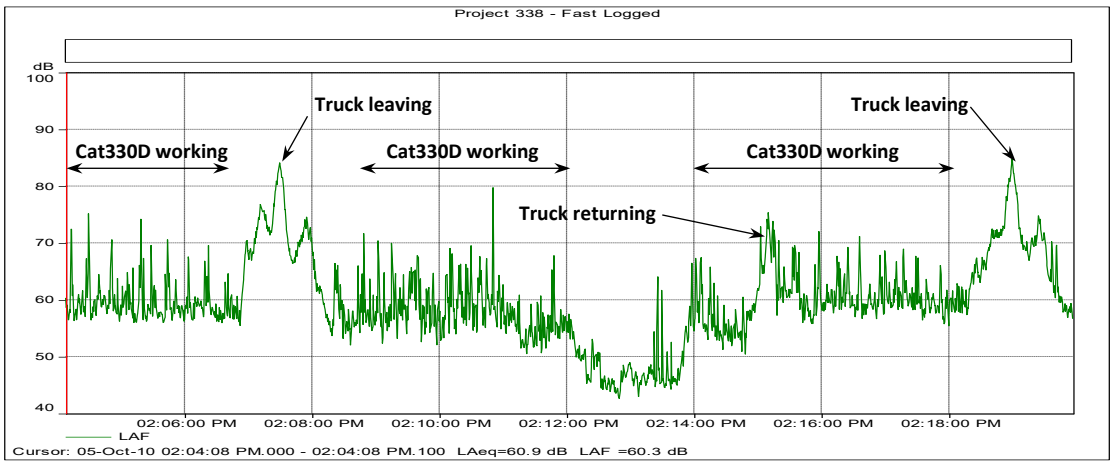


Figure 3. Sound Trace of Cat 330D Excavator at 80m

The excavated silt material will be transported to an adjacent dump site using an articulated truck such as a Volvo A40E shown on Figure 4. These trucks have been measured at 68dBA L_{10} at 50m as shown on Figure 5.

Figure 4. Volvo A40E Dump Truck

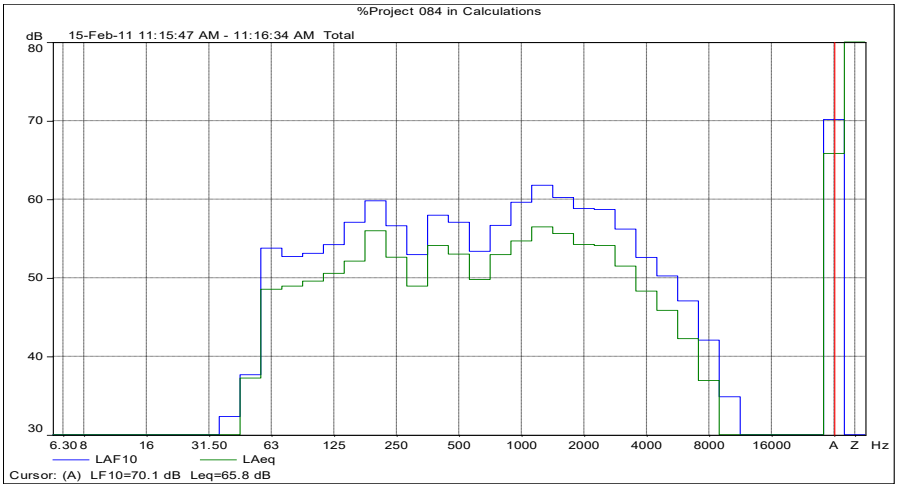


Figure 5. Volvo A40E Dump Truck Spectrum at 65m

Once below the silt the pond will be excavated using 2 x Komatsu PC1000 excavators or similar such as shown on Figure 6. The noise level from this excavator operating at 25m from the measurement position was 75dBA L_{10} as shown on Figure 7.

Figure 6. Komatsu PC1000

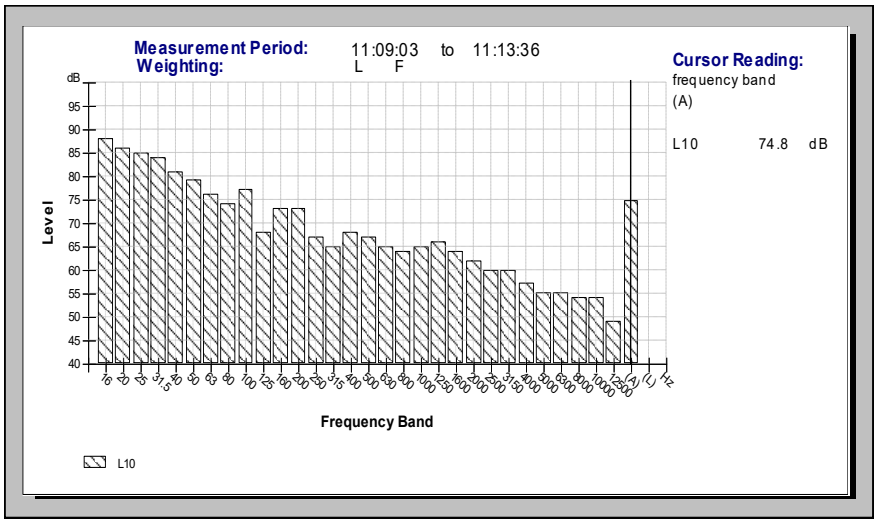


Figure 7. Komatsu PC1000 Sound Spectrum at 25m

These excavators will load dump trucks, such as a Cat 777 or Volvo R100. As the Cat 777 is slightly noisier than the Volvo R100 the noise from the Cat 777 (as shown in Figure 8) has been assumed in the calculations. The trucks will transport the gravel around the pond to the previously mined area to rehabilitate the land. The noise of the dump trucks transporting overburden has been measured as the trucks passed within 10m of the measurement point. The result of this measurement is shown on Figure 9.

Figure 8. Cat 777 Dump Truck

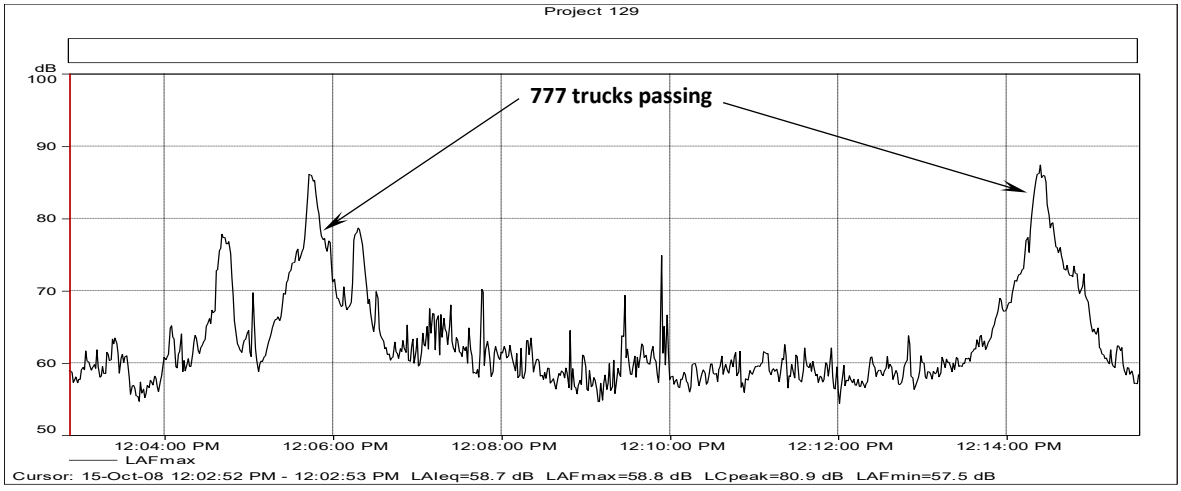


Figure 9. Cat 777 Dump Truck Noise

The gravel will be tipped in the rehabilitation area and managed using a Cat D10 bulldozer or similar. A Cat D10 bulldozer is shown on Figure 10 and the sound spectrum of this bulldozer operating is shown on Figure 11.

Figure 10. Cat D10 Bulldozer

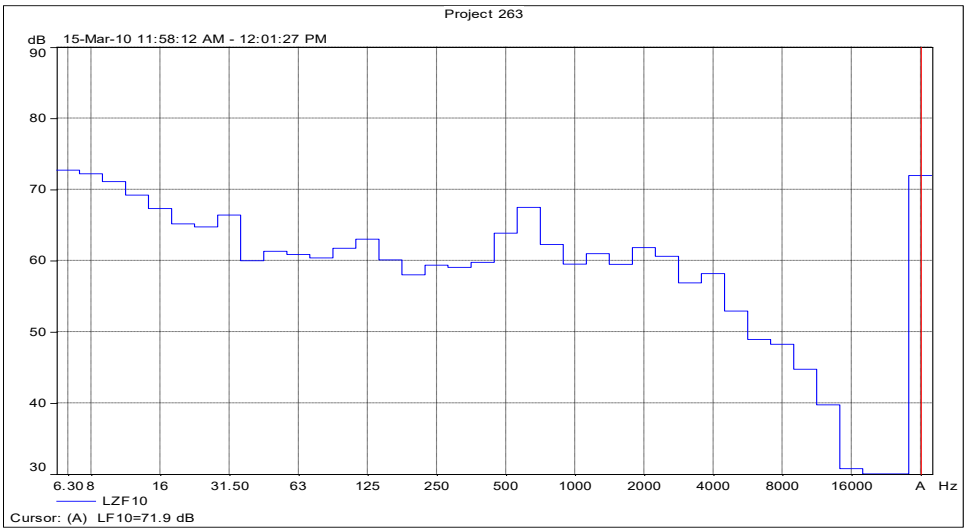


Figure 11. Cat D10 Bulldozer at 80m

The other significant noise source on site will be the mining recovery plant that will be either land based or located on a floating dredge in the pond. Figure 12 shows a land based recovery plant. The only significant difference with the proposed plant is that it is on a barge floating in a purpose-built pond typically 5m below the natural ground level. The noise level as measured at 60m from the processing plant operating with clear line of sight to the plant is shown on Figure 13. The predictions assume the mining recovery plant is land based. If floating within a pond, there will be additional screening by the edge of the pond to the neighbours and hence slightly lower noise levels than predicted below.

Figure 12. Recovery Plant

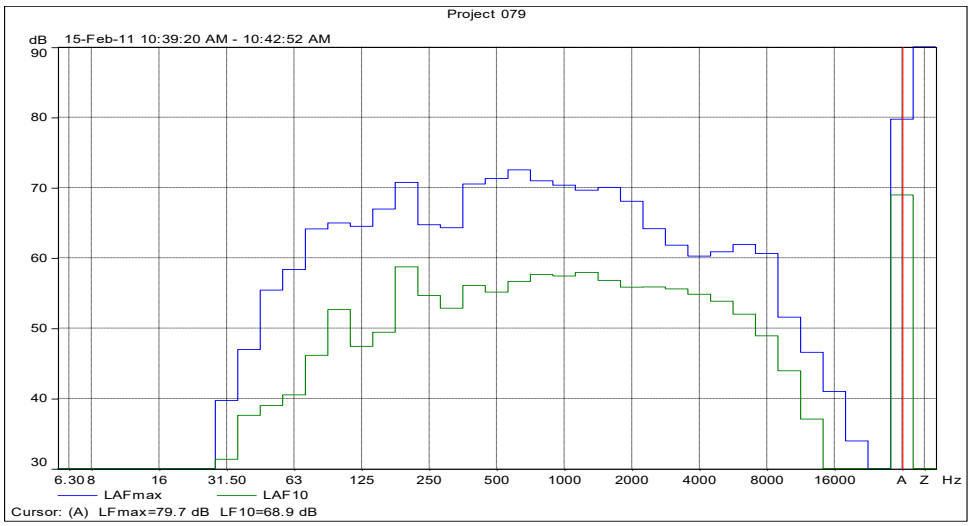


Figure 13. Sound Spectrum of Recovery Plant operating at 60m

Mining will take place over a five to seven year period commencing at the northern end of the area to be mined and working south as shown on Figure 14. The mine path will advance steadily over the programmed five to seven year mining period with the width of the mine path varying between 50 – 400m.

Secondary potential noise sources on site will include a grader operating on the haul roads and dewatering pumps. The grader is significantly quieter than the Cat 777 dump trucks so will not have any cumulative noise effects. The dewatering pumps will be located within the mine area where they will be well screened by the pit edge. As these pumps will operate at night time they will need to be within the 40dBA L_{10} and 70dBA L_{max} limit of the District Plan. A preliminary analysis of similar size pumps shows the noise from these pumps will be within the lower night time limit of 40dBA L_{10} and 70dBA L_{max} without any additional noise control treatment.

4 PREDICTED NOISE LEVELS

The construction of bunds is the only construction noise that is proposed for this project. The closest that the plant constructing the noise control bunds will come to a dwelling is 35m. Assuming the construction plant will be a D6 dozer, articulated trucks and an excavator, the noise at 35m will be within the 75dBA L_{10} and 90dBA L_{max} design limits, as set out above, at the closest dwelling to any bund. By complying with the noise level during the bund construction at the closest dwelling, the construction noise will comply at all dwellings.

The noise from mining has been predicted using the Brüel & Kjær Predictor programme v2022.11. This is a powerful environmental noise calculation software package that uses a digital terrain model with each of the noise sources modelled at the various locations on the ground. Calculations are undertaken in accordance with the requirements of ISO 9613-1/2 Acoustics – Attenuation of Sound during Propagation Outdoors. As the ground contours are not available for the area it has been assumed the ground is flat. This will result in higher noise levels being predicted. Any screening effects of the ground contour will provide a factor of safety with the assessment. However, for the majority of the area the ground is relatively flat, so the results will be representative for the site. For this project, a grid varying from 5m to 25m has been adopted to calculate the noise contours. The noise from each item of plant operating has been calculated at each grid point and the noise contours have been drawn based on these levels. All calculations have been undertaken assuming a slightly positive meteorological effect at the receiver position with a ground absorption of 0.7 and a receiver height of 1.5m.

The analysis assumes a busy day with all plant operating. To predict the noise from the proposed mining all of the above noise sources have been located at various points on the dredge path. The mining activities have been evaluated at locations 1 – 7 as shown on Figure 14 with each location being close to dwellings along the route so they represent the highest noise level for each dwelling.

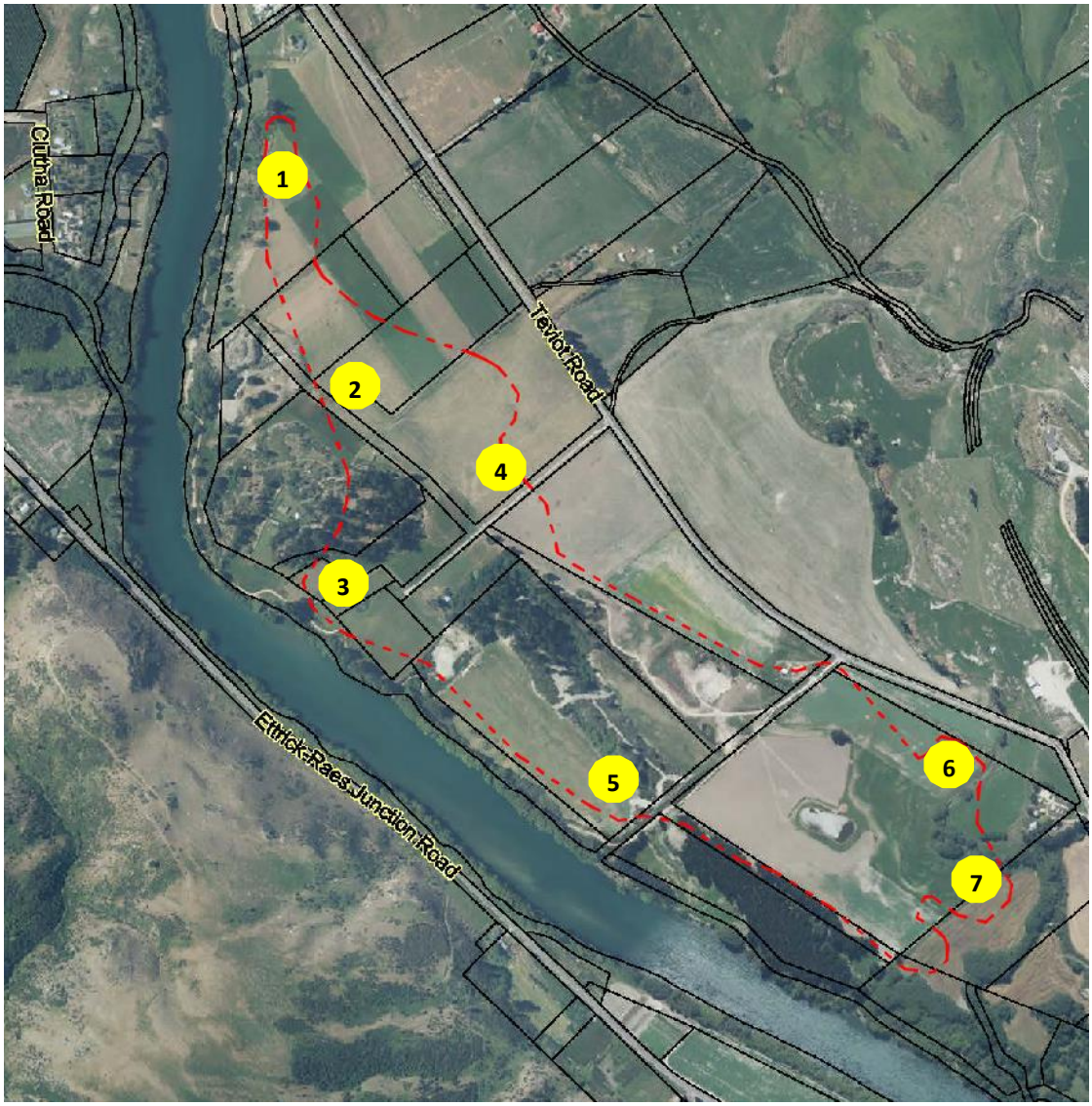


Figure 14. Positions of Dredging Stages Evaluated

At each of the selected dredging locations 1 – 7 as shown on Figure 14, the noise contours have been predicted based on the plant operating between 7:00am – 7:00pm Monday to Friday plus 7:00am – 1:00pm on Saturdays. That is, during the period when the 55dBA L_{10} noise limit in the District Plan is applicable.

The assessment assumes a minimum of a 4m high bund will be constructed across the northern side of the mining and nominally 300m down the western side of the site and 700m down the eastern side of the site plus a 3m high bund nominally 300m long to screen the dwelling at 5386 Ettrick-Raes Junction Road.

Figure 15 shows the noise contours for the initial stages of the mining at the northern end of the site.

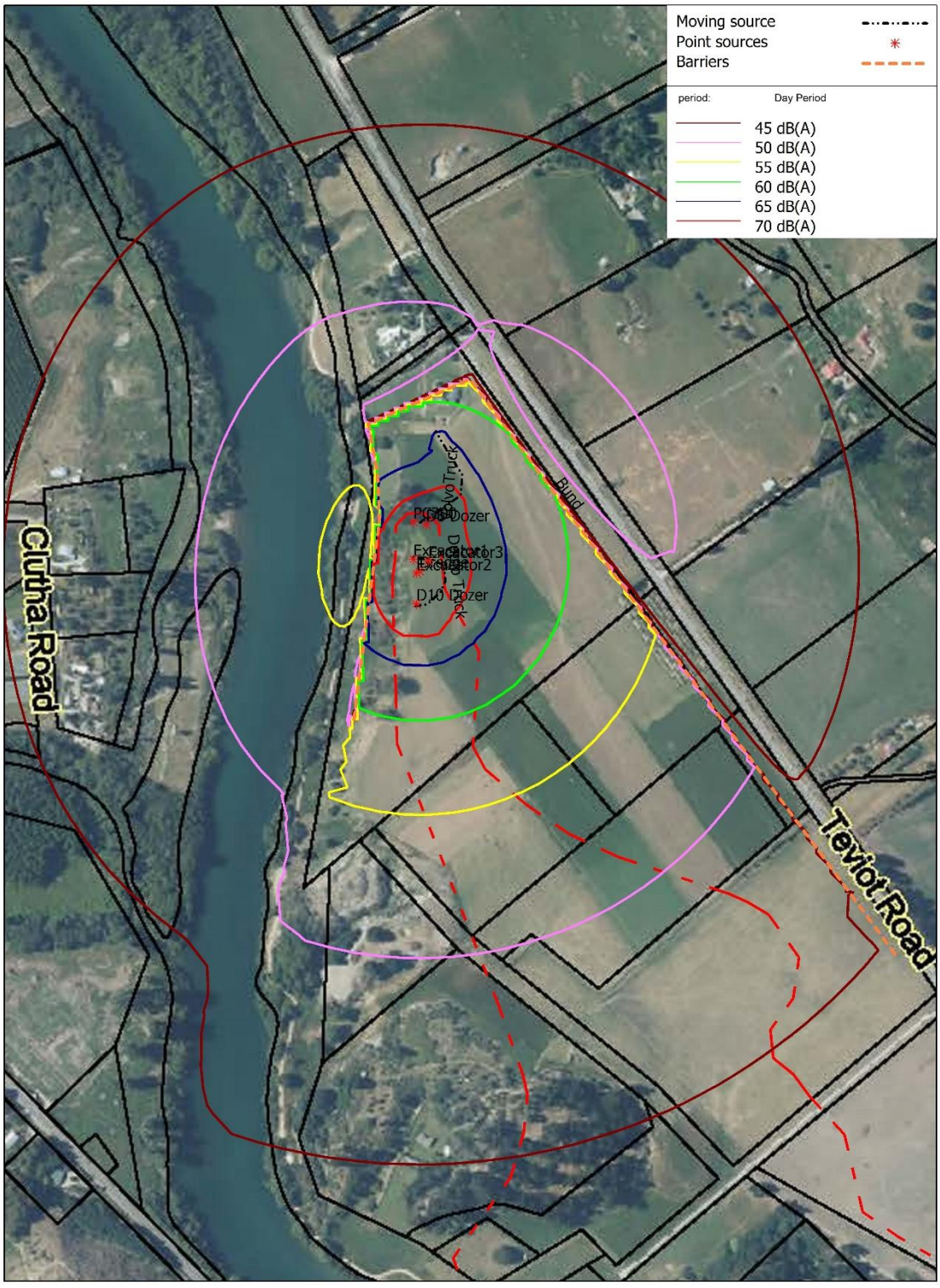


Figure 15. Mining at the northern end of the site

Figure 16 shows the noise contours when mining at location 2 (Figure 14) opposite 5280 Ettrick-Raes Junction Road.

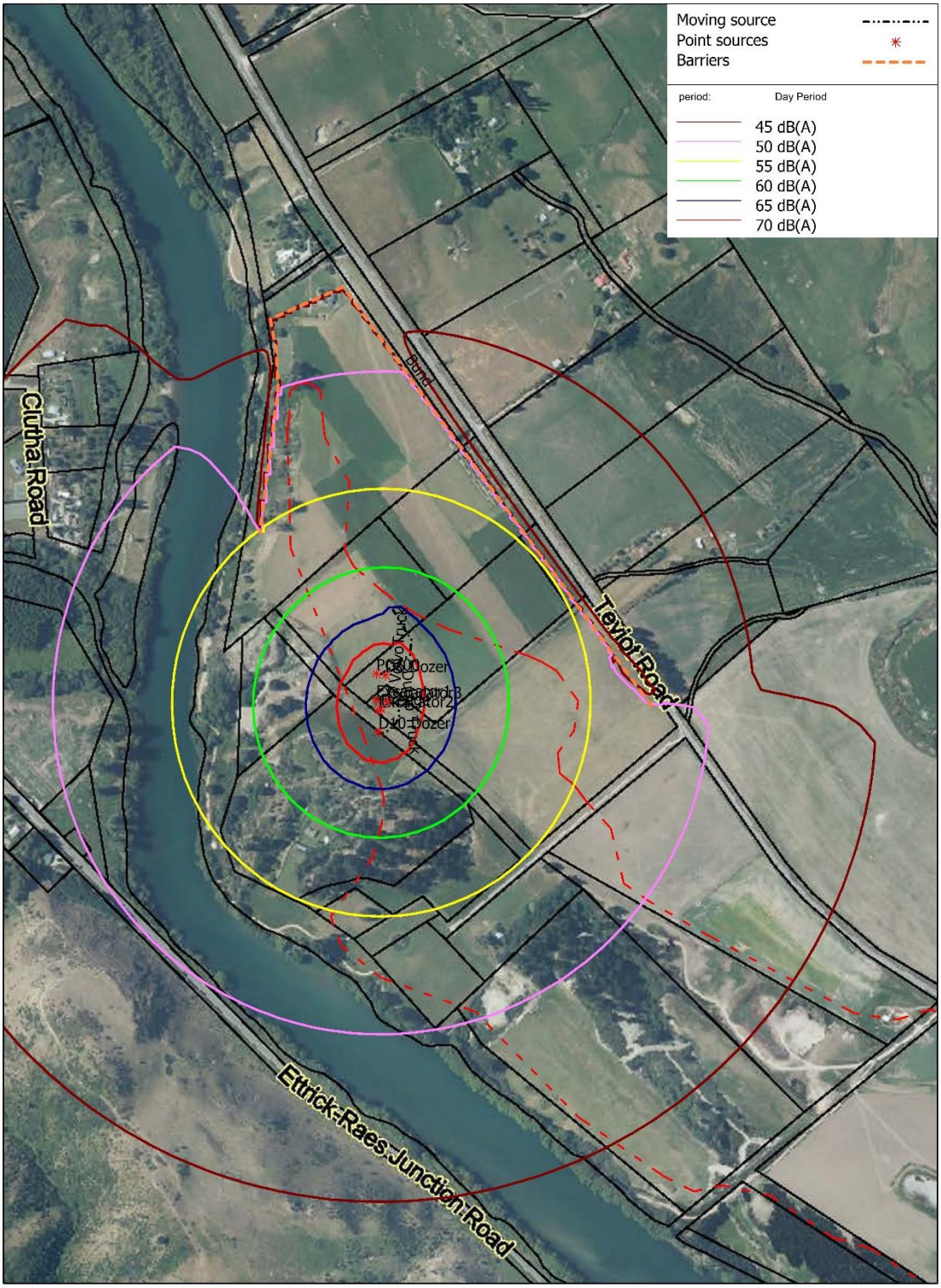


Figure 16. Mining at the location 2, (Figure 14)

Figure 17 shows the noise contours when mining at location 3 (Figure 14) halfway along the mining path on the western side of the site.

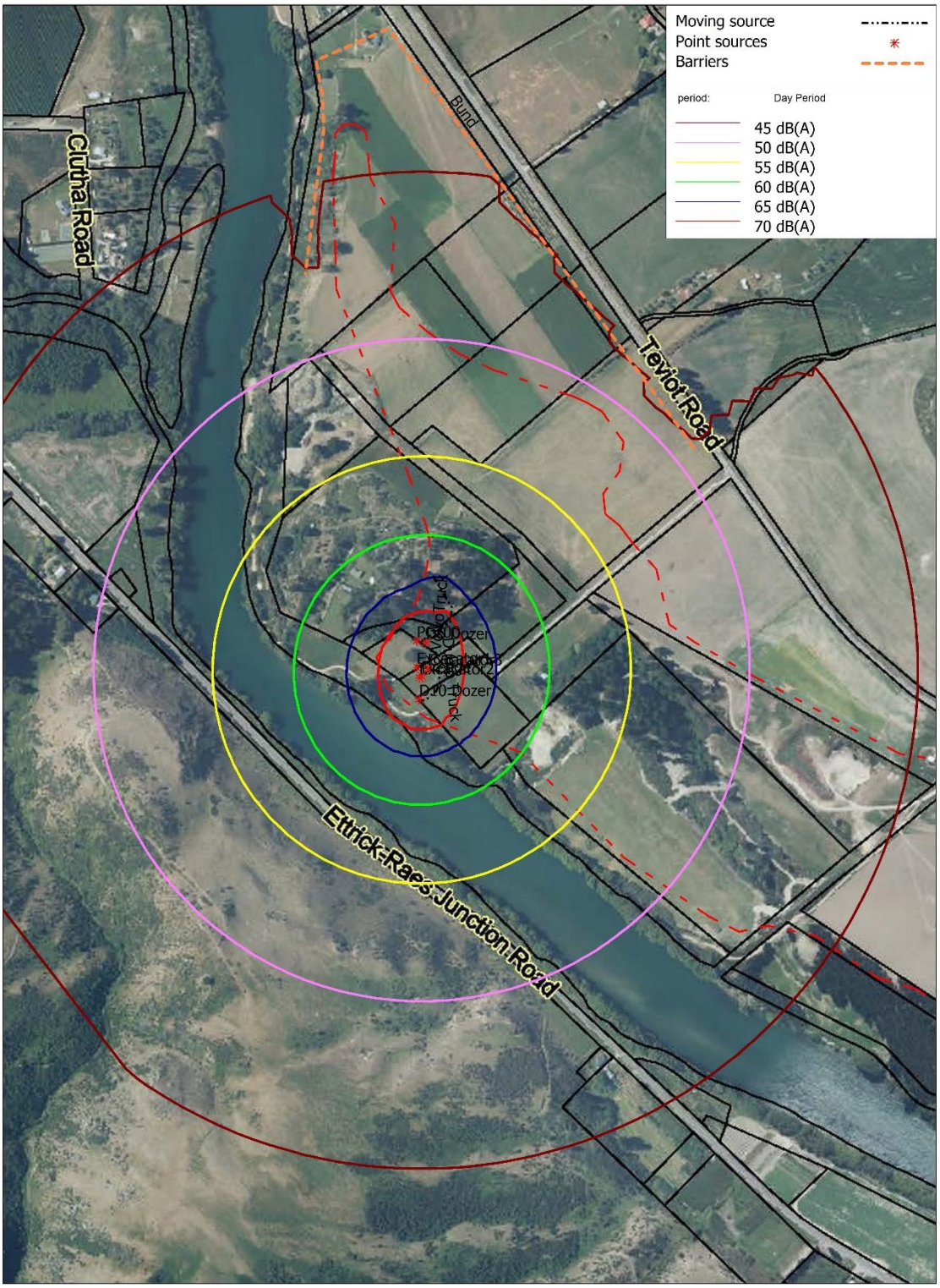


Figure 17. Mining at location 3, (Figure 14)

Figure 18 shows the noise contours when mining at location 4 (Figure 14) opposite 1403 Teviot Road.

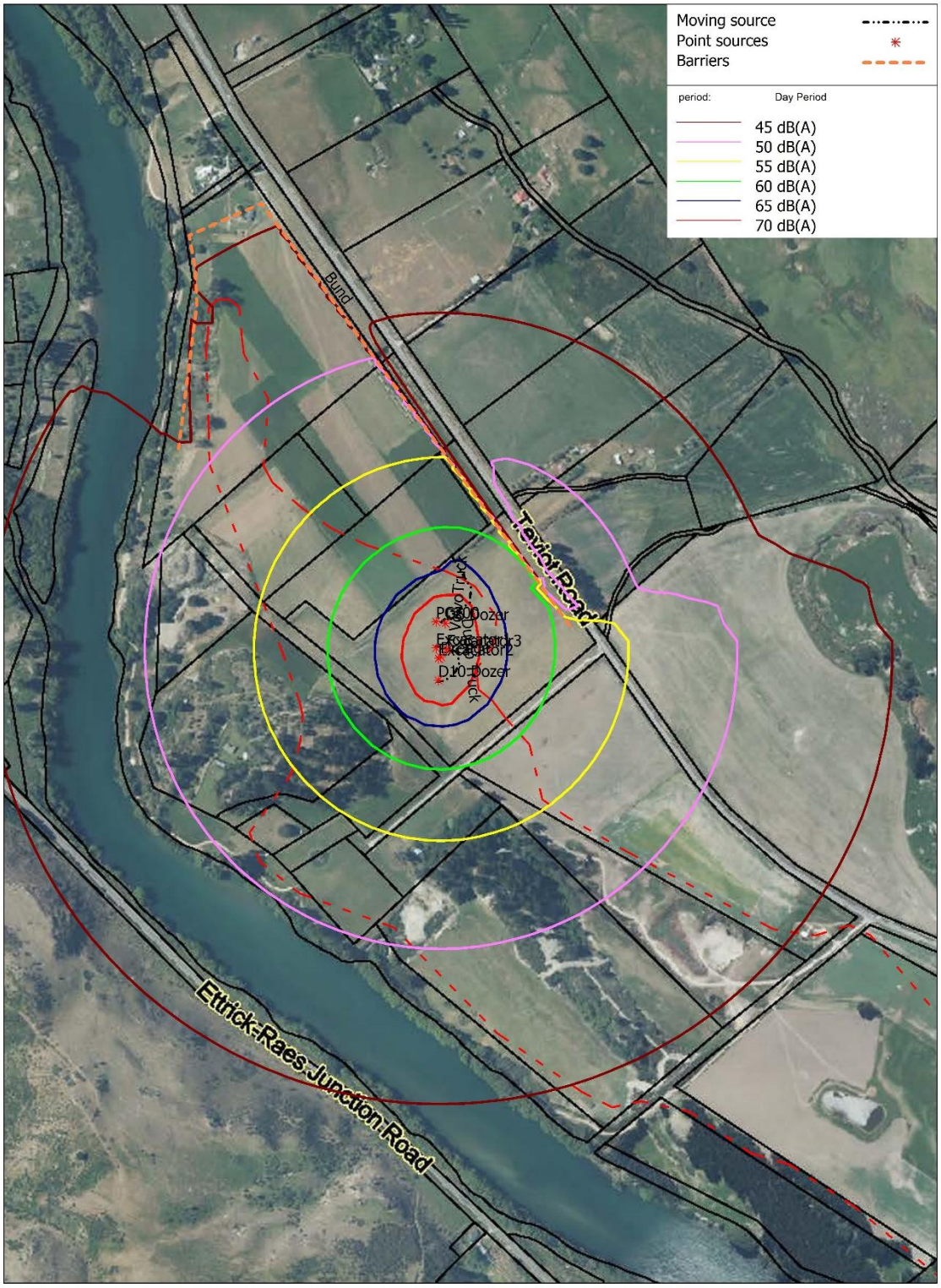


Figure 18. Mining at location 4, (Figure 14)

Figure 19 shows the noise contours when mining at location 5 (Figure 14) opposite 5386 Ettrick-Raes Junction Road.

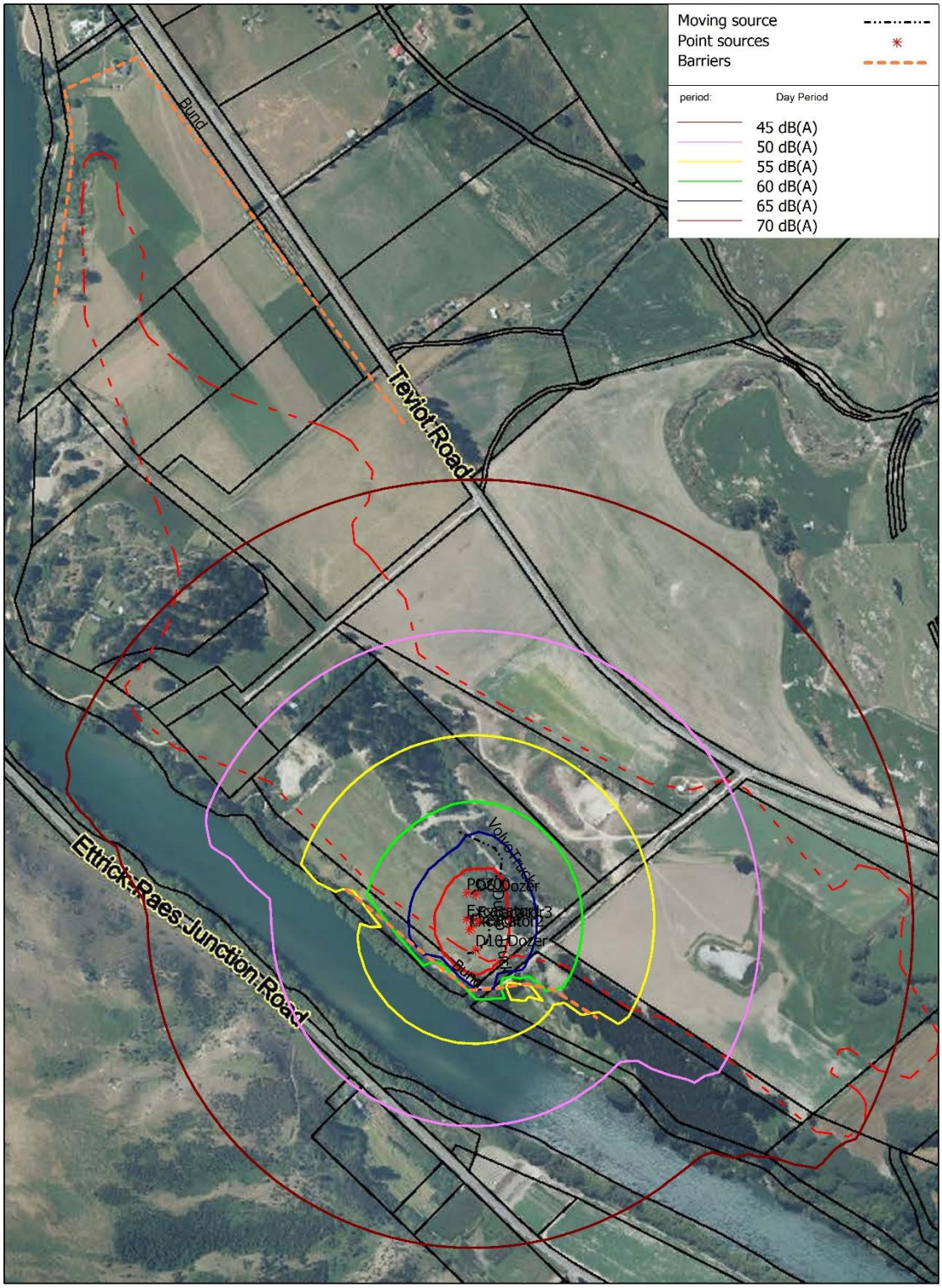


Figure 19. Mining at location 5, (Figure 14)

Figure 20 shows the noise contours when mining at location 6 (Figure 14) opposite 1537 Teviot Road.

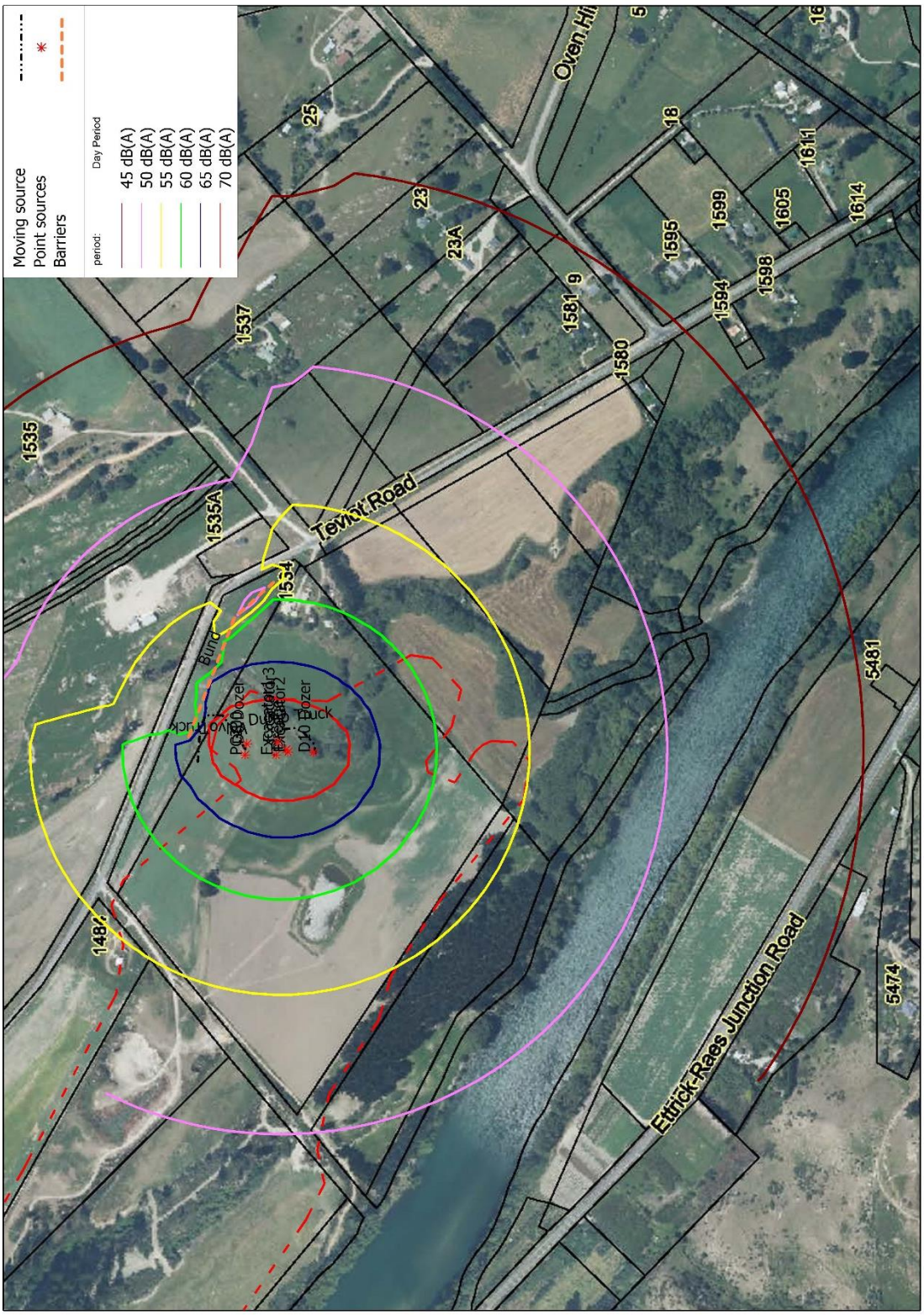


Figure 20. Mining at location 6, (Figure 14)

Figure 21 shows the noise contours when mining at location 7 (Figure 14) at the southern end of the mine area.

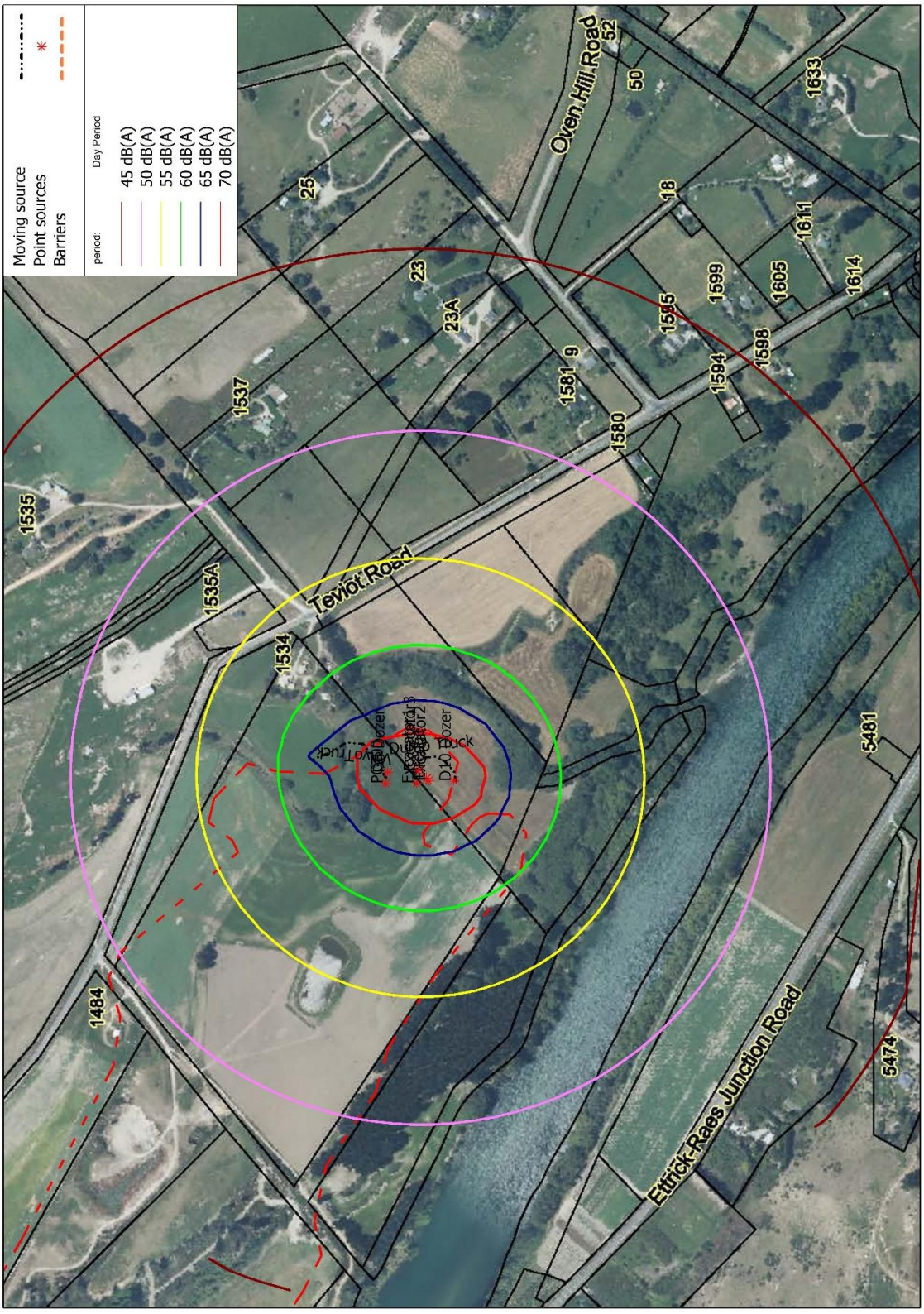


Figure 21. Mining at location 7, (Figure 14)

In addition to the noise contouring, the noise level at the most exposed notional boundary of the closer dwellings around the mine, as shown on Figures 22 and 23 have been predicted.

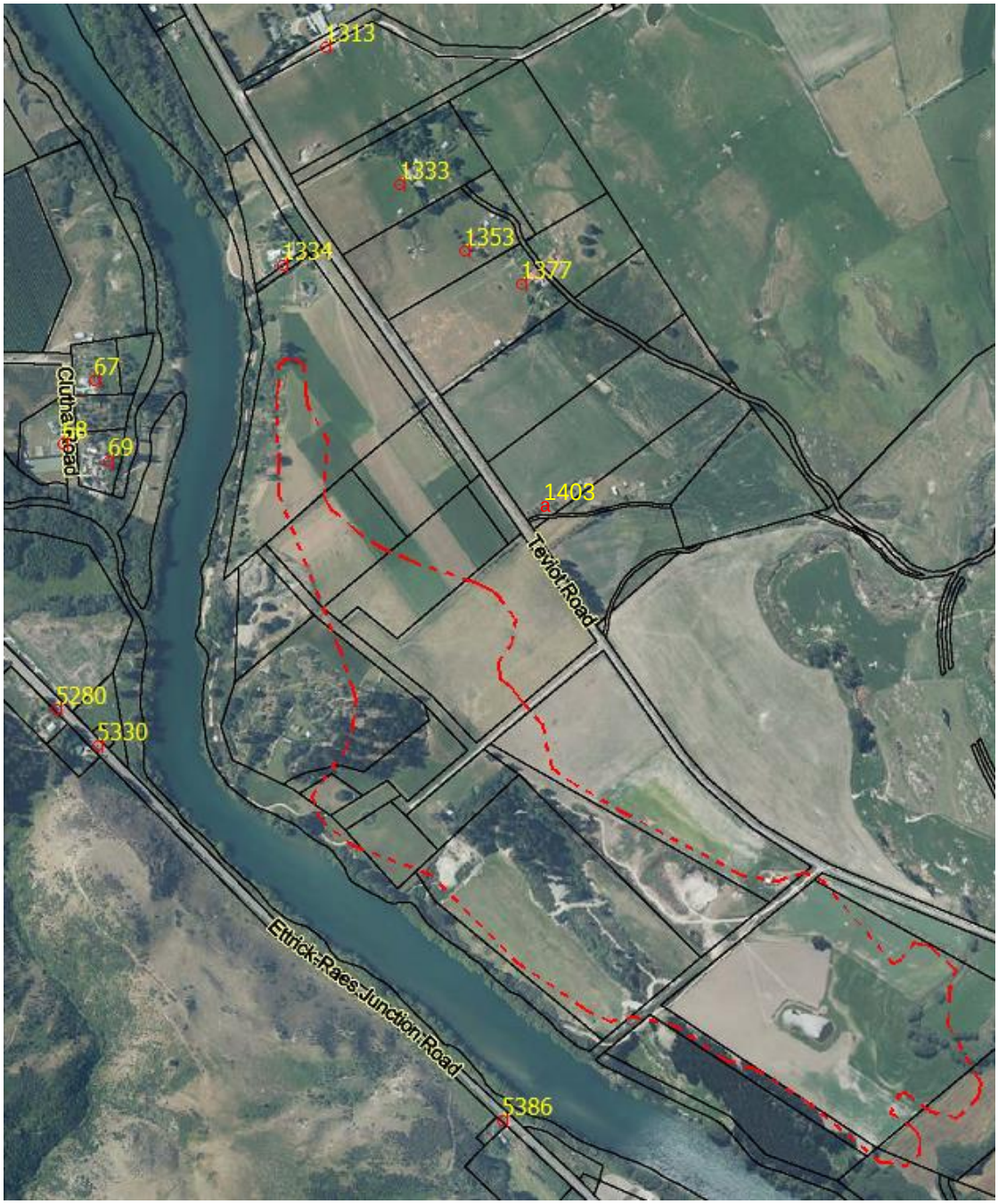


Figure 22. Location of dwellings to the north and west of mine

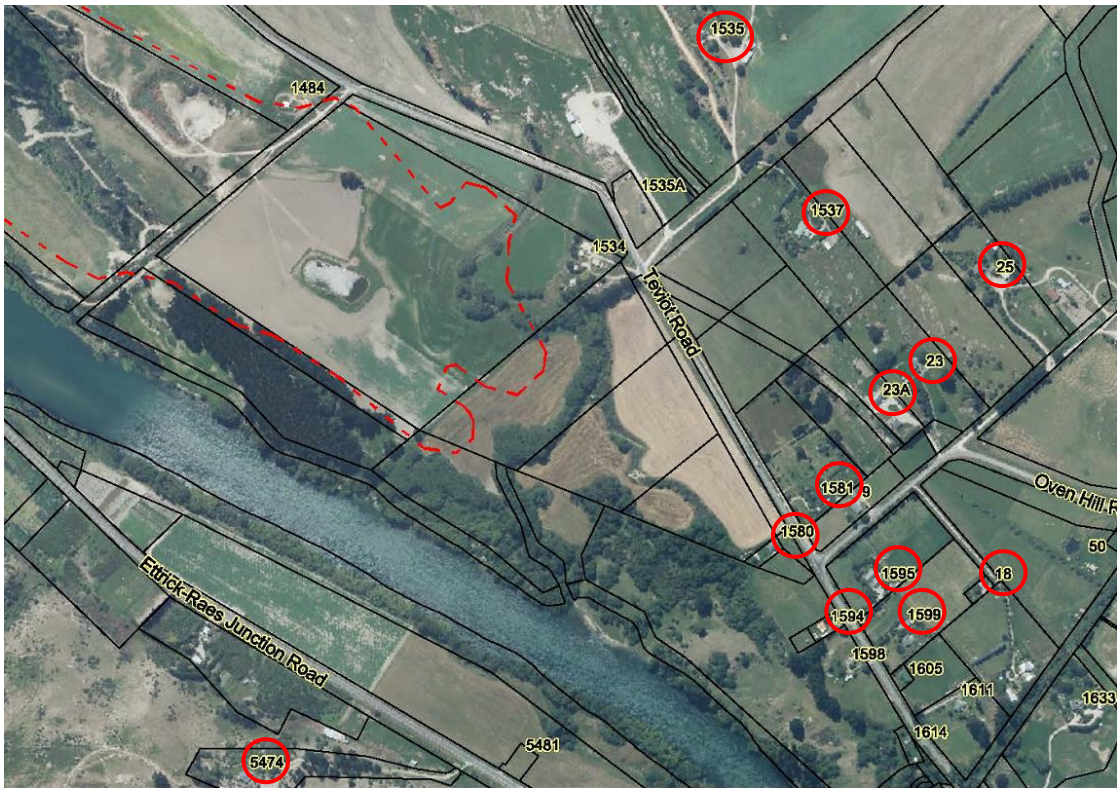


Figure 23. Location of dwellings to the east of mine

The predicted noise levels at the notional boundary of the closer dwellings for each of the dredging locations are shown in Table 1.

Table 1. Predicted Noise Levels (dBA L_{10})

Dwelling	Site 1*	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
67 Clutha Road	47	47	43	42	35	33	30
68 Clutha Road	45	47	43	43	35	33	31
69 Clutha Road	47	49	45	44	36	34	31
5280 Ettrick-Raes Junct	40	48	48	44	38	34	32
5330 Ettrick-Raes Junct	40	49	50	45	40	35	33
5386 Ettrick-Raes Junct	35	42	47	42	50	44	43
5434 Ettrick-Raes Junct	31	37	40	37	43	46	47
5474 Ettrick-Raes Junct	30	35	37	35	39	44	45
1313 Teviot Road	42	38	34	36	29	32	29
1333 Teviot Road	46	41	37	39	31	34	31
1334 Teviot Road	50	43	38	40	32	31	28
1353 Teviot Road	47	42	38	41	33	35	32

1377 Teviot Road	45	43	38	42	36	36	33
1403 Teviot Road	44	48	43	50	41	40	37
1535 Teviot Road	29	36	36	37	40	47	48
1537 Teviot Road	28	34	35	35	39	49	49
1580 Teviot Road	28	33	34	33	38	47	49
1581 Teviot Road	28	33	34	33	38	47	49
1594 Teviot Road	28	32	33	32	37	44	46
1595 Teviot Road	28	32	33	32	36	44	46
1599 Teviot Road	27	31	32	31	36	43	45
18 Oven Hill Road	26	31	32	31	35	42	43
23 Oven Hill Road	26	33	34	33	37	46	47
23 Oven Hill Road	27	33	34	33	37	47	48
25 Oven Hill Road	26	32	33	33	36	44	44

* Site locations are shown on Figure 14

5 CONCLUSION

Based on field measurements of the type of plant that will be used on site the noise from the various mining activities has been predicted for the dredge operating at the closer points to existing dwellings to reflect the upper level of noise likely to be experienced by the neighbours. For much of the time the equipment will be further from the residents and hence there will be less noise at the receiver positions. However, to ensure there will be compliance with the predicted noise levels the noisiest scenarios have been modelled.

When mining near the closer houses it will be necessary to include a minimum of a 4m high bund at the northern end of the site and a 3m bund opposite 5386 Ettrick-Raes Junction Road to provide screening of the closer houses. This will enable the daytime limit of 55dBA L_{10} to be achieved. No night time work is proposed.

When considering the above and the requirements of the Resource Management Act, the proposed alluvial gold mine can be managed so the noise effects will be less than minor.

* * *

APPENDIX A

Guide to Noise Terms

The following sets out an explanation of the acoustic terms that will be referred to throughout this report. The aim is not to necessarily provide technical definitions, but to enable a basic understanding of what is meant.

The setting of specific noise levels to control any adverse effects does not necessarily mean that noise will not be heard. Audibility depends on the level of a sound, the loudness of the background sound and any special frequency composition or characteristics that a sound may have.

Research suggests that a small number of people (approximately 10%) will find any noise not of their own making unacceptable. Conversely, there are approximately 25% of the population that are essentially immune to any noise. Neither of these two extremes is normally designed for. In establishing the appropriate noise levels the aim is to try and represent the typical expected community reaction, this will generally be approximately 90% of the people.

In order to reflect community response to noise it is necessary to establish a measure that reflects our attitude to the sounds that we hear. Due to the variability of many sounds (level, tone, duration, intrusiveness above the existing sound, etc) no single descriptor will totally describe the potential community reaction to a sound. For this reason there are a number of terms that need to be understood.

dBA

The basic unit to quantify a sound is the decibel. The A-weighted sound level, or dBA, is a good environmental noise descriptor because of the similarity between A-weighting and the frequency response of the human ear at moderate sound levels. It can also be measured easily. However, it provides no indication of tonal

frequency components or unusual frequency distributions of sound that may be the cause of annoyance. Where appropriate, this must be assessed separately.

We can hear a change in sound pressure that varies from 1 (taken as the threshold of hearing) through to 1,000,000,000,000 (taken as the threshold of pain). In order to bring these numbers to a more manageable size a logarithmic scale is normally adopted. This reduces the above values to 0 and 12 respectively. The decibel is then described as 10 times the logarithm of the ratio of the pressure level of interest, to a reference pressure level. Thus, the scale becomes 0 to 120dBA.

Some typical subjective changes in noise levels are:

A change of 3dBA is just perceptible
A change of 5dBA is clearly perceptible
A change of 10dBA is twice (or half) as loud

Because we use a logarithmic scale care must be taken when adding sound levels. Two equal noise sources raises the level of one source by 3dBA. It takes 10 equal noise sources to raise the level of one source by 10dBA. ie 60dBA + 60dBA = 63dBA and 60dBA x 10 = 70dBA.

Maximum Sound Level (L_{max})

This unit equates to the highest (maximum) sound level for a defined measurement period. It is adopted in NZS6802:1991 Assessment of Environmental Sound, mainly as a method of protecting sleep.

L_{10}

The sound level which is equalled or exceeded for 10% of the measurement time. This level is adopted in NZS6802:1991 Assessment of Environmental Sound to measure intrusive sound. This level may be considered as the average maximum sound level.

Background Sound L_{95}

The sound level which is equalled or exceeded for 95% of the measurement time. This level is adopted in NZS6802:1991 Assessment of Environmental Sound to measure the background sound. This level may be considered as the average minimum sound level and is the component of sound that subjectively is perceived as continuously present.

Equivalent Sound Level (L_{Aeq})

The L_{Aeq} may be considered as the continuous steady noise level that would have the same total A-weighted acoustic energy as a fluctuating noise over the same time period.

Ambient Sound

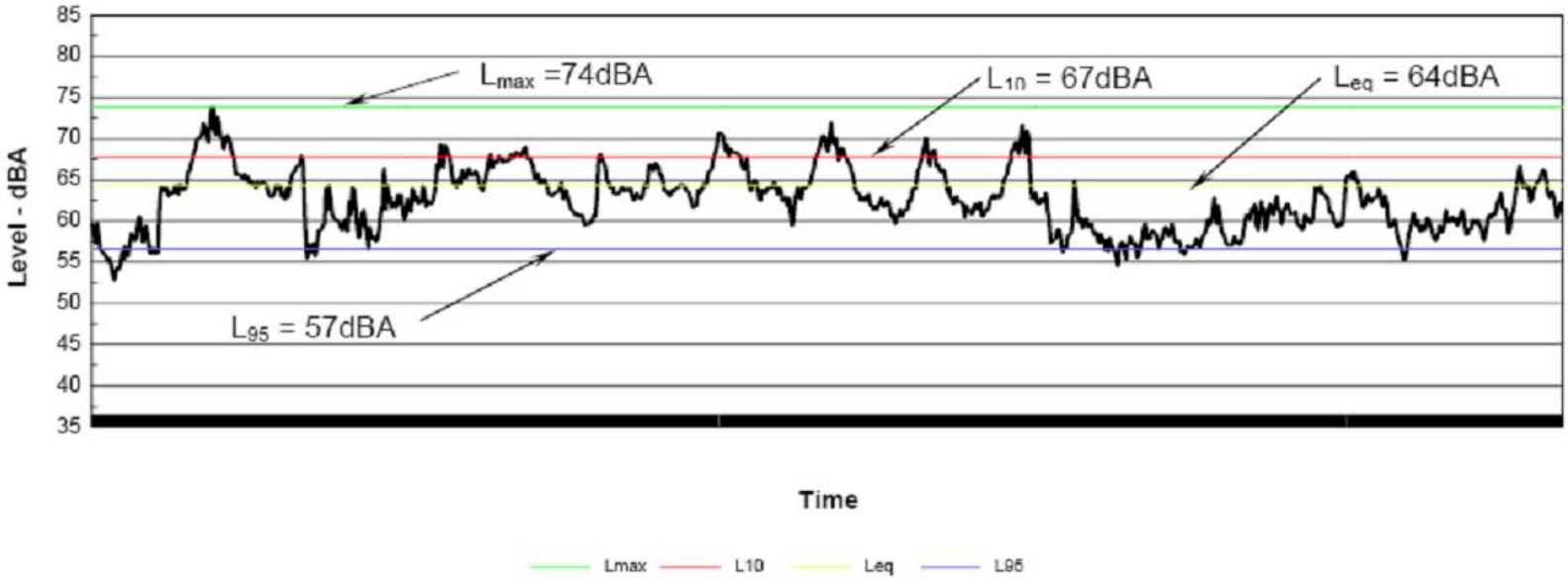
The ambient sound is normally used to describe the total noise environment. The ambient sound is often measured as the 24 hour $L_{eq,}$ which is an average value over the 24 hour period. Shorter times are often used, such as the daytime period

Notional Boundary

The notional boundary is defined as a line 20 metres from the facade of any rural dwelling or the legal boundary where this is closer to the dwelling.

Figure A1 shows a noise trace with the relationship of L_{max}, L_{10}, L_{95} and L_{eq} values when including all events over the 15 minute measurement period and Figure A2 some typical noise levels.

* * *



L_{max} is the maximum noise level
L_{10} is the noise level that is equaled or exceeded for 10% of the measurement period
L_{95} is the noise level that is equaled or exceeded for 95% of the measurement period
L_{eq} is the noise level that contains the same energy as the time varying noise

Figure A1

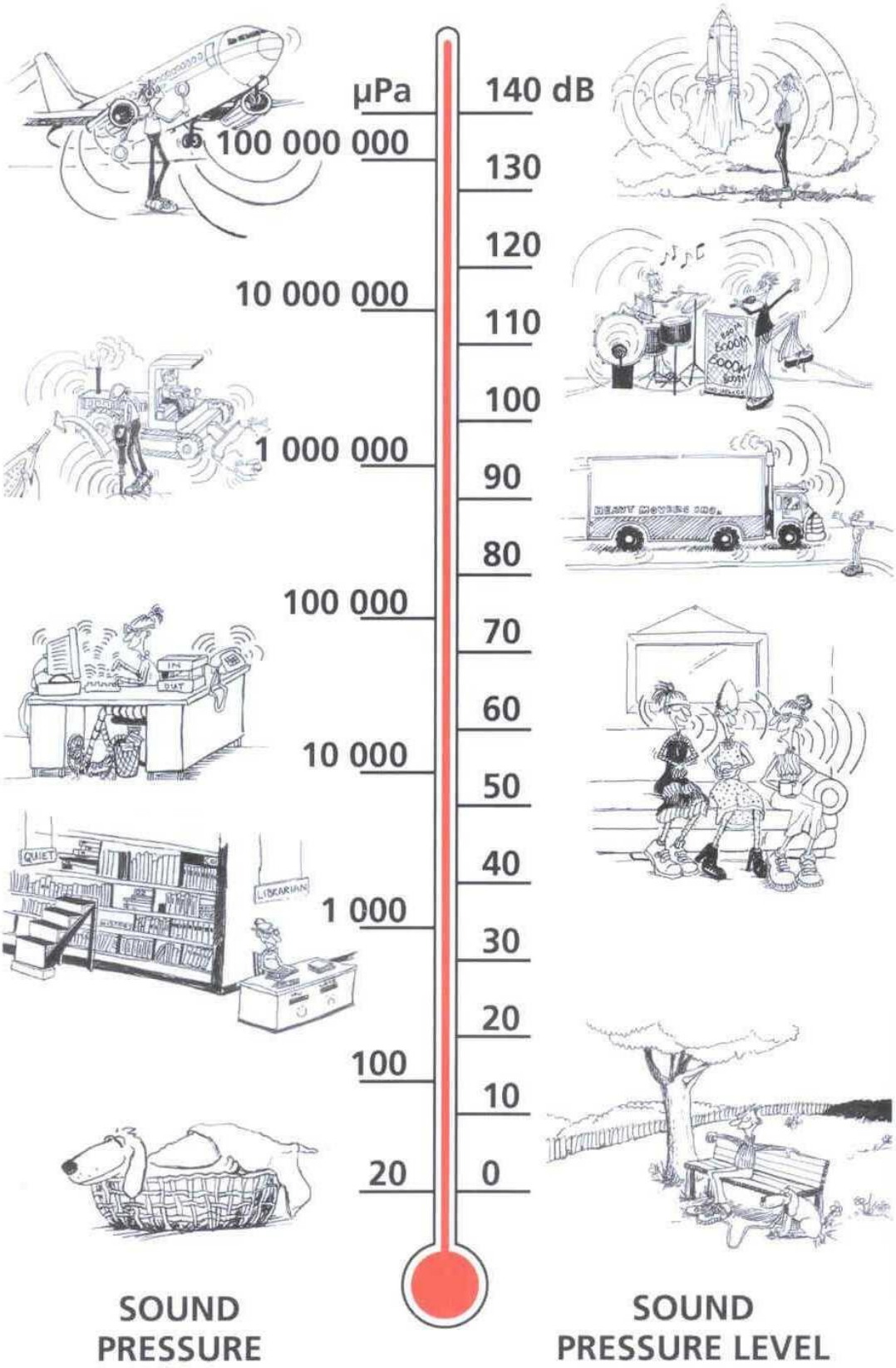

μPa
100 000 000
10 000 000
1 000 000
100 000
10 000
1 000
100
20
140 dB
130
120
110
100
90
80
70
60
50
40
30
20
10
0
QUIET
LIBRARIAN
SOUND PRESSURE
SOUND PRESSURE LEVEL

Figure A2

1/355 Manukau Road
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Epsom, Auckland 1344

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E: hegley@acoustics.co.nz

22 September 2023

Simon Johnstone
Hawkswood Resources
simon@hawkeswood.co.nz

Dear Simon

PROPOSED ALLUVIAL MINING - MILLERS FLAT

The mining footprint for the proposed Millers Flat Mine has been modified from that originally adopted in the noise report entitled Proposed Alluvial Mining, Millers Flat Assessment of Noise Effects, Report 22048 dated 20 March 2023. The new mining footprint is shown in Figure 1.

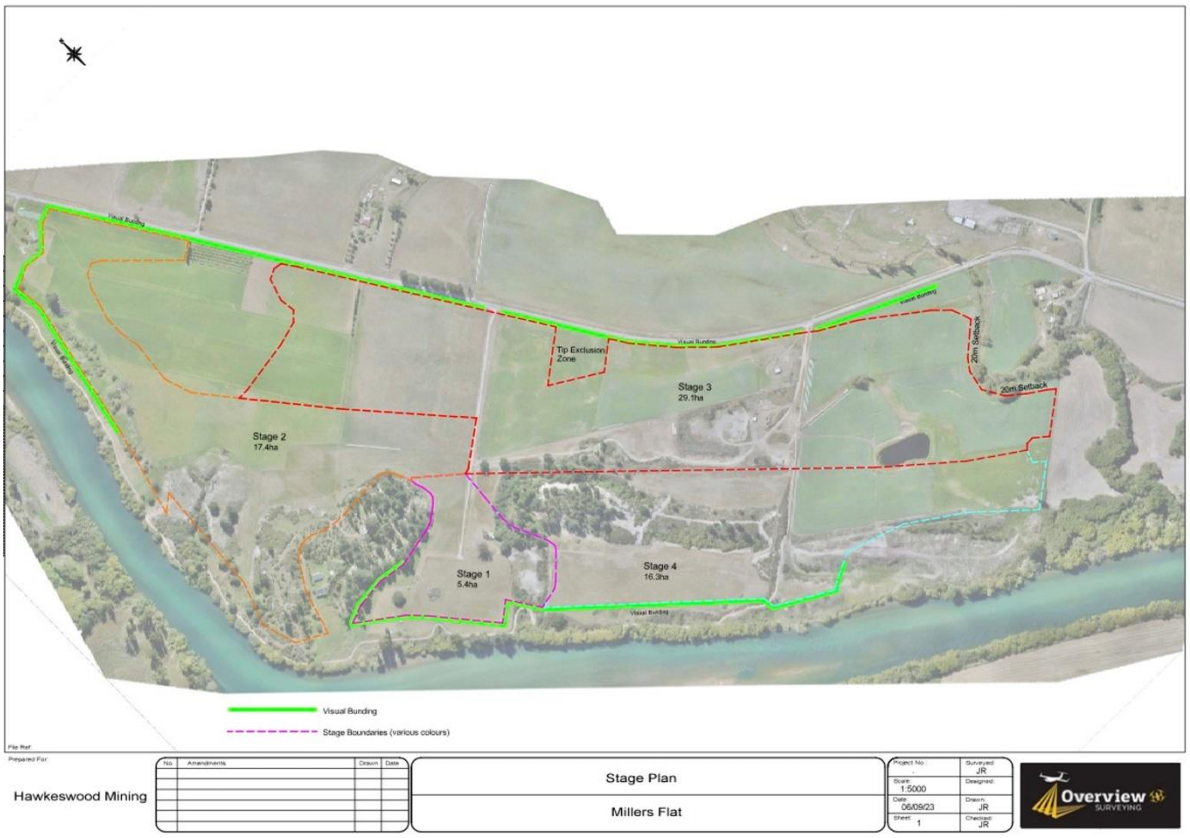

Figure 1. Proposed mining area

The proposed changes to the mining area are all minor with respect to the noise effects. When taking into account the proposed bunding, the noise as predicted for the site and set out in the above report dated 20 March 2023 are still relevant and reflect the worst case noise that will be experienced from the revised mining plan shown in Figure 1.

Should you have any questions regarding the above please do not hesitate to contact me.

Yours sincerely
Hegley Acoustic Consultants

Nevil Hegley

TOWNPLANNING
GROUP

Hawkeswood Mining Limited:
Dust Management Plan

Millers Flat Gold Mine
1346-1536 Teviot Road

25 October 2023

Document prepared by:

Town Planning Group (NZ) Limited

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Web: www.townplanning.co.nz

Offices in Tāhuna, Wānaka, Ōtautahi & Tāmaki Makaurau

Contents

Figures

1 Introduction

1.1 Scope

This management plan has been prepared to manage dust as part of the Hawkeswood Mining Limited gold mine at 1346-1536 Teviot Road, Millers Flat.

The objectives of this management plan are:

- To operate in full compliance with the resource consent requirements and demonstrate this through reporting procedures;
- To liaise closely with neighbours in the local community regarding dust management during operation;
- To minimise and limit nuisance impacts to local residents and adjacent land users from dust generated by mining operations;
- To provide the methods to be employed to avoid, remedy or mitigate any adverse effects on the environment due to dust as a result of mining activities.

The plan will provide methods to be used to achieve these objectives.

1.2 Resource Consents

Resource consents from Central Otago District Council and the Otago Regional Council are currently being sought. This plan will be revised and updated if required once conditions of these resource consents are decided.

2 Description of Operation

The site will be used by Hawkeswood Mining Limited to establish and operate an alluvial gold mining operation. The operation generally involves the following activities.

Site establishment

- Test pitting

- Development of a starter pit
- Construction of access roads

Mining operations

- Stripping of overburden
- Stockpiling of overburden
- Transport of overburden
- General site activities

Site rehabilitation

- Backfill of mine void and topsoil
- All bunds will be removed
- The land will be restored to the pre-existing land contour as closely as possible (with the exception of a terminal void)
- Grass will be established over the disturbed land
- Rehabilitation will be undertaken progressively as overburden from the next stage is used to fill in the mine pit from the previous stage

2.1 Site location and layout

The site is located at 1346-1536 Teviot Road, Millers Flat, Central Otago (**Figure 1**). The layout of the site is shown in **Figure 2** below.

Figure 1 Site Location indicated by red arrow (Source: CODC GIS)

Figure 2 Site layout plan

2.2 Surrounding land uses

The surrounding area is rural with land predominantly used for pastoral farming activities.

The township of Millers Flat is located approximately 700m to the southeast at the closest point. The township of Ettrick is located approximately 800m northwest of the site at the closest point. Rural residences are located in the surrounding area.

The Clutha River / Mata-Au is located to the west and southwest of the site. The river is a Statutory Acknowledgement Area and has a range of intrinsic, cultural, recreational and aesthetic values, and is used by the general public for fishing, boating and other recreational uses.

The Clutha Gold Cycle Trail (the "cycle trail") is a compacted gravel track, running between Roxburgh and Lawrence, and linking to other cycle trails in Central Otago. The cycle trail runs along the Clutha River / Mata-Au to the west and south-west of the site, before cutting through the site via the paper road, to then travel along Teviot Road toward Millers Flat.

Figure 3 Approximate path of Clutha Gold Cycle Trail indicated in yellow. Extent of application site area indicated in red outline (Source: CODC GIS)

2.3 Local meteorological conditions

The closest meteorological station with historical records is located within the site. A wind rose (**Figure 4**) has been developed from the data from 1 January 2011 to 9

December 2022. The wind rose shows that prevailing winds are from east-southeast and west-northwest.

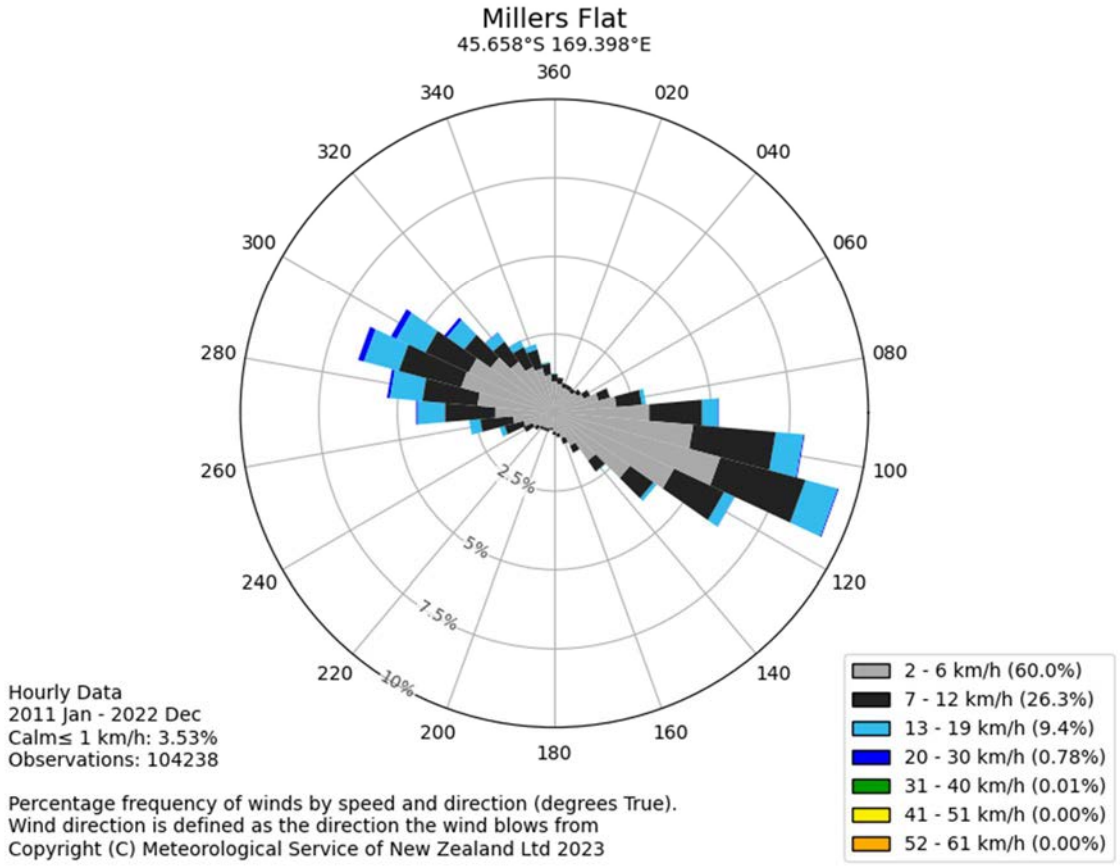

Figure 4 Wind rose for Miller's Flat (Source: Metservice)

3 Dust Sources and Generation

3.1 Potential dust sources

The activities that will take place at the mine that may generate discharges to air are:

- Earthworks, including stripping of overburden and topsoil
- Vehicle movements on unpaved surfaces
- Wind generated dust from dry exposed areas such as stockpiles, haul roads and backfill areas
- Rehabilitation
- Loading and unloading materials

A wide range of mining activities have the potential to generate dust. The source(s) are usually visible and readily identifiable. Dust from Hawkeswood Mining Limited mining activities is anticipated to be almost entirely generated by material disturbance within the mining pits, vehicle movements on unsealed roads, and exposure to wind in open areas. Processing of material through the Gold Recovery Plant is not dusty as the process is undertaken using wet material, with added water.

3.2 Factors influencing dust generation

- Wind speed across the surface; the critical wind speed for pick-up of dust from surfaces is 5m/s, above 10m/s pickup increases rapidly
- The percentage of fine particles on the material on the surface
- Moisture content of the material on the surface
- The area of exposed surface
- Disturbances such as traffic, excavation, loading and unloading of materials
- The height of the source above the surrounding ground level

The smaller the particle size of the material on the surface of a road or exposed surface the more easily the particles are able to be picked up and entrained in the wind. Moisture binds particles together preventing them from being disturbed by wind or vehicle movements.

4 Receptors

Potential receptors of dust emissions from the site include:

- Residences

  There are a number of rural residences close (within 250m) to the proposed work area. Those that are aligned with the prevailing wind directions of east-southeast and west-northwest may be at increased risk of experiencing effects from dust.

- Users of the Clutha Cycle Trail

  These receptors will be transient, though very close to the work area in places.

5 Dust Mitigation Procedures

5.1 Site wide activities

The following dust mitigation measures will be undertaken as required to minimise the overall dust emissions from the mine;

- Particularly dusty activities such as dry earthworks will cease when conditions are dry and winds are strong. The wind speed trigger for stopping dusty activities will be set to 10 m/s initially, based on an on-site wind sensor set between 4m and 8m above ground level. The wind speed trigger may be amended on consideration of local terrain and location of working areas and considering the real-time dust monitoring results obtained (Section 6 below).
- Exposed surfaces will be kept to a minimum.
- Water or other dust suppressants shall be applied to unsealed internal roads and other potentially dusty surfaces as necessary to minimise dust emissions.
- Vehicle speeds on site will be restricted to a maximum of 30 km/hr.
- Regularly maintain unsealed access roads using best industry practices which could include grading and laying of fresh metal.
- Trucks carrying potentially dusty loads shall be covered or dampened.
- Existing shelter belts of trees along the boundary of the site will be maintained.

The application of dust suppression techniques will depend primarily on weather conditions, as during the months of October to March when weather conditions are normally dry and windy the potential for dust emissions will be greater and therefore dust suppression techniques will be used routinely. However, during the months of April to September weather conditions are generally wetter, subsequently dust suppression measures will be implemented on an as needs basis. Water for dust suppression is available is ample quantities from the dewatering of the mine void.

5.2 Material stockpiles

Hawkeswood Mining Limited will undertake the following to minimise dust from stockpiles:

- Limit the height of stockpiles to 7m
- Keep active stockpiles damp when necessary
- Vegetate or cover long-term stockpiles

- All soil stockpiled for longer than six months shall be protected from exposure to wind by covering them with a synthetic material or growing a suitable vegetative cover

Hawkeswood Mining Limited will have at least one water cart on site at all times which will be used to dampen access ways and stockpiles. The water cart will be fitted with forward facing sprays and a water cannon which can also be used water stockpiles when necessary. The water cart will be supplemented with sprinkler systems where required.

The long-term stockpiles and bunds will be grassed in the areas that are not subjected to traffic. Any areas requiring vehicle access will be treated by the water cart.

5.3 Elimination of fugitive dust

The action task list for the elimination of fugitive dust at the site is as follows:

1. Reduce the pace of, or cease dust producing activities until the problem is corrected
2. Notify the site manager of dust conditions and implement dust suppression procedures
3. Increase frequency volume and/or coverage of water misting sprays to prevent soil and it from drying
4. Modify operating procedures and methods to eliminate problematic conditions
5. Increase the level of worker awareness and instruct them on the implementation of any new or modified operating procedures
6. Perform routine audits of dust suppression methods and work areas for dust sources

5.4 Sensitive Receptor Management Zone

There are four residences that are located within 250m of the work site and the prevailing wind direction, which may be sensitive to dust effects from the mining project. A Sensitive Receptor Management Zone has been created to provide additional controls within these areas, shown in **Figure 5** below and Attachment B. These additional controls may be waived in individual areas with the written approval of the associated resident.

- Potentially dusty works will be undertaken in this area during winter, where practicable.
- Stockpile heights will be reduced to 4m, to align with the height of any boundary bunding.

- The wind speed trigger may be lowered below 10m/s if indicated by visual observations and the boundary dust monitoring described in Section 6 below.

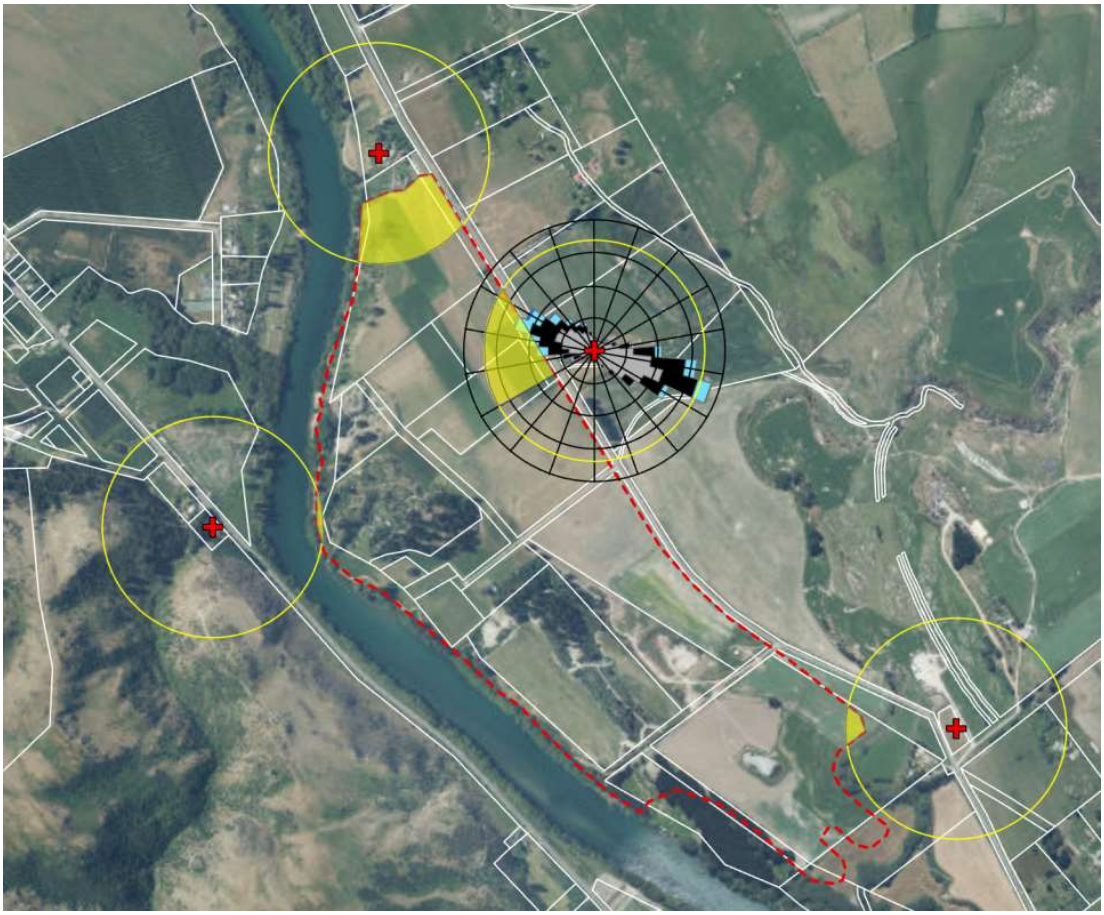

Figure 5 Sensitive Receptor Management Zone, based on houses within 250m of the work area and within the prevailing wind direction. Wind rose imposed over 1403 Teviot Road, Millers Flat, to demonstrate how prevailing wind direction impacts on the extent of the Sensitive Receptor Management Zone.

6 Monitoring

6.1 Overview

To ensure dust mitigation measures are implemented and are affective at minimising dust a dust monitoring plan as outlined in **Table 1** below has been implemented.

Table 1 Dust Monitoring Plan

Monitoring activities	Frequency
Check weather forecast for strong winds and rainfall	Daily
Observe weather conditions from observations and data from weather station	Daily and as conditions change
Inspect stockpiles to ensure a reasonable dampness is maintained	Daily and as conditions change
Inspect dust generating activities to ensure dust emissions are effectively controlled	Daily and as conditions change
Inspect watering systems to ensure equipment is maintained and functioning	Weekly
Monitor dust generating activities and water application rate	In winds over 5m/s

6.2 Instrumental monitoring

The purpose of dust monitoring is to demonstrate that the controls are adequate and allow for adaptive management if necessary.

Two real-time dust monitors will be installed on the site boundary to measure the concentrations of fine particulate matter (PM10). These will be positioned between the work site and sensitive receptors, with the precise location to be determined in consultation with a suitably qualified person.

If the following trigger levels are exceeded, an investigation into the cause and a review of controls will be undertaken (refer to Appendix D).

Trigger Type	Averaging Period	Trigger Value
PM_{10}	1 hour	150 µg/m^3
Short term total suspended particulate	1 hour	200 µg/m^3
Visible Dust	Instantaneous	Visible dust emissions beyond the site boundary

6.3 Recording

Dust monitoring will be recorded on the forms in Appendix C at the frequency specified in Section 6.1. Alternatively, data from automated dust monitors may be recorded electronically instead of using paper forms.

7 Complaints

Any complaints received by Hawkeswood Mining Limited will be recorded on a complaint form noting the following:

- Time, identity of contact details of complainant
- Nature of the complaint
- Weather conditions at time of complaint
- Actions taken and any remedial actions as necessary. If complaint was related to an event in the recent past note any dust producing activities
- If it is apparent that there is a source of dust other than from the mine area causing a dust nuisance, evidence of this source must be recorded.

The complaint forms shall be kept in a register and submitted to Central Otago Regional Council and Otago Regional Council on request. An after-hours telephone number is available and will be distributed to neighbouring properties following the commencement of the operation.

8 Responsibility

A minimum of two individuals will be trained to implement the dust management plan. These individuals will be responsible for ensuring the dust management plan is fully implemented and maintained. The mine employees must take ownership of the dust management plan to ensure its success. Employees at the plant must receive training to understand the role of implementing and maintaining the dust plan including conducting inspections and taking corrective actions.

The site manager will have ultimate responsibility in ensuring that the objectives of the dust management plan are met.

9 Contingency

In the event that dust monitoring results reveal significant exceedances above background levels, or repeated complaints are received, the site operations, dust monitor data and recorded metrological information will be analysed to establish the problem source. The site manager will then be responsible for implementing the procedures described in Section “Elimination of fugitive dust” to immediately reduce dust generation from the problem area. If the problem persists, operations in the problem area shall cease while a solution is investigated and implemented.

10 Review

The dust management plan shall be reviewed at least on an annual basis and may be amended during the period of this consent as appropriate to improve management and contingency procedures.

11 Appendices

Contents

A: Resource Consents

B: Sensitive Receptor Management Zone Plan

C: Forms

- **Complaints Investigation Form**
- **Dust Monitoring Record Form**
- **Dust Level Exceedance Investigation Form**

Appendix A: Resource Consents

Appendix B: Sensitive Receptor Management Zone Plan

Esri, Maxar, Earthstar Geographics, and the GIS User Community

LEGEND

- Site extent
- Houses
- Sensitive receptor management zone
- 250m radius

DUST MANAGEMENT PLAN: SENSITIVE RECEPTOR MANAGEMENT ZONES

Wind Rose

- 2-6 km/h (60.0%)
- 7-12 km/h (26.3%)
- 13-19 km/h (9.4%)
- 20-30 km/h (0.78%)

2753-22 | Hawkeswood Mining Ltd

18/10/2023 SCALE: 1:14,000 @A3

SOURCE: LINZ

TOWNPLANNING GROUP

PO Box 2559
QUEENSTOWN

0800 22 44 70
townplanning.co.nz

Appendix C: Forms

MILLERS FLAT MINE

COMPLAINTS INVESTIGATION FORM

Date	
Name of complainant	
Address of complainant	
Date of incident	
Weather conditions at time of incident (sun, rain, dry)	
Wind direction and strength at time of incident (still, light, gusts)	
Description of dust and potential source (thick, light, location)	
Actions taken (incl. any remedial actions)	
Follow up with complainant to advise of actions taken (date, time, and note of conversation)	

Form completed by		Date	

MILLERS FLAT MINE

DUST MONITORING RECORD FORM

Week commencing _____

Daily Monitoring Activities (initial as completed)	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**
Check weather forecast for strong winds and rainfall							
Observe weather conditions from observations and data from weather station							
Inspect stockpiles to ensure a reasonable dampness is maintained							
Inspect dust generating activities to ensure dust emissions are effectively controlled							

Weekly Monitoring Activities	**Checked by**	**Date**
Inspect watering systems to ensure equipment is maintained and functioning		

Winds over 5m/s	**Wind speed**	**Time**	**Date**
Monitor dust generating activities and water application rate			

Tiggers	**Notes**	**Measurement**	**Time**	**Date**

MILLERS FLAT MINE

DUST EXCEEDANCE INVESTIGATION FORM

Trigger/Exceedance	
Date and time	
What work was happening on site	
What work caused the problem	
Actions taken to solve the problem	
Monitoring actions	
Other notes	

Form completed by		Date	

DATED 25TH NOVEMBER **20** 22

Millers Flat Water Company Limited

and

Name JACKS RIDGE LTD

Address PO BOX 76 WHITFORD 2149

WATER SUPPLY AGREEMENT

Lucas & Lucas
Solicitors,
Dunedin
(Garth Lucas)

WATER SUPPLY AGREEMENT

THIS AGREEMENT is made on the date in the schedule between **MILLERS FLAT WATER COMPANY LIMITED** (the Company) and the person or body named as "the User" in the schedule hereto with intention to have effect as a deed.

BACKGROUND

A The Company is proposing to establish a water supply scheme for the Millers Flat township intending to supply domestic quantities of water to properties able to be serviced by its scheme.

B The Company and the User have agreed on the terms of supply to the User's property.

C This agreement is intended to record the terms of the agreements reached with the owners of the properties receiving water from the scheme.

D The obligations and responsibilities of each party to the other are in consideration of each parties obligation and entitlements as recorded in this agreement.

THE PARTIES AGREE AS FOLLOWS

1 WATER SUPPLY

The Company will supply water from the scheme to the User in accordance with this agreement if and when water is available. There is no guarantee of supply. The Company may make rules governing use of water at any time having regard to cost, water reticulation issues, water quantity and or water quality, or other matters which prudently require rules or restrictions. Without any Company warranty of the quality or fitness of water supplied for any particular purpose, the Company and the User agree that water is not in any event supplied for the purpose of being used for and will not be used for any industrial or commercial purpose.

2 UNIT ENTITLEMENT AND SUPPLY INTENTION

The quantity of water supplied shall be as from time to time determined by the Company. The Company intends to provide water based on the recommended quantity and flow and which will meet Drinking Water Standards for New Zealand, 2005, for each property for which a supply agreement has been signed, and for which the applicable fully paid up share is held by or for the User in the capital of the Company. The entitlement to a unit shall, subject to availability of water, mean such quantity of water as from time to time may be determined by the Company with the expectation that it will be 1,000 litres per day plus 200 litres per day per person up to 5 persons.

3 NO ENTITLEMENT EXCEPT TO SHAREHOLDERS

No User shall be entitled to water supply unless the User is a shareholder in the Company and then only on the basis of an entitlement of one unit for a single share held in respect to an applicable property.

(a) If the User should own more properties within the scheme (or capable of being supplied by the scheme and the Company has agreed to include the same) and shares are held for each other such property, then the User shall be entitled to such number of units as the User has applicable properties and otherwise qualifies under clause 2 above.

(b) If the User has more shares in the capital of the Company than the User has properties served by the scheme then the User shall receive supply only to those of the User's properties which are applicable, i.e. served by the scheme. All other shares in the name of the User, where fully paid up, and where associated with another applicable property for which the owner has signed the Company's Water Supply agreement, shall be deemed to be held in trust for the owner of that property. Shares not associated with an applicable property and all shares not fully paid up, shall be "dry shares" as defined in the Companies Constitution.

4 COMPANY RESPONSIBILITY

The Company will arrange for the User to be connected to the scheme from a point of supply outside of the Users property boundary or at some other point as agreed between the User and the Company and will maintain the connection to the point of supply.

The Company shall be responsible for all repairs and maintenance to the scheme and its assets to the point of supply. All works past the point of supply and all works inside the property boundary (except where agreed otherwise, or to the extent that they form part of the scheme in the larger sense and are required to transport water to enable supply elsewhere) shall be the User's responsibility.

5 WATER CHARGES

The User shall pay to the Company a charge for the water so supplied of such amount as the Company from time to time determine and at such times and at such places as the Company from time to time determine.

6 CONSEQUENCE OF NON PAYMENT

If the water charges are not paid by due date then the same together with all increases payable under clause 5, and all charges payable under clause 8 may be recovered from the user as a liquidated debt due to the Company as the same are incurred, and the provisions of clause 8 shall apply.

7 NO COMPANY LIABILITY FOR FAILURE OF SUPPLY

If, owing to any cause the water supply from the scheme shall fail or become diminished so that it is impracticable to supply all or any part of the water, the User shall not by reason of any such failure or diminished supply have any claim to compensation or any right of action or other remedy against the Company but the water charges will still be payable by the User.

8 COMPANY RIGHTS IN EVENT OF NON PAYMENT

In the event of the User committing any breach of this agreement the Company may, without liability for any compensation or damages to the User or any other person, (where a property is not occupied) cut off the supply of water; or (where a property is occupied) reduce the supply of water to such amount as shall be deemed by the Company as sufficient for the necessities of life and health, but without any provision for irrigation or other use.

In either event the User shall be and remain liable to pay as the same are levied:

(a) the full cost of the change in or termination of supply; and

(b) the full cost of reinstatement of supply; and

(c) all charges for further devices the Company may deem necessary to limit or measure or monitor and/or record water flow; and

(d) all charges for administrative deliberation and recording and monitoring each week during the reduced or terminated supply period; and

(e) all normal water charges; and

(f) any applicable penalty charge; and

(g) interest where payable on any unpaid amount.

The Company shall be entitled to require that all of the above charges be paid or secured as a pre-condition to reinstatement of supply.

9 INDEMNITY TO COMPANY AND GRANTOR

The Company will install and undertake such pre-filtering and UV filtering or other treatment of the water that may be required for health or safety of persons by any competent authority, or as required under the Health (Drinking Water) Amendment Act 2007. The user will make no claim on the Company or on any Grantor arising from any quality, quantity, continuity, pressure, or flow issue related to water supplied by the Company.

The User acknowledges to the Company and the Grantors that water may be turbid and not potable and that injurious chemicals may be in the water. The User shall be solely liable for and shall keep the Company and the Grantors safe harmless and indemnified and defended from and against any actions, claims, demands, proceedings, damages, costs, charges, and expenses whatsoever in respect of the use of the water by the User or by any other person or persons using or coming into contact with the water or any living thing, product

or other thing affected by the water, whether by the neglect or omission of the User or with the consent or approval of the User whether the same shall be explicit or inferred.

10. SALE OR TRANSFER OF PROPERTY

The supply is personal to the User and cannot be transferred from the property to which this agreement relates at the time of execution and the User agrees that on any transfer or other change of ownership of the property the User will ensure that no representation or warranty contrary to the terms of this agreement is given to any person, either expressly or by implication, and that the benefit and burden of this agreement is also transferred with the property subject only to the consent of the Company to the transfer, the provisions of this agreement which may relate to such transfers, and the payment of all amounts and the performance of all obligations that are due and owing to the Company.

The User agrees to give notice to prospective purchasers of the User's property that water is supplied to the property under this agreement, to supply to all such persons a copy of this agreement, and to advise that the cost of water supply is payable to the Company in addition to and not as part of local authority rates.

Subject to the User complying with the terms of this clause, the Company agrees to offer to enter into a replacement agreement on the then current agreement terms with succeeding owners of the User's property, and subject to the completion of such an agreement to supply water to the succeeding owners. Any one-off start-up capital cost or joining levy paid by the User shall not be required to be paid again by a succeeding owner, but the Company may charge for its costs in relation to the transfer.

11. COMPANY DECISION FINAL

The decision of the Company on all matters relating to this agreement, the operation of the scheme in general and the supply of water thereunder whether to the User or to any other person or persons shall be final and binding on all parties and the Company shall be entitled to act as it sees fit in all respects.

12 SUPPLY SUBJECT TO COMPANY ENTITLEMENT

The rights and obligations of the parties hereto shall cease and this agreement be deemed to be immediately terminated in the event that the Company should lose by whatever means any licence, right, privilege, confirmation, consent, permit or easement that the Company needs to be practically and economically able to operate the Scheme and thereby provide water to the User or if the Scheme or any part of it is so damaged or destroyed by whatever means that the Company is unable to practically or economically supply water to the User PROVIDED THAT any money owing by the User to the Company at the time of termination under this Clause shall be due to and recoverable by the Company in terms of this Agreement.

The User agrees that in the interests of the Company and the community which it serves, the User will not to oppose any application for or for the renewal of any such licence, right, privilege confirmation, consent, or permit that the Company may at any time seek, nor seek to impose any conditions on the same.

13. REPAIR AND MAINTENANCE

The repair and maintenance of the pipeline so as to keep the whole and every part of it in good order repair and condition and to prevent it becoming a danger or a nuisance shall be the responsibility of the Company EXCEPT that any damage caused to the pipeline by any deliberate act or omission of the User shall be the responsibility of the User and in such case the Company shall be entitled to carry out any necessary repair maintenance replacement or renewal so as to keep the pipeline in good operating condition and to charge the cost of so doing to the User which cost may be recovered as liquidated damages.

14. GOODS SERVICES TAX

Goods Service Tax at the appropriate rate shall be payable by the User to the Company in addition to any water charge or charges as established and payable hereunder.

15 TERM

This Agreement shall continue until:

(a) The User gives to the Company twelve months (or such lesser period as the Company in its sole discretion may be prepared to accept) notice in writing of the Users intention to revoke this agreement and upon the expiry of such period of notice does actually revoke the same; OR

(b) The Company for any reason should on reasonable grounds decide to terminate this Agreement or refuse water supply to the User whereupon the Company shall be entitled to determine this Agreement upon giving 7 days notice in writing to the User; OR

(c) This Agreement is otherwise cancelled or terminated as provided herein or the Company should resolve to refuse supply in accordance with any appropriate provision which may be contained within the constitution of the Company; OR

(d) The Company should at any time adopt a differing form of standard form of Agreement when the Company shall be entitled to cancel this Agreement at such time as the Company shall decide provided that it shall offer to the User a replacement Agreement in the new standard form and the Company shall not be liable to the User for any costs, claims, damages or compensation for action taken pursuant to this provision whether or not the User shall have accepted the new Agreement.

16 FAILURE OF SUPPLY

If the supply of water to the Company for distribution to Users holding Agreements with the Company fails ceases or is diminished in any way then the Company shall make water available to the User only in so far as it is practicable for the Company to do so. In the event of the Company having to reduce supply then the Company shall be entitled to do so in such manner and in such shares and proportions as the Company in its sole discretion may determine. The User shall have no right of action against the Company nor any entitlement for damages or compensation of any nature whatsoever for a failure by the Company to supply water in terms of this agreement or for any reduction by the Company in the quantity or quality of water supplied to the User or in respect of the method of reduction of supply as determined by the Company or the fairness thereof.

17 ALTERATION IN SUPPLY

If the supply of water to the Company or the terms of supply to the Company should in any way be altered or cease the Company shall be entitled without notice to the User to immediately make alterations to the supply to the User or the terms of supply or to cease supply as should be necessary to comply with the alteration or loss of supply to the Company.

18 DELIVERY POINT

(a) The water shall be delivered to the User to a point of supply on the service main outside the property boundary of the Users land or from such point or points as the Company may from time to time determine and through a measuring device to be provided and maintained by the Company. The point of supply shall not be on the User's land unless that User consents. Save as authorised by the Company or otherwise specifically permitted by the Company or this agreement the User shall not alter or interfere with any such measuring device to allow any person to do so nor shall the User take or attempt to take any water from the Company's pipelines otherwise than as delivered by the Company to the User.

(b) If the User should require measuring devices in excess of the number which the Company is prepared to supply then the User shall first obtain the written approval of the Company to the installation of such extra devices (which the Company may arbitrarily refuse) and any such extra devices as may be approved shall be of a type approved by the Company and shall be at the Users sole cost as to purchase, installation and maintenance and the User shall maintain same to a standard acceptable to the Company. Should the User fail to maintain such devices to a standard acceptable to the Company then the Company (after giving reasonable notice to the User to remedy such default) may remove the devices and charge the User the costs of so doing.

19 RIGHT OF ENTRY

Where a User has consented to a point of supply on that User's property, the Company and its employees agents employees contractors and workmen shall have the right at any time and from time to time without being deemed to commit a trespass and without payment of compensation for damages to enter upon the land of the User or the land connected or associated to the User for all or any of the following purposes:

(a) To maintain repair clean or reconstruct pipelines and all other works which the Company deems necessary for the supply of water to the User or for the supply of water to any other User holding an Agreement from the Company.

(b) To gauge or otherwise determine the quantity of water used by the User.

(c) To view the condition of the Company's pipeline works and measuring devices.

20 AVAILABILITY OF ACCESS

Where any pipeline or other structure or devices owned by the Company is situate in or upon any land owned by or connected or associated to the User THEN the User shall ensure that access to any such pipeline or other structure or device owned by the Company and used in the control and management of the water conveyed in the Company's systems is kept available to the Company and to its contractors, employees, agents, workmen and other persons acting for or on behalf of the Company AND in respect of any future development alongside such pipelines structures or devices will ensure that such development does not impede restrict limit or otherwise in any way inhibit or impair that access AND will ensure that no trees are permitted to grow or fences erected adjacent to or in the vicinity of such pipeline, structure or other device so as to cause any blocking or interference with the same or any damage thereto or impede or prevent access thereto or cleaning thereof AND will at the Users cost in all things remove any tree or trees fence or fences determined by the Company as causing or contributing to such impediment or prevention of access or cleaning or blocking interference or damage and will remedy or repair any such immediately and to the Company's satisfaction.

21 BREACH OF AGREEMENT

In the event of the User committing any breach of the terms of this agreement the Company may without payment of any damages or compensation to the User or any other person:

(a) Reduce (by such quantity as the Company may determine) the supply of water to the User either permanently or until such time as such breaches have been made good but without obligation to reduce Company charges for which the User shall remain continue liable to pay in accordance with this agreement; OR

(b) Subject to law, regulation, public policy or third party agreement to the contrary, stop completely the supply of water to the User either permanently or until such time as all breaches have been made good but without obligation to reduce Company charges for which the User shall remain continue liable to pay in accordance with this agreement; OR

(c) Impose upon the User such monetary or other form of penalty as the Company or the directors of the Company shall from time to time decide.

22 TERMINATION

The Company shall be entitled at any time to immediately terminate this agreement if the User ceases to be a shareholder in the Company or ceases, in the opinion of the directors of the Company, to be associated or connected with shares in the capital of the Company sufficient to warrant supply in terms of the Company's constitution, BUT the User shall remain liable for all monies owing to the Company and for any antecedent breach of this Agreement up to the date of termination of this Agreement.

23 THIRD PARTY USERS

The User agrees that the Company shall be entitled to levy all charges to the User, notwithstanding that the User may lend or let the User's property to a guest or tenant from time to time. Although the Company shall be entitled to receive payment and communicate with the person or persons normally resident in the property no such usage or custom or course of dealing shall release the User as owner of the property from liability for the User's obligations under this agreement.

Where a property is leased for a period of at least 5 years, the Company may, at its discretion, agree, on request of the User, with evidence of the lease, and subject to the completion of an agreement with the tenant, to address notices to Tenant instead of the User, but such agreement shall not exonerate the User from any liability either for payment or performance of any other User obligation under this agreement.

24 ASSIGNMENT OF WATER "RIGHT"

The User shall not assign, transfer or otherwise part with possession, mortgage or charge the User's interest in this Agreement without the prior written approval of the Company.

25 GENERAL EXEMPTION

Notwithstanding anything in this agreement, the Company shall use its best endeavours to ensure the supply of water, but shall not be under any obligation to make water available to the User. In the event of the Company being unable to make such supply available to the User, or refusing to make such supply available to the User, then the User shall have no rights of action against the Company for any claims, costs, damages, expenses, or compensation of any nature or kind whatsoever.

26 MISUSE

If an User should knowingly take water from the Company's Scheme at any time when the User is not entitled to take water OR should knowingly continue to take water after a particular period of supply should have ceased THEN the User shall be deemed to be in breach of this Agreement and in addition to each and every other remedy or penalty which the Company may have or chose to impose the Company at its option may in respect of each occasion:

(a) Charge the User a penalty of an amount to be decided by the Company but to not more than such maximum sum as may from time to time be fixed by the Company and unless and until so fixed the maximum sum shall be $1000.00: OR

(b) Where the Company is able to determine the quantity of water so taken then either:

  (i) Charge the same to the User at the appropriate charge for excess water: OR

  (ii) Reduce the Users future water entitlement by a similar quantity so that the total supplied to the User does not exceed his proper entitlement.

27 NEGLECT OR MISUSE OF ASSETS

To the extent that this Agreement imposes on the User any duty responsibility or onus to repair, maintain, keep clear or otherwise in any manner whatsoever attend to or prevent interference, blockage or damage to any pipeline, structure or other device owned by the Company THEN if the User should neglect, refuse, fail or omit to carry out such duty responsibility or onus or if the User should misuse or abuse or damage in any way any property of the Company (whether pipeline, structure, devise or other property) the Company shall be entitled to hold the User as being in breach of this Agreement. If the User should be held to be in breach of this Agreement then in addition to all or any other rights or remedies of the Company provided in this Agreement the Company shall be empowered to make good the effect of the Users neglect, failure, refusal, omission, misuse, abuse or damage (as the case may be) and recover the cost of so doing from the User as liquidated damages or by any other method or methods permitted by this Agreement for recovery of money (whether water supply charges or otherwise) from the User.

28 IRRESPONSIBLE USE OF WATER

Should the User at any time be using water from the Company's scheme irresponsibly (the determination of which shall be in the sole discretion of the Company) the User shall be solely responsible for all costs claims expenses damages charges or other expenses whatsoever resulting from such irresponsible use of water and shall indemnify the Company against all such. Irresponsible use of water shall constitute a fundamental and serious breach of this agreement.

The User acknowledges that water use may be considered by the Company as irresponsible in certain times or seasons or circumstances, while the same use in other times or seasons or circumstances may be permitted.

29 RECOVERY OF MONEY

In addition all methods of recovery of money (whether water supply charges, damages or other whatsoever) by the Company from the User provided in this Agreement the Company shall have and be entitled to exercise all other rights and remedies for recovery of money provided at law. Such rights and remedies, whether provided herein or provided at law, may be exercised by the Company in any order or any number thereof concurrently or consecutively as the Company may decided from time to time and the Company shall not be deemed by electing one or more rights or remedies to have thereby waived any other right or remedy.

30 WAIVER

The Company shall not be deemed to have in any way or to any degree waived all or any of its rights powers or authorities under this Agreement by at any time or from time to time, refusing, failing or neglecting to hold

the User in breach of this Agreement or impose any penalty or other imposition authorised by this Agreement or to take any action authorised by this Agreement.

31 AMENDMENT OF AGREEMENT

The Company may from time to time at any General Meeting of the Company resolve to amend, add to, delete from or replace this Agreement and if the Company shall so resolve then the User will immediately do, sign and execute all such acts, deeds, documents and things as may be necessary or required by the Company to give effect to such resolution. This shall include (but not by way of limitation) the execution of any document amending or replacing this Agreement. Any such amendment, addition, deletion or replacement shall be deemed to come into effect (the effective date) on and from the date of that General Meeting unless the resolution shall specify some other date to be the effective date. The User shall be bound by this Agreement as amended or the replacement Agreement (as the case may be) from the effective date. The Company shall pay the costs of all such alterations or replacements except those costs or expenses in relation thereto which the User may himself incur and this Clause shall not be deemed to authorise or allow the User to incur any costs or expenses of any nature whatsoever and charge the same to the Company.

If for any reason any amendment or replacement agreement is held to be unenforceable, the provisions of the last valid agreement shall not be cancelled by reason of adoption of the later unenforceable provisions.

No resolution adopting an amendment or replacement agreement shall have the effect of surrendering any easement or access rights previously granted to the Company or reducing any part of such rights, which shall be altered or surrendered only be the signing by the Company of a Instrument registrable under the Land Transfer Act.

32 NOTICES

Notices by the Company to a user shall be deemed sufficiently served if posted by ordinary mail, or delivered to the User's property, or if published in a newspaper or newsletter circulating in the Millers Flat township, or if displayed on public notice boards in at least two agreed and customary places in the township.

33 DEFINITIONS

"**applicable property**" means a property within the scheme

"**Grantor**" means a person or company from whose property the water for the scheme is sourced, or over whose property the water is carried pursuant to any agreement with the Company. (see clause 9)

"**scheme**" means the water supply scheme constructed by the Company and all parts assets and constructions thereof and all connections thereto owned operated used or utilised by the Company.

"**Unit**" means a single property as identified by the Directors the owner of which if a water supply from the Company is required to that property would be required to hold one share in the capital of the Company in respect to that property. The Directors may from time to time in their discretion determine what constitutes a unit for the purpose of supply and the definition of same may vary between residential, commercial and industrial uses and within those categories.

"**User**" means a shareholder of the Company who is receiving water supply to a property or properties owned by the shareholder.

WITH INTENTION TO BE LEGALLY BINDNG this document is signed on the date in the Schedule.

SCHEDULE date of agreement 25/11/2022 20....

User (full names of all owners) JACKS RIDGE LTD

Mailing address P.O Box 76 WHITFORD, MANUKAU 2149

~~Millers Flat~~ ~~9544~~ (delete if not applicable)

Phone number 021784675

email ANDREW@HAWKESWOOD.CO.NZ

All users to complete this section

Property

Address (if different from mailing address) 1426A TEVIOT RD

Millers Flat 9544

Legal Description SEC 91 BLK VIII BENHER SD

Valuation number. 28473/19900

Complete if applicable

All users complete from rates notice

EXECUTION

SIGNED for and on behalf of **MILLERS FLAT WATER COMPANY LIMITED**

Director

Director

SIGNED by the **USER** confirming acceptance of terms of previous 10 pages in the presence of

USERS PLEASE SIGN HERE

All owners must sign this section.

Name John Ross

Address 13 Pohutukawa Rd

Occupation Vanilla farmer

WITNESS TO SIGN AND COMPLETE HERE

LEGEND

- Site extent
- Temporary cycle trail diversion
- Existing cycle trail
- Extent of cycle trail temporarily affected by mining

DUST MANAGEMENT PLAN: SENSITIVE RECEPTOR MANAGEMENT ZONES

2753-22 | Hawkeswood Mining Ltd

26/10/2023 SCALE: 1:7,000 @A3

SOURCE: LINZ

TOWNPLANNING GROUP

PO Box 2559
QUEENSTOWN

0800 22 44 70
townplanning.co.nz

Proposed Alluvial Gold Mine
1346 – 1536 Teviot Road, Millers Flat

Landscape Effects Assessment Report

24 October 2023

Prepared by

MIKE MOORE
BSc, Dip LA, MRRP, ANZILA

LANDSCAPE ARCHITECT

Po box 5076, Dunedin

Tel (03)479 0833 . fax (03) 479 0834 . cell 0274 360 163

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Introduction

Hawkeswood Mining Ltd have commissioned a landscape effects assessment of the proposed alluvial gold mining operation at 1346 – 1536 Teviot Road, Millers Flat. The land is currently used for pastoral activities, and land mined will be rehabilitated back to pastoral farmland on completion of the project.

The land is within the Rural Resource Area and partly zoned Rural Residential in the Central Otago District Plan (CODP) and is not within any landscape overlays. The application for mining is a discretionary activity in terms of Rule 4.7.4.

This report addresses the landscape effects of the proposed mining, and will be structured as follows:

- Methodology.
- Site and area description.
- Landscape values.
- The proposed development
- Mitigation and rehabilitation
- Landscape effects assessment.
- Assessment against the relevant Central Otago District Plan provisions; and
- Conclusion.

Methodology

This assessment follows the concepts and principles outlined in the New Zealand Institute of Landscape Architects (NZILA) Best practice guidelines[1], and has been informed by a review of the relevant statutory provisions and a site visit on 5 December 2022.

[1] Te Tangi a te Manu: Aotearoa New Zealand Landscape Assessment Guidelines, Tuia Pito Ora New Zealand Institute of Landscape Architects, July 2022.

Site and area description

As shown in **Figure 1**, the site is located within the Teviot Valley on the true left side of the Clutha River / Mata Au, approximately 1.2 km upstream of Millers Flat township, and between the river and Teviot Road. It is located on river flats and covers an area of variable width, approximately 1.7km long (approximately 70ha in area). Access to the site is from two existing driveways along Teviot Road.

The wider landscape context is the Teviot Valley, defined by schist, largely pastoral hill country to either side. The landscape has a 'working rural' character with settlement and development focused on the Teviot Valley corridor. The township of Millers Flat is approximately 1.2km to the south-east, while the settlement of Ettrick is located approximately 1 km distant across the river to the north-west. The site is bounded by Teviot Road to its north-east, and the Clutha Gold cycle trail along its river side. State Highway 8 lies just across the river.

The site geology is alluvial gravels, and the landform is largely comprised of river flats with some variability arising from natural watercourse channels, as well as human modification. The site is mainly on a low terrace-form some 2 – 6m above the riverside Clutha Gold cycle trail. At the southern end of the site, the willow lined Tima Burn meanders toward the Clutha / Mata Au, and there is a farm irrigation pond located in paddocks. More centrally, there are gravel pits associated with a Council owned dump site. Near the river there are modified landforms relating to historic gold mining sluicing, dredging and tailings. Apart from where the current exploratory quarrying in the central part of the site has resulted in significant landform modification already, the site is mainly under pasture cover and grazed. Areas of previous mining modification are typically covered in exotic tree and scrub species, most notably pine, willow, and hawthorn.

The mining operations are already largely set up for the exploratory mining, and there is currently an approximately 16m deep pit open, along with associated gravel stockpiles of similar height. Grassed bunds are already in place in some areas, or currently being

formed. The screening plant is present on site along with settlement ponds, and a temporary depot area incorporating containers, stored equipment, and parked vehicles has also been created.

Figures 2 - 11 illustrate the character of the site and area.

Landscape values

Landscape and landscape values are defined in the NZILA Landscape Assessment Guidelines[2] as follows:

'Landscape embodies the relationship between people and place: it is the character of an area, how the area is experienced and perceived, and the meanings associated with it'.

Landscape values are '*the reasons a landscape is valued. Values are embodied in certain attributes'.*

The landscape impacted by the proposed mining is river flat which has been significantly modified by previous mining and by agricultural use. It is not recognized as an area of outstanding natural landscape (ONL) or Significant Amenity Landscape (SAL) in the CODP but falls into the category of 'other rural landscapes' as discussed in Section 2.3.1. Whilst not the focus of landscape protection provisions, the CODP nevertheless, seeks '*to maintain and where practicable enhance rural amenity values created by the open space, landscape, natural character and built environment values of the District's rural environment'.*[3] The explanation to Policy 4.4.2 refers to '*the open space and natural character of the rural environment' as* a significant resource for the District.

In my assessment, the characteristics and features that contribute to the landscape quality and amenity values in the area surrounding the site include:

[2] Te Tangi A Te Manu, Aotearoa New Zealand Landscape Assessment Guidelines, Tuia Pito Ora New Zealand Institute of Landscape Architects, July 2022,
[3] CODP Objective 4.3.3.

- Rural character based on openness and generally modest impact of built form / natural landform modification, along with rural land uses, predominantly stock grazing.

- The Clutha River / Mata Au is a significant natural feature with natural character values and which has cultural significance to tangata whenua (including as a mahinga kai trail and important transportation route).

- Legibility of landforms relating historic gold mining practices in the area such as sluicing / tailings in places.

- More broadly, the hills to either side of the valley provide a less built, more natural rural setting to the valley landscape.

Given the impact of the exploratory mining already underway, with stripped vegetation and gravel stockpiles etc., the site itself has now taken on a somewhat industrial character in the area where this work is proceeding.

The proposed development

As shown in **Figure 12** it is proposed to establish an alluvial gold mine including on-site processing and stockpiling of overburden. Landscape impacts of this operation will arise from the following:

- An area of vegetation and land disturbance that includes pre-stripping of vegetation and topsoil, the excavated pit, gravel stockpiles, and areas behind the pit that are being rehabilitated. This ‘disturbance area’ will migrate around the site as mining proceeds and is estimated to be approximately 12 ha in area. Accounting for ancillary activities the total work area will be approximately 27ha in area. The pit depth will vary but is likely to be an average of 16m. Stockpile heights associated with the exploratory mining are currently over 10m in height but will be reduced to a maximum of 7m to reduce visual effects. The disturbed

area will be progressively rehabilitated as mining proceeds by infilling back to approximately previous levels, application of topsoil and re-grassing in pasture.

- A gold recovery test plant with associated ponds as illustrated in **Figure 13.** The location of this will vary as the operation proceeds, however, most of the time it will be located within the pit below ground level.

- A depot area up to 7ha in area will be established, including parking for vehicles, a portacom building (approximately 15 x 4m in footprint and 3m high), and 6 containers (approximately 12.2 x 2.4m in area and 2.6m high). A 6m high container shelter will be installed over two of the containers to form a workshop. This depot area will be centrally located and will need to be relocated at least once over the life of the operation.

- Screening / noise bunds have been or will be established, in the locations shown in Figure 12. These will be approximately 3 - 4m high and grassed and will remain in place as required for the duration of the works.

- Other visual effects will arise from lighting of the processing, depot and active work area in winter months. Lighting levels will comply with the CODP standards for rural areas. As well as lighting, moving vehicles will have visual effects where visible from beyond the site.

The proposed operation will be temporary. A 10-year consent duration is sought, with an anticipated mine life of 5 – 7 years.

Mitigation and rehabilitation

The key mitigation factor is that the proposed operation will be temporary, and that the effects will be for a limited, approximately 5-7-year timeframe. Once completed, the area (including the existing dump area) will be returned to pastureland with virtually no sign that it was mined.

Whilst the site area is large, it will not all be impacted at once, and the proposed progressive rehabilitation to pasture immediately following mining is a key mitigation measure.

The site is on river flats that have previously been modified by gold mining works and are currently farmed. These have relatively low biophysical landscape sensitivity. The site extent has been defined to avoid impacting the Tima Burn – a natural tributary stream to the Clutha River / Mata Au that runs adjacent to the site at its south-east end. Likewise, the site extents have been identified to avoid impacting the margins of the Clutha River / Mata Au and the Clutha Gold cycle trail. Bunds have already been constructed alongside part of the Clutha Gold trail to provide screening and separation.

The depot area will be sited centrally and at distance from Teviot Road and this will assist to reduce its visual impact from the road. To minimise the adverse effects of 'visual clutter' associated with the depot area elements, it is recommended that:

- Grass covered bunding is established along its north-eastern side to provide screening from Teviot Road.

- The containers, portacom and workshop shelter are as far as possible finished in one dark colour with a low light reflectivity value (LRV) to provide unity and minimise their visual prominence where visible from surrounding viewpoints. I note that container shelters can be provided in a green colour and this is recommended.

Temporary bunding (for the life of the operation) is proposed for noise mitigation. Some of this is already in place (alongside the Clutha Gold trail). Approximately 4m high bunding will also be placed between Teviot Road and the area to be mined and this will assist to screen views of the mining works from the road.

The following conditions of consent are recommended to appropriately minimise adverse landscape and visual effects:

(a) All mining and rehabilitation works are to be complete within 10 years.

(b) Grassed earth bunds to 4m high, shall be established to assist with screening of the working area of the mining works from Teviot Road.

(c) Gravel stockpiles shall be no higher than 7m.

(d) Areas where mining is complete shall be reinstated as soon as possible to blend naturally with surrounding contours and shall be established in pasture.

(e) When the mining operation is complete, all buildings, roadways, stockpiles, plant and mitigation bunds shall be removed, and the area rehabilitated to pasture to blend with surrounding areas. This final rehabilitation is to be completed within the 10-year timeframe.

(f) All works shall be set back a minimum of 20m from the banks of the Tima Burn.

(g) All containers and buildings on the site are to be finished in the same colour, which shall be Resene Iron Sand (LRV – 9%). The container shelter fabric shall be a dark green colour to blend as far as possible with the containers. Grassed bunding to minimum 3m height shall be established and maintained along the Teviot Road side of the depot area and for the duration of the works.

Landscape effects assessment

Landscape effects are defined as follows:
'An adverse or positive outcome for a landscape value as a consequence of changes to a landscape's physical attributes.[4]

Landscape effects are assessed against the landscape values and the relevant statutory provisions. They may be positive or adverse in nature and I rate the degree of effect in terms of the 7-point rating scale shown in the following table. The table also illustrates

[4] Te Tangi A Te Manu, Aotearoa New Zealand Landscape Assessment Guidelines, Tuia Pito Ora New Zealand Institute of Landscape Architects, July 2022,

the relationship of this scale to RMA terminology as outlined in the Landscape Assessment Guidelines.

Degree of effect assessment scale

Very low	*Low*	*Low-mod*	*Moderate*	*Mod-high*	*High*	*Very high*
Less than minor		*Minor*	*More than minor*		*Significant*	

Viewpoints assessment

The proposed mining will be visible to varying extents from public areas and private properties in the area surrounding. This assessment is limited to consideration of public viewpoints, and the key public viewpoints impacted are Teviot Road, State Highway 8, Oven Hill Road and the Clutha Gold trail. Effects from private property viewpoints in the wider area may be generally similar to those described from the nearby public roads but could also differ considerably, depending on the level of vegetative screening in place. It is anticipated that additional assessment from specific private property viewpoints, where requested, can be undertaken at a later stage.

Figure 1 shows the viewpoint locations discussed.

Teviot Road (see Figures 2 - 5.)

Relevance of viewpoint	Teviot Road is a major local road. Impacted viewers will be road users with effects being experienced as transient whilst they pass by. The effects of the works from this viewpoint however, will be indicative to some extent, of those from viewpoints on properties to the east and north-east side of the site.
Existing views description	Currently, the site forms the largely open farmland foreground of views from the road to the south-west. The Clutha River / Mata Au is not visible, but its presence is marked by the willow trees in the middle distance. Rural amenity values associated with pasture and coherent

	natural landform are already compromised by weedy areas of existing landform disturbance associated with the dump site and previous mining, and in particular, by the gravel piles and machinery and containers etc, associated with the exploratory works.
Description of visual effects	The site is adjacent to and visible from, an approximately 1.9km stretch of Teviot Road. Depending on where the working area is located at the time, grass covered bunding 4m high, will largely screen the mining operation from view. The bunds themselves will have an adverse impact on rural openness for road users however. The bunds are unlikely to screen views of the operation at all times and from all places on Teviot Road and where visible, the most prominent elements will be gravel stockpiles and possibly working machinery and trucks depending on the viewing angle from the road. Visual effects associated with the depot area will be effectively mitigated by the proposed central location, the proposed bunding, and colour of the structures. Visual effects will be adverse in nature due to a change from a pastoral rural character to a semi-industrial character including reduced openness and naturalness. The degree of adverse effect is likely to vary over the life of the project depending on the proximity of the working area to the road at the time. Overall however, I rate the effects as adverse / high. Following rehabilitation, the site will return to an open, pastoral rural character with similar landform to that existing presently. This will be minus some of the existing tree cover but, in my assessment, given that these are common exotic species (largely pine) their loss may enhance landform legibility and landscape quality. Long term I rate the visual effects as neutral - positive / low

State Highway 8 (see Figure 6)

Relevance of viewpoint	State Highway 8 is the major highway / public thoroughfare in the area. Impacted viewers will be road users with effects being experienced as transient whilst they pass by. The effects of the works from this viewpoint however, will be indicative to some extent, of those from viewpoints on properties adjacent to the highway.
Existing views description	The site is across the river from the highway and significantly screened from view by the riverside trees. This screening will be less complete in winter months as the trees are mainly deciduous. In a few places there are glimpses through the trees to the site and the present stockpiles etc, associated with the exploratory works.
Description of visual effects	Given the screening provided by the riverside trees, only fleeting glimpses of the activity are possible, although I note that this screening will be reduced to an extent in winter months when the trees lose their leaves. The visual effects of the proposed activity will be effectively mitigated from the highway by the trees and are likely to be fairly similar to those existing already associated with the exploratory mining. Overall, I rate the effects as adverse / moderate-low. Following rehabilitation, there will be no residual effects of any note and I rate the long-term visual effects as neutral.

Oven Hill Road (see Figure 7)

Relevance of viewpoint	Oven Hill Road is a relatively minor rural road. Effects from here however, give some indication as to the effects characteristic from higher viewpoints (road users and private properties).
Existing views description	The site is visible in oblique aerial views over the Teviot Valley and the landscape pattern of more developed / settled valley floor contained by more natural hill slopes is evident. The farmland of the site contributes to the general rural character of the valley. The existing disturbance associated with the exploratory works reads as a semi-industrial site and detracts from rural amenity.

Description of visual effects	From this higher oblique viewpoint, the full extent of the 'disturbance area' along with that of the depot and processing plant area will be evident. These will be of greater scale than the area which is currently impacted by the exploratory mining works (and visible in Figure 7). This adversely affects rural character, but its impact is reduced by the substantial viewing distance (approximately 2.3km). Overall, I rate effects of the operational phase of the project as adverse / moderate. Following rehabilitation, rural character values will be fully restored, and visual effects will be neutral – positive / very low.

Clutha Gold Trail (see Figures 8 - 11.)

Relevance of viewpoint	The Clutha Gold Trail is an important recreational route in this part of the District. Viewers will be trail users with effects experienced as transient.
Existing views description	Where the trail follows the riverbank the landscape has an enclosed character, confined by the riverside trees and the low terrace face. The river can be seen and in places there are old tailings features. There are a few places where the current exploratory works are visible in the form of recently created bunds and / or glimpses of gravel stockpiles or machinery. From the section of the trail that crosses from the river to Teviot Road through the site, open farmland and the old weed infested dredged channel associated with historic mining is visible. The disturbance associated with the exploratory works is also very evident.
Description of visual effects	The mining will be at least partially screened from view from the trail by the combination of the low terrace face and the existing or proposed bunding. It is likely that there will some visibility of gravel stockpiles and machinery as there is currently (of the exploratory works) and that trail users will be aware of the mining activity to an extent due to noise effects.

	The mining will necessitate the temporary relocation of the trail from the riverside to Teviot Road, and effects from this part of the track will most likely allow for close – medium range views of the mining activity. Given that track users are transient, they may find views of the activity of some interest. Mitigation bunding can be placed to provide separation and screening from the track in this area however. The mining will adversely affect the rural character values from the track whilst operational, most significantly from the part of the track leading from the riverside to Teviot Road. The degree of adverse effect is likely to vary over the life of the project depending on the proximity of the working area to the trail at the time. Overall however, I rate the effects as adverse / moderate. Following rehabilitation, rural character will be reinstated, and the legacy effects will be neutral – positive / very low.

Landscape effects discussion and conclusion

The site is not in an area of significant landscape quality and its sensitivity to mining is lowered to the extent that it has already been subject to quarrying and mining activities. On the other hand, the location of the site close to a main road (Teviot Road) and the Clutha Gold trail increases its sensitivity to visual amenity impacts compared with a more remote site.

The proposed mining works will have a semi-industrial character and will impact the rural character of the site in terms of its openness and naturalness. The mitigation measures proposed will limit these impacts to a small extent, and the timeframe of the operation involved is relatively short. Additionally, for people aware of the history in this area, the proposed mining will represent the latest of a series of gold mining operations that may be considered interesting and part of the local character. I consider that this may excuse to an extent, the temporary disruption to the pastoral rural landscape character for some viewers. The long term / legacy effects will be a return to pastoral farmland with the existing dump site also tidied up.

Overall, I rate the landscape effects of the activity from areas in closer proximity (i.e. Teviot Road and the Clutha Gold Trail) as adverse / moderate (more than minor) – adverse / high (significant) for the operational period. From more distant viewpoints such as Oven Hill Road, or where there is effective screening (State Highway 8) effects will be adverse / moderate-low (minor) – adverse / moderate (more than minor). The long-term effects following mitigation will be nil or positive in my assessment.

Assessment against the relevant Central Otago District Plan provisions

The CODP provisions considered relevant to the landscape effects of the proposed activity are outlined below, along with brief comment.

CODP objectives and policies considered relevant to these matters	**Comment**
4.3.3 Objective – Landscape and Amenity Values *To maintain and where practicable enhance rural amenity values created by the open space, landscape, natural character and built environment values of the District's rural environment, and to maintain the open natural character of the hills and ranges.*	The proposed mining impacts an area of working rural landscape on the Teviot Valley floor and will not affect the open natural character of the hills and ranges. The proposed mitigation measures will limit the scale of impacts to some extent. Whilst the mining is operational, I have assessed its effects on the valley landscape – in particular on openness, naturalness and rural amenity, as up to adverse / high (significant) from closer viewpoints and adverse / moderate (more than minor) – adverse / low-moderate (minor) from more distant or well screened viewpoints. Following rehabilitation, rural amenity values will be entirely restored and possibly enhanced.
4.4.2 Policy – Landscape and Amenity Values	The proposed mining is located in response to

To manage the effects of land use activities and subdivision to ensure that adverse effects on the open space, landscape, natural character and amenity values of the rural environment are avoided, remedied or mitigated through: *(a) The design and location of structures and works, particularly in respect of the open natural character of hills and ranges, skylines, prominent places and natural features,* *(b) Development which is compatible with the surrounding environment including the amenity values of adjoining properties, …* *(e) The location of tree planting, particularly in respect of landscape values, natural features and ecological values, …* *(g) Encouraging the location and design of buildings to maintain the open natural character of hills and ranges without compromising the landscape and amenity values of prominent hillsides and terraces. ….*	the resource location and necessarily involves medium term disruption to rural amenity values including qualities of openness and naturalness. The works however are located within an already significantly modified valley floor setting and do not impact the more sensitive terraces, hills and ranges. Mitigation measures are proposed to minimise adverse effects to the extent practicable. A key factor is the modest duration of the operation. Following rehabilitation there will be no residual adverse landscape effects and the result in terms of visual amenity will be neutral – positive / low (minor) in my assessment.
4.4.8 <u>Policy - Adverse Effects on the Amenity Values of Neighbouring Properties.</u> *To ensure that the effects associated with some activities including (but not limited to): (a) Noise (including noise associated with traffic generation, night time operations), and vibration, (b) The generation of a high level of traffic, in particular heavy vehicles, (c) Glare, particularly from building finish, (d) A*	My assessment has been restricted to addressing the effects of the activity from public viewpoints and has not addressed effects from specific private properties within the visual catchment surrounding. Where visible, the effect of the bunds, stockpiles and machinery associated with the mining, on the visual amenity of residents in the area is likely to be adverse with the degree of effect dependent on the level of screening and

reduction in visual amenity due to excessive signage and the storage of goods or waste products on the site, (e) The generation of odour, dusts, wastes and hazardous substances, and (f) The use and/or storage of hazardous goods or substances do not significantly adversely affect the amenity values and privacy of neighbouring properties or the safe and efficient operation of the roading network.	viewing distance. Effects of the operation will be for a limited duration, with rural amenity values completely restored following rehabilitation.
4.3.6 Objective - Margins of Water bodies *To preserve the natural character of the District's water bodies and their margins.*	The mining operation will avoid the margins of the Clutha River / Mata Au and Tima Burn with setbacks from the Clutha Gold Trail and Tima Burn observed. More widely, natural character along the margins of these waterways and in the landscape generally is significantly modified by various combinations of previous mining activity, rural land use and the presence of exotic vegetation, and natural character sensitivity is modest.

Conclusion

The site is not within an area with landscape values of particularly recognized significance, but the maintenance / enhancement of rural amenity values is an objective of the CODP. The site is already modified by historic mining and by rural land use activities but is near Teviot Road and the Clutha Gold trail, giving it moderate sensitivity to mining in terms of landscape / visual effects in my assessment.

The mining activity will migrate around the site and rehabilitation back to pastoral farmland will be progressively undertaken as mining proceeds. Mitigation measures

include the progressive rehabilitation, establishment of screening bunds, setbacks from the Tima Burn and the Clutha Gold Trail, and colour controls over permanent (for the life of the project) built elements.

The project will entail a change of character on the site from rural / pastoral to semi-industrial but the proposed mitigation measures will limit the scale and impact of this to some extent. Overall, I assess the effects on rural amenity values whilst mining is operational, as up to adverse / high (significant). A key mitigating factor is the fact that the operation and associated effects will be temporary and of modest term - limited to 10 years duration. The long term / legacy effects on rural character and amenity will be nil or positive. I consider that there is inconsistency with the CODP provisions relating to maintenance of rural amenity in the short term but that this will be for limited time, and will be entirely remedied.

Mike Moore
Registered NZILA Landscape Architect

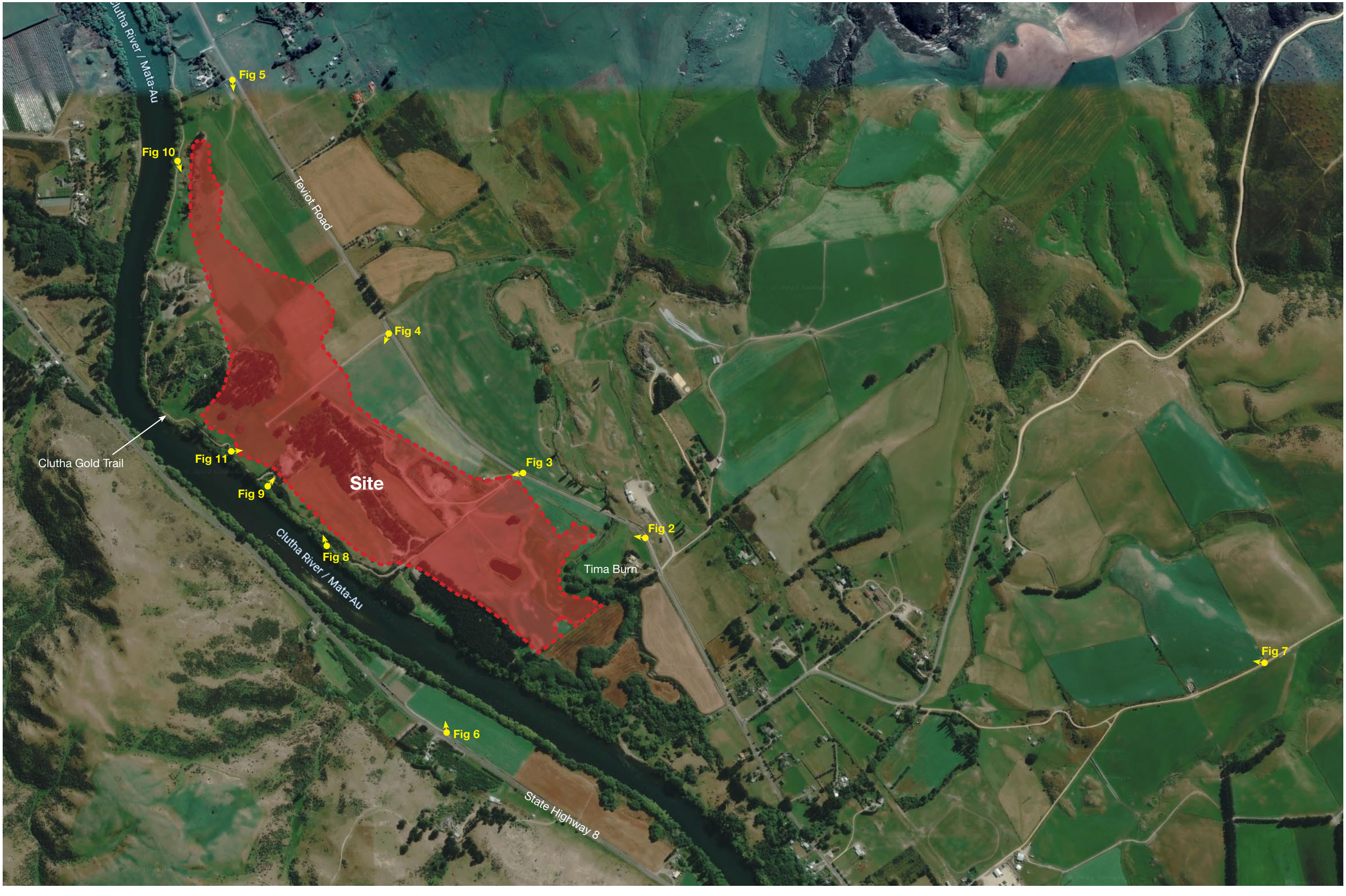

Figure 1: Location and photo-points plan

Figure 2: View across the site from near its southern end on Teviot Road.

Figure 3: View across the site from near the Clutha Gold Trail access point on Teviot Road.

Figure 4: View across the site from near its northern entrance on Teviot Road

Figure 5: View across the site from near its northern end on Teviot Road

Figure 6: View toward the site from State Highway 8

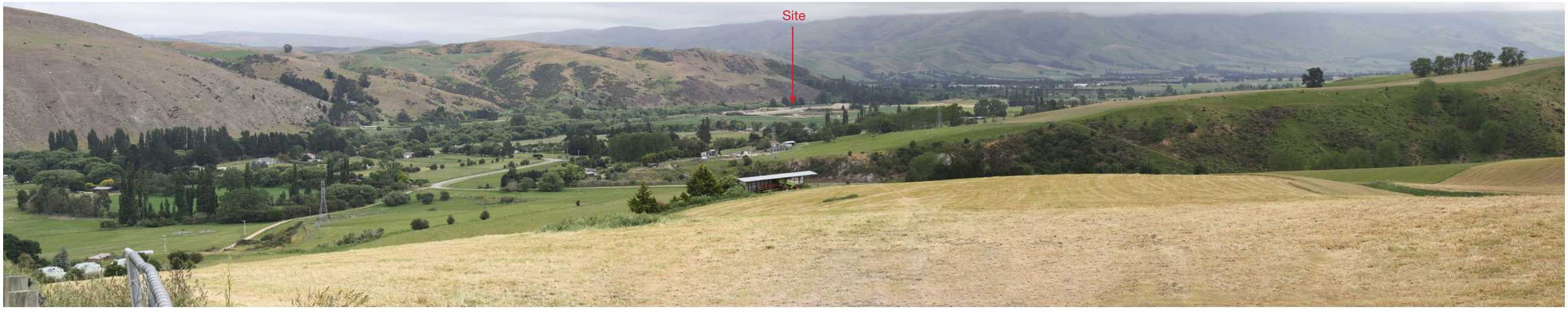

Figure 7: View toward the site from Oven Hill Road

Figure 8: View toward the site from the Clutha Gold Trail

Figure 9: View toward the site from the Clutha Gold Trail

Figure 10: View toward the site from the Clutha Gold Trail

Figure 11: View toward the site from the Clutha Gold Trail

Key

- Proposed noise / visual screening bunding (location indicative only)
- Existing bunding (indicative location shown)
- Depot area
- Mining extent

Direction of Mining
Generally North to South

Indicative 2 Ha
'disturbance area' shown

Tima Burn
(with setback shown)

Stockpile

Earth Bund

Site Entrance

Power Line

Teviot Road

Clutha River / Mata Au

Clutha Gold Trail

Figure 12: Proposed Mining Site Plan

Scale 1 : 5000 (A3)

Figure 13: The processing plant already present on the site for the exploratory works.

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Office 5, 17 Banks Ave, Mount Maunganui / W: airmatters.co.nz

12/10/2023

To: Sam Kealey | Senior Planner
From: Nigel Goodhue | Environmental Scientist
File Ref: J23162
Subject: Dust Management Plan – Peer Review – Hawkeswood Mining Limited, Teviot.

Introduction

Hawkeswood Mining Limited (the applicant) has applied to the Central Otago District Council (the Council) for a land use consent to construct and operate a gold alluvial mining operation on the banks of the Clutha River / Mata-Au in Teviot, Central Otago.

As part of the application a Dust Management Plan (DMP) was submitted that outlined the potential sources of dust, the controls to minimise the dust, methods to monitor the dust, and complaints procedures and responsibilities under the DMP. Pattle Delamore Partners assessed the DMP in a technical capacity and requested further information to understand the potential effects. In response, the DMP was updated (24 April 2023) and provided to Council. A further technical review was completed by Pattle Delamore Partners of the updated DMP and comments provided back to the Council's processing officer. The Council Officer's Section 95 Report notes that '*[in regards to dust] … without further evidence to the contrary, there are reasonably likely to be more than minor effects on the public users of the cycle trail and that the proposal will impact on the rural amenity values presently experienced in the receiving environment*'.

On this basis Air Matters was engaged by the applicant to peer review the DMP.

Review Scope

On the 12 September 2023 the applicant provided an updated mining plan ('*Mining Methodology by Hawkeswood Resources*'). The proposed update will result in working areas nearer to the north-eastern boundary (adjacent to the Clutha River / Mata-Au) and on the eastern boundary adjacent to Teviot Road. The active work area also increases from ~2ha to >20ha (active areas + temporary stockpiles) at any one time. These changes and the updated controls which include an increase in dust suppression, should be reflected in the DMP. Despite the change to the scale in the activity, the principals in the DMP and the recommendations in this review are still considered appropriate.

The updated methodology results in the activity exceeding the permitted activity provisions of the Otago Regional Council's *Regional Plan: Air for Otago*. Consequently, an air discharge permit will now be required from ORC.

It is acknowledged that the PDP technical assessment and the Council Officer's Section 95 Report raised concerns with regard to the potential health effects relating to fine particulate matter (PM_{10}) discharges from the activity. It is expected that a full assessment of effects relating to PM_{10} will be undertaken as part of the application to ORC. On this basis the DMP (and this peer review) focusses on employing best practise to control general effects of dust. For the purpose of supporting the Land Use Consent application this peer review has assessed:

- Description of the dust generating activities;
- The effectiveness of the proposed controls and monitoring methods;
- Alignment of the DMP with the Ministry for the Environment's (2016) good practice guide for managing dust and any other relevant dust management guidelines;

Reviewed Documents

- *Hawkeswood Mining Limited: Dust Management Plan Millers Flat Gold Mine* (9 February 2023); Town Planning Group.
- *Hawkeswood Mining Limited: Dust Management Plan Millers Flat Gold Mine* (24 April 2023); Town Planning Group.
- *Technical Review – RC220350 – Hawkeswood Mining Limited – Air Quality Assessment* (19 May 2023); Pattle Delamore Partners Limited.
- *Application for Resource Consent to the Central Otago District Council: Hawkeswood Mining Limited. Land use consent to establish and operate a gold mining activity at 1346-1536 Teviot Road, Millers Flat* (12 October 2022). Town Planning Group.
- *Response to further information request RMA/2022/220350 – Teviot Road, Roxburgh* (10 February 2023). Town Planning Group.
- *Response to second further information request RMA/2022/220350 – Teviot Road, Roxburgh* (4 May *2023).* Town Planning Group.
- *Test report – particle size analysis prepared for Hawkeswood Mining Limited* (29 March 2023); Central Testing Services.
- *Map illustrating neighbouring properties that have supplied written approval.* Ref: 2753-22 (27 June 2023); Town Planning Group.
- *Hawkeswood Mining Limited:* Mining Methodology. Undated. Supplied to Air Matters on 12 September 2023.

Review and Discussion

The DMP provides a sufficient description of the proposed activity and the areas that have the potential to generate dust. Controls to avoid and minimise dust are well described and generally in accordance with best practices and include limiting open working areas and progressive restoration; using a suitable water cart for dampening down working areas and stockpiles when required; monitoring weather conditions and ceasing operations during high wind and dry conditions; limiting vehicle speeds on site; using covered trucks to transport material and retaining existing wind breaks on the boundary of the site. Proposed monitoring to ensure that the prescribed controls are adequate include: visual monitoring of dust generating activities; checking weather forecasts for windy/dry conditions and operating four dust deposition gauges at the boundary of the site.

The site is within a rural environment with a number of residential and lifestyle properties surrounding the site. In accordance with Victoria Environmental Protection Agency's (2022) separation distance guideline, properties located more than 250m away are not likely to be adversely affected by deposited material if best practice controls are implemented.

There is a property on the northern boundary (1334 Teviot Road) and, based on the revised mining area, potentially other properties to the south-east that are within 250m of the work site. The prevailing wind directions and strengths (as provided in the resource consent application) are north-west and south-east which aligns with these neighbour's location. Based on the limited separation distances and meteorological conditions there is an increased risk of adverse effects on these properties.

The DMP does not address the potential effects on property within close (250m) proximity of the work site and it is recommended that this specific risk and controls are identified in the DMP. Recommended controls could include limiting mining operations to the winter (wetter) months or creating a specific 'management zone' for these areas. Management in these areas could include lowering the wind threshold for works, additional watering requirements and reduced stock pile heights.

Other neighbouring properties (that have not provided written approval) that are beyond 250m and not within a predominant wind direction are unlikely to experience adverse effects provided the described controls are implemented.

The Otago Rail Trail - cycle trail runs adjacent to the proposed site. Users of the trail will be transient and effects will be limited to nuisance and amenity effects. If implemented correctly, the proposed controls will ensure the effects on any cycle user are maintained to a practical minimum. Actively monitoring the effectiveness of the controls (refer to 'boundary dust monitoring' below) will assist in continuing to minimise the effects on the cycle trail.

It is also noted that the applicant is currently operating a centrally located test pit which employs the key controls identified in the DMP including watering with a cart. The applicant is not aware of any dust related complaints relating to their operation, from neighbours or users of the cycle trail.

Wind speed threshold for ceasing work

The MfE (2016) Good Practice Guide recommends a stop work threshold for wind speeds above 10 m/s. This value was determined from measurements correlated to elevated dust levels (for example Watson, 2000). This derived value is based on wind measurements at a 10-meter elevation. Due to 'wind-share' affects, wind speeds at ground level will be less than this.

Consequently, it is important to locate the wind sensor at an appropriate height taking into account the terrain, bund height and locations of working areas. Wind speed threshold should then also be based on these factors. It is recommended that the wind sensor is located at a height that is reflective of the onsite stockpile heights. Based on this, a threshold of greater than 10 m/s may be acceptable and should be adapted using visual observations and the boundary dust monitoring described below.

Boundary dust monitoring

The applicant proposes to use dust deposition gauges changed out on a 30-day rotation. This is an acceptable method for demonstrating that the controls for deposited dust are adequate over a longer timeframe. However, as noted in the technical review this method does not allow a real-time understanding of the effectiveness of controls and does not relate to fine particulate matter and health effects.

On this basis Air Matters recommends that a minimum of two real-time dust monitors are deployed on the site boundary to measure the concentrations of fine particulate matter (PM_{10}). The purpose of the monitoring would be to demonstrate the controls are adequate and allow for adaptive management if necessary. A threshold of 150 $\mu g/m^3$ is appropriate (as described in MfE (2016) for this activity and if exceeded an appropriate procedure investigating the cause and reviewing controls should be included in the DMP.

The Peer Review notes that the '[addition of real time monitoring] would add significant value to supporting the application considering the lack of detail provided on the assessment of affects. Air Matters agree with this statement.

Conclusion and Recommendations

Overall, the DMP provides a sufficient description of the proposed activity and the areas that have the potential to generate dust. Controls to avoid and minimise dust are well described and generally in line with best practices. To minimise the potential effects the following changes to the DMP are recommended:

1) Addition of a specific management zone(s) to reflect any limited separation distance to sensitive receptors. The management techniques should limit work to winter periods (if practical) or specific controls put in place i.e. lower wind speed threshold and more frequent dust suppression;

2) The wind anemometer should be located at a height of between 4-8 meters. A cut off threshold greater than 10 m/s may be appropriate and if employed should be adaptively managed using visual observations and real-time monitoring (Recommendation 3);

3) A minimum of two particulate monitors, capable of indicating TSP / PM_{10} levels, should be deployed at appropriate locations on the boundary of the site. The purpose of the monitors is to validate the effectiveness of the onsite controls. As far as practical they should be located downwind of the working area and between the work site and any sensitive receptors. The monitoring should be in real-time and alert the site's management team when fine dust levels exceed the values set in the MfE (2016) Good Practise Guide. An investigation of the cause, and review of controls if required, should be undertaken and this process should be documented in the DPM.

4) Including standardised forms as an appendix in the DMP including a complaints investigation form; form for recording the daily and weekly dust monitoring plan observations and a real-time dust level exceedance investigation form.

Subject to the implementation of the above recommendations into the DMP the effects of dust emissions from the project beyond the site boundary will be acceptable and the actual and potential effects considered less than minor.

Limitations

This Peer Review has been specifically prepared for the purpose of evaluating the existing DMP and relies on information provided by the applicant and their consultants. Air Matters has not undertaken a visit to the site. The Peer Review makes a number of recommendations with the intention of ensuring adverse effects are avoided and minimised to an acceptable level by employing best practise.

Nigel Goodhue

Environmental Scientist

References

Watson J, Chow J, Pace T (2000) Fugitive Dust Emissions. The Air Pollution Manual − Second Edition. Air and Waste Management Association.

Ministry for the Environment (2016). Good Practice Guide for Assessing and Managing Dust. Wellington.

Environment Protection Agency Victoria − Separation Distance Guideline Proposed Update (2022); based on '*Mine for other minerals'*.

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11 November 2022

Barry MacDonell
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Dear Barry

PROPOSED ALLUVIAL MINING, MILLERS FLAT

Thank you for a copy of the request for further information from the Central Otago District Council with respect to the effects of vibration. Council has requested:

> *No assessment is provided with the application that specifically addresses the potential effects of vibration on adjoining properties. Please provide further information addressing potential adverse effects associated with vibration.*

There are no rules in the Central Otago District Plan with respect to vibration. However, Section 17 of the Resource Management Act states:

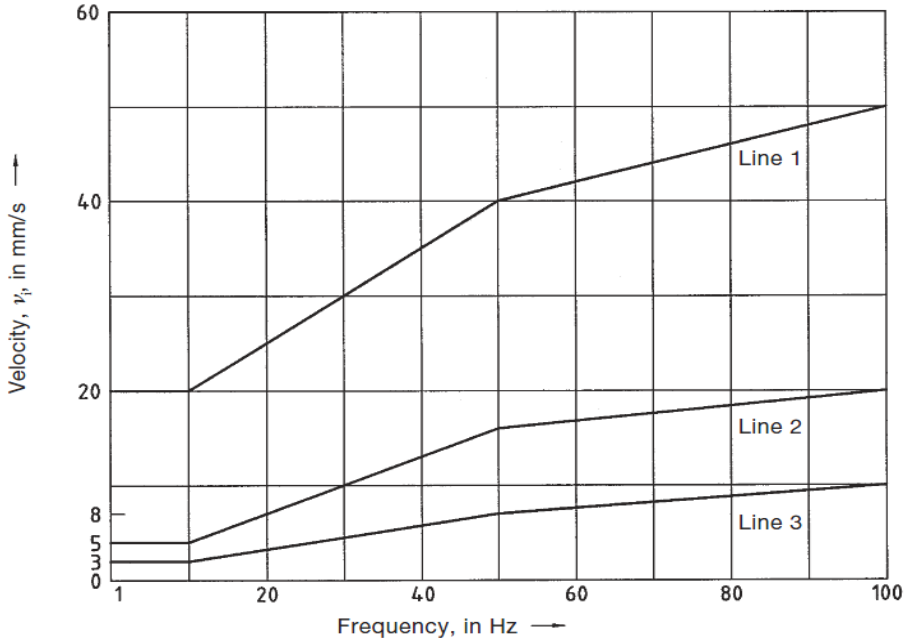
> *Duty to avoid, remedy, or mitigate adverse effects*
>
> *(1) Every person has a duty to avoid, remedy, or mitigate any adverse effect on the environment arising from an activity carried out by or on behalf of that person, whether or not the activity is in accordance with a rule in a plan, a resource consent ...*

The German Industrial Standard DIN 4150-3 (1999) provides vibration levels that are considered reasonable for the evaluation of short-term structural vibration, such as the construction of the proposed bund:

Table 1. Guideline values for vibration velocity to be used when evaluating the effects of short-term vibration on structures

Type of structure	Guideline values for velocity, v_i, in mm/s			
	Vibration at the foundation at a frequency of			Vibration at horizontal plane of highest floor at all frequencies
	1Hz to 10Hz	10Hz to 50Hz	50Hz to 100Hz*	
1 Buildings used for commercial purposes, industrial buildings, and buildings of similar design	20	20 to 40	40 to 50	40
2 Dwellings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20	15
3 NA				
*) At frequencies above 100 Hz, the values given in this column may be used as minimum values.				

Guideline values for vibration velocity to be used when evaluating the effects of short-term vibration on structures



Curves for guideline values specified in Table 1 for velocities measured at the foundation

The Standard requires measurements to be conducted in the x, y and z directions on the ground floor of the building to be investigated, either at the foundation of the outer wall, on the outer wall itself, or in a recess in that wall. In buildings without a basement, the point of measurement shall be no more than 0.5m above the ground. Measurement points shall preferably be on the side of the structure that faces the source of excitation. The time history of the vertical vibration (z-axis) and horizontal vibration (x- and y-axes, at right angles to each other) shall be recorded, with one of the directions of measurement running parallel to a side wall of the building.

To evaluate the effects of long-term vibration DIN 4150-3 recommends the following limits:

Table 3. Guideline values for vibration velocity to be used when evaluating the effects of long-term vibration on structures

Type of structure	Guideline values for velocity, υ_i, in mm/s, of vibration in horizontal plane of highest floor, at all frequencies
1 Buildings used for commercial purposes, industrial buildings, and buildings of similar design	10
2 Dwellings and buildings of similar design and/or occupancy	5
3 NA	

During the bund construction the only source of vibration will be trucks, an excavator and a bulldozer spreading and track compacting the proposed bund. The maximum vibration would be generated by the bulldozer, which could come within 35m of the closest dwelling (1334 Teviot Road), which is to the north of the mining area. The vibration effects at 35m have been calculated as shown in Figure 1 below and will be minimal for anyone at this dwelling. As all other locations of potential effect are further away there will be even less vibration effects at those sites.

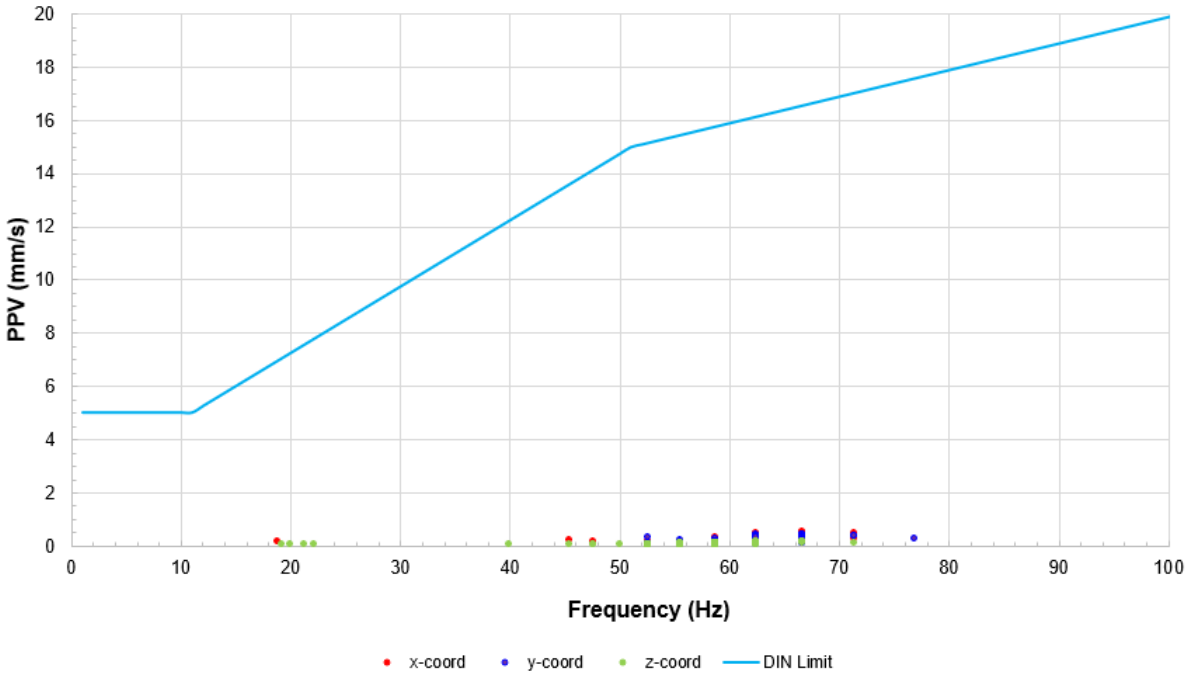


Figure 1. Predicted vibration levels from bulldozer, mm/s

The mining recovery plant will initially land based transitioning to a floating dredge in the pond as the mining progresses. When the recovery plant is land based the potential vibration sources include the bulldozer, excavator, trucks and recovery plant.

There will be minimal vibration generated by the recovery dredge and, as for the construction of the bund and assuming the haul roads are reasonably well maintained, the greatest vibration effects will be from the bulldozer. The closest any land-based mining will come to the dwellings is just over 50m from the 1334 Teviot Road to the north of the mine as set out above. The vibration to this dwelling is predicted to be up to 0.39mm/s, well within the recommended 5mm/s limit set out in DIN 4150-3.

With the dredge operating on the pond the vibration effects will still be controlled by the bulldozer operating on the ground surface of the mine area. As the bulldozer will never be closer to any other dwelling than the 50m adopted in the above predictions the vibration level will be below 0.39mm/s at all times.

Based on the above, the vibration levels from the proposed mining work will be well within a reasonable level at all times.

Should you have any questions regarding the above please do not hesitate to contact me.

Yours faithfully
Hegley Acoustic Consultants

Nevil Hegley

Millers Flat Gold Mine

Transport Assessment Report

Prepared for	Hawkeswood Mining Ltd
Job Number	HWML-J001
Revision	C
Issue Date	25 October 2023
Prepared by	Logan Copland, Senior Transportation Planner
Reviewed by	Dave Smith, Technical Director, Transportation Planning

1. Introduction

Abley Ltd (Abley) was engaged by Hawkeswood Mining Ltd (the applicant) to provide a transport assessment to support a land use consent application which seeks to establish and operate an alluvial gold mining operation at 1344-1536 Teviot Road, Millers Flat, for a duration of 10 years. It is understood that the proposal is a discretionary activity, given the number of staff expected onsite is greater than three (which is the permitted baseline).

2. Site Description

The site is located across 1344-1536 Teviot Road, Millers Flat. The site has frontage to Teviot Road along its north-eastern boundary. The Clutha River runs past the site to the west and south-west. An excerpt from the resource consent application (prepared by Town Planning Group) is included as Figure 2.1, which shows the extent of the site. Millers Flat township is approximately a 1-3 minute drive in a south-eastern direction.

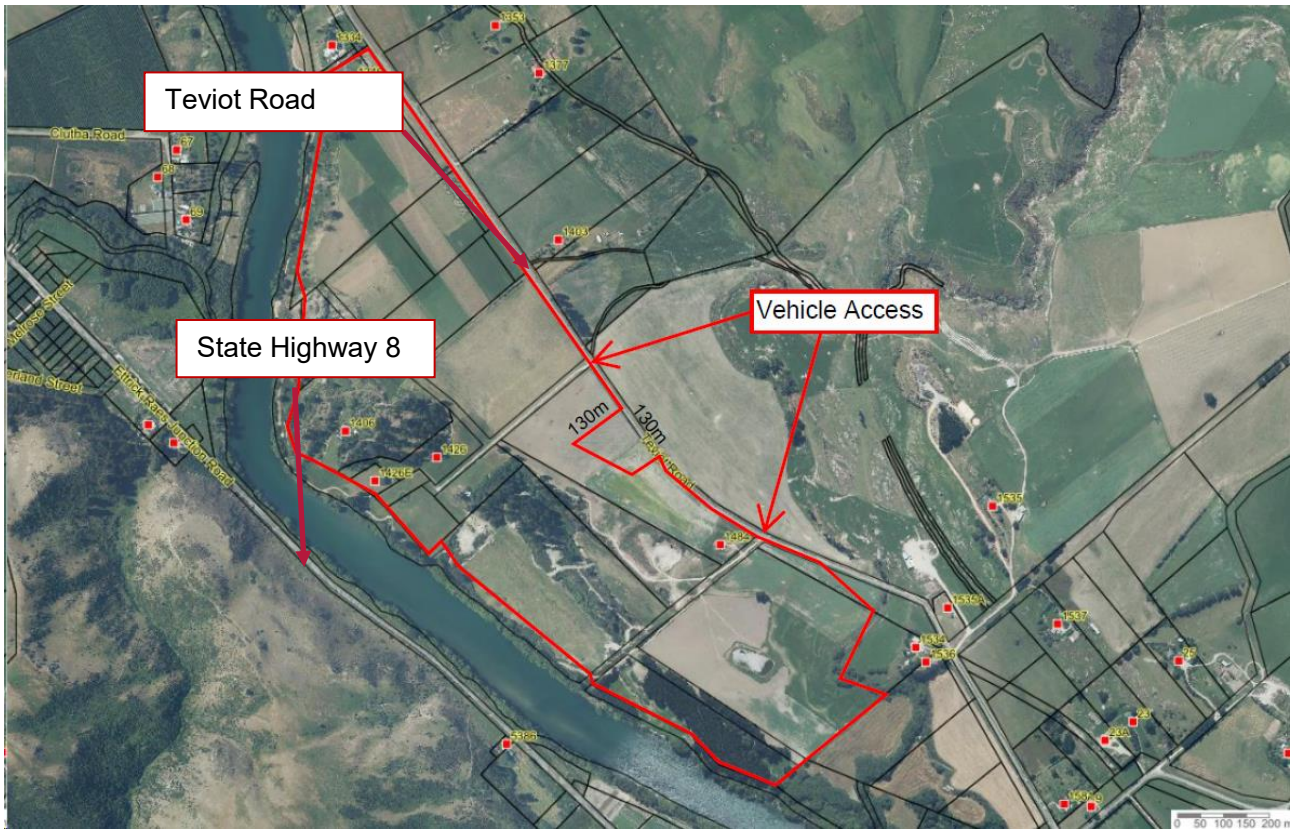


Figure 2.1 Site Location (Source: Town Planning Group)

It is understood that the majority of the site is currently used for pastoral farming activities. It is also understood that part of the site is used for green-waste tipping, and that Council owns that part of the site. The tipping is understood to be authorised but not managed by the Council. The tipping area is currently accessed via the south-eastern most vehicle access. It is understood from the site manager that the tipping activity will cease and will not run concurrently with the proposed mine.

Vehicle access to the site is currently via two vehicle accesses as identified in Figure 2.1. These accesses are currently unsealed. The southern access is an unnamed paper road and as such the land is administered by CODC. The formation within that land provides access to the tipping area discussed above. This is also the location where the Clutha Gold Cycle Trail links from the Clutha River across Teviot Road. This is shown in Figure 2.2

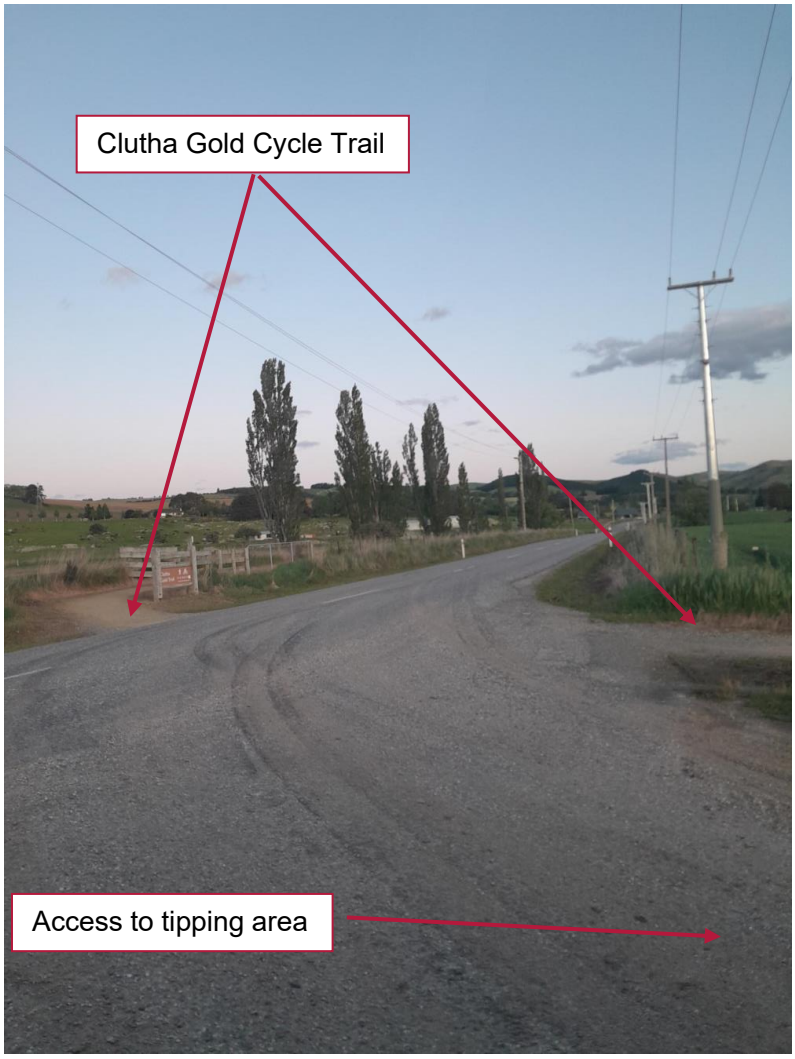


Figure 2.2 Photograph showing current Clutha Gold Cycle Trail Crossing

There are no dedicated crossing facilities for cyclists to cross Teviot Road in this location, although the available sight distances are good and crossing in this location is understood to operate safely.

3. Surrounding Transport Network

The site has frontage to Teviot Road. Teviot Road connects to State Highway 8 in two locations, via Jedburgh Street at the north and Millers Flat Bridge Road to the south (both of which cross the Clutha River). It is approximately 17km in length running along the eastern side of the Clutha River, whereas State Highway 8 runs parallel to the river on the western side and provides a secondary roading connection between Millers Flat and Roxburgh township. See Figure 3.1.

Figure 3.1 Teviot Road. (Source: Google Maps)

3.1 Cross Section

Teviot Road is a two-way / two-lane road with a chip-seal surface and a dashed centreline. The carriageway is typically between 6.0m-7.0m wide with narrow unsealed shoulders. There are shallow swale drains either side of the road.

Figure 3.2 Typical Cross-Section of Teviot Road adjacent to site

There are currently no dedicated pedestrian or cycle facilities which is typical in a rural roading environment such as this.

3.2 Traffic Flows

The most recent estimate from MobileRoads (2016) shows an annual average daily traffic (AADT) ranging from 200vpd at the southern end and 430vpd at the northern end[1].

These volumes are dated such that may not reflect the current volumes, although to our knowledge there are no recent developments in the area that would significantly affect the AADT values. Assuming an annual growth factor of 5% (which is conservatively high) these values are more likely be in the order of 268vpd and 576vpd and respectively. Peak hour traffic flows are expected to be less than 60 vehicles per hour (a rule of thumb is that peak hour flows are 10% of daily flows) or approximately one

[1] https://www.mobileroad.org/desktop.html

vehicle per minute on average. MobileRoads states that 10% of the ADT values is estimated to be heavy vehicles, or approximately 58 heavy vehicles per day.

3.3 Speed Environment

Teviot Road has a posted speed limit of 100km/h. According to Waka Kotahi NZ Transport Agency's (Waka Kotahi) MegaMaps tool, the mean operating speed along the road adjacent to the subject site is 83km/h. The safe and appropriate speed is shown in MegaMaps to be 80km/h.

3.4 Reported Crash History

Waka Kotahi's Crash Analysis System has been used to search the reported crash history in the vicinity of the site. The full length of Teviot Road was searched between 2018-2023 inclusive up to the time of preparing this report. A total of four crashes were reported. Three of these were non injury crashes and one was a minor injury crash.

The minor injury crash occurred where the driver was distracted by bug in the vehicle and was reported to be an unlicensed driver with health issues that may have contributed to the crash. One of the non-injury crashes (Crash ID 2022244322) occurred when the driver was intoxicated and lost control of the vehicle. Another non injury crash (Crash ID 201833362) occurred when the driver veered to the left of the road and hit loose metal which caused overcorrection in wet conditions. The final reported crash (Crash ID 201964506) occurred when a dog ran onto the road and the driver avoided it, causing the vehicle to leave the road.

The collision diagram is shown in Figure 3.3. Note that Crash ID 201964506 is not included on the diagram due to a software glitch, but we highlight that this was a non-injury crash and is understood to have occurred approximately 280m south of Jedburgh Street.

Overall, we note that there were no serious injury or fatal crashes reported, and none involving pedestrians or cyclists.

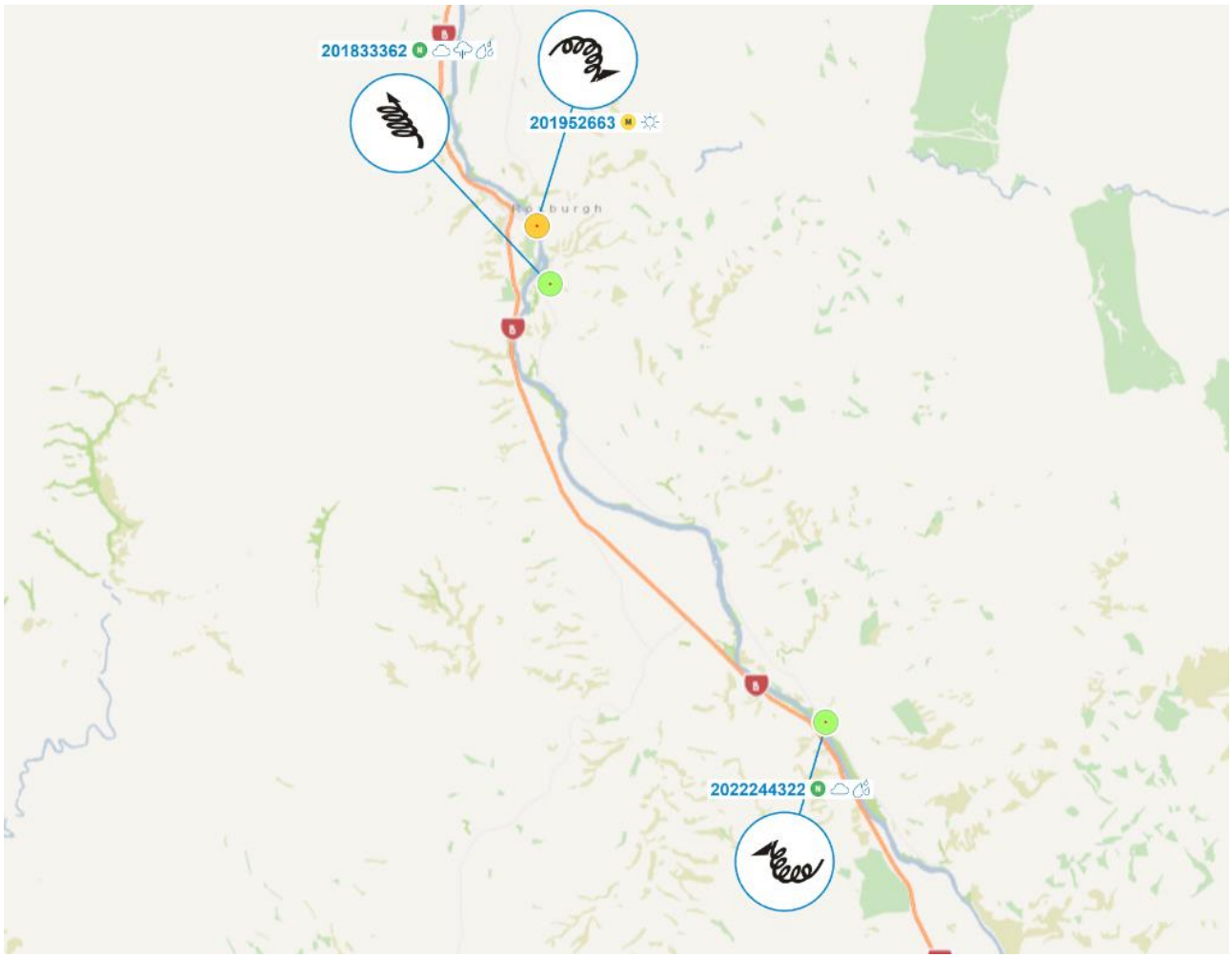


Figure 3.3 Collision Diagram

There are no crash trends arising from the reported crash history and the data does not suggest that there are any existing safety issues on the road network adjacent to the site that would be exacerbated by this proposal. We further note that none of the reported crashes occurred close to the site or near the existing vehicle accesses.

3.5 Temporary Use of Teviot Road as a Bypass

The report writer recently travelled from Cromwell to Dunedin and noted that SH8 was temporarily closed partway through Roxburgh township, and Teviot Road was being used as a bypass during this time. However, the road operated under a temporary reduced posted speed limit of 80km/h. The road was observed to carry heavy vehicles during this time.

3.6 Risk Ratings

Waka Kotahi MegaMaps has been referred to in order to analyse the road safety of road corridors. The two types of risk metrics are summarised as follows:

- Collective risk is a measure of the total estimated death and serious injury (DSi) casualty equivalents for a site. It is effectively a measure of the number of deaths and serious injuries that can be expected at a site over the next analysis period (typically five years). At a corridor

level, Collective Risk is the total estimated DSi casualty equivalents derived from the intersection and midblock components divided by the length of the corridor. It is expressed as estimated DSi / km. This is shown in Figure 3.4

- Personal risk is a measure of the risk of an individual dying or being seriously injured at a site. It is calculated by dividing Collective Risk by a measure of traffic volume exposure. This is shown in Figure 3.5

The risk rating will identify if there are any underlying safety issues along any of the corridors.

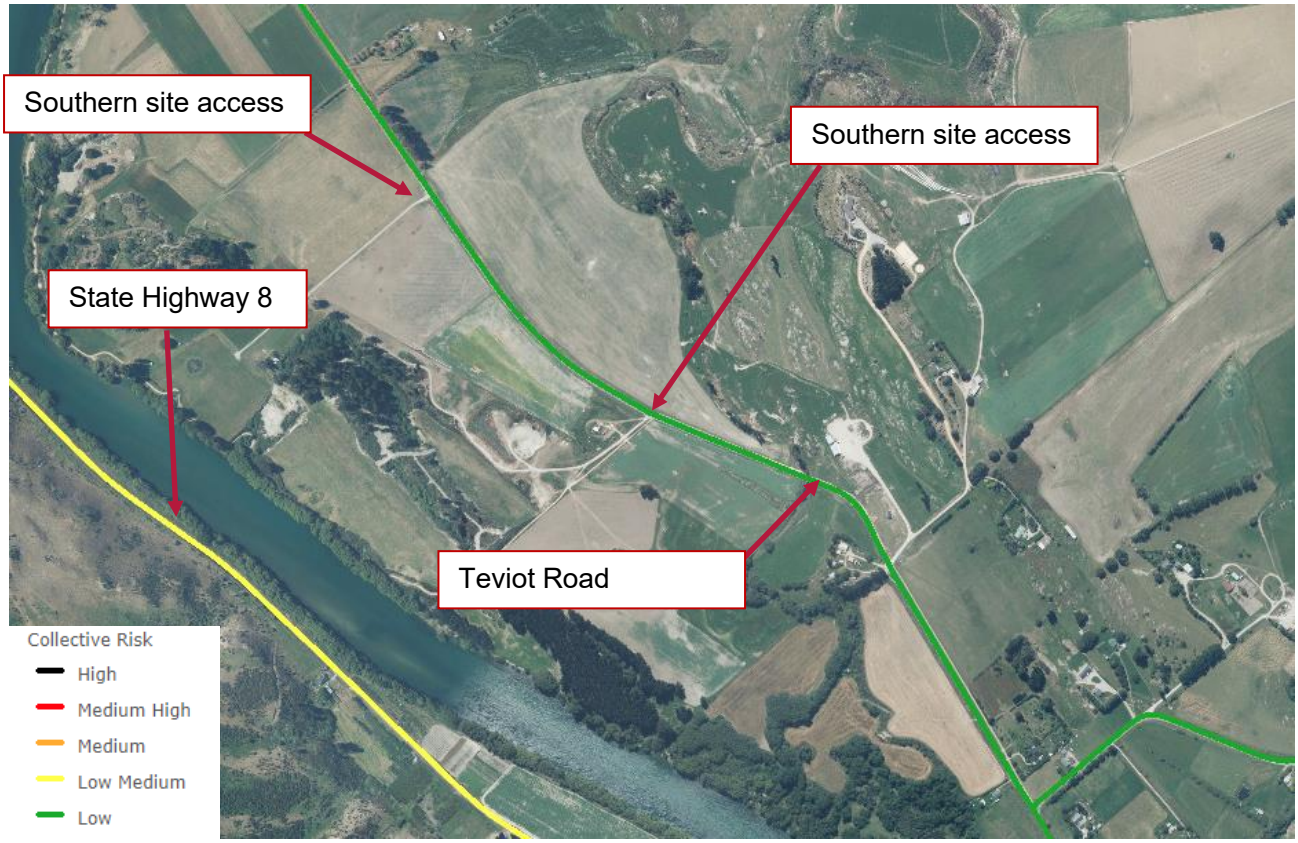


Figure 3.4 Collective risk for surrounding road network

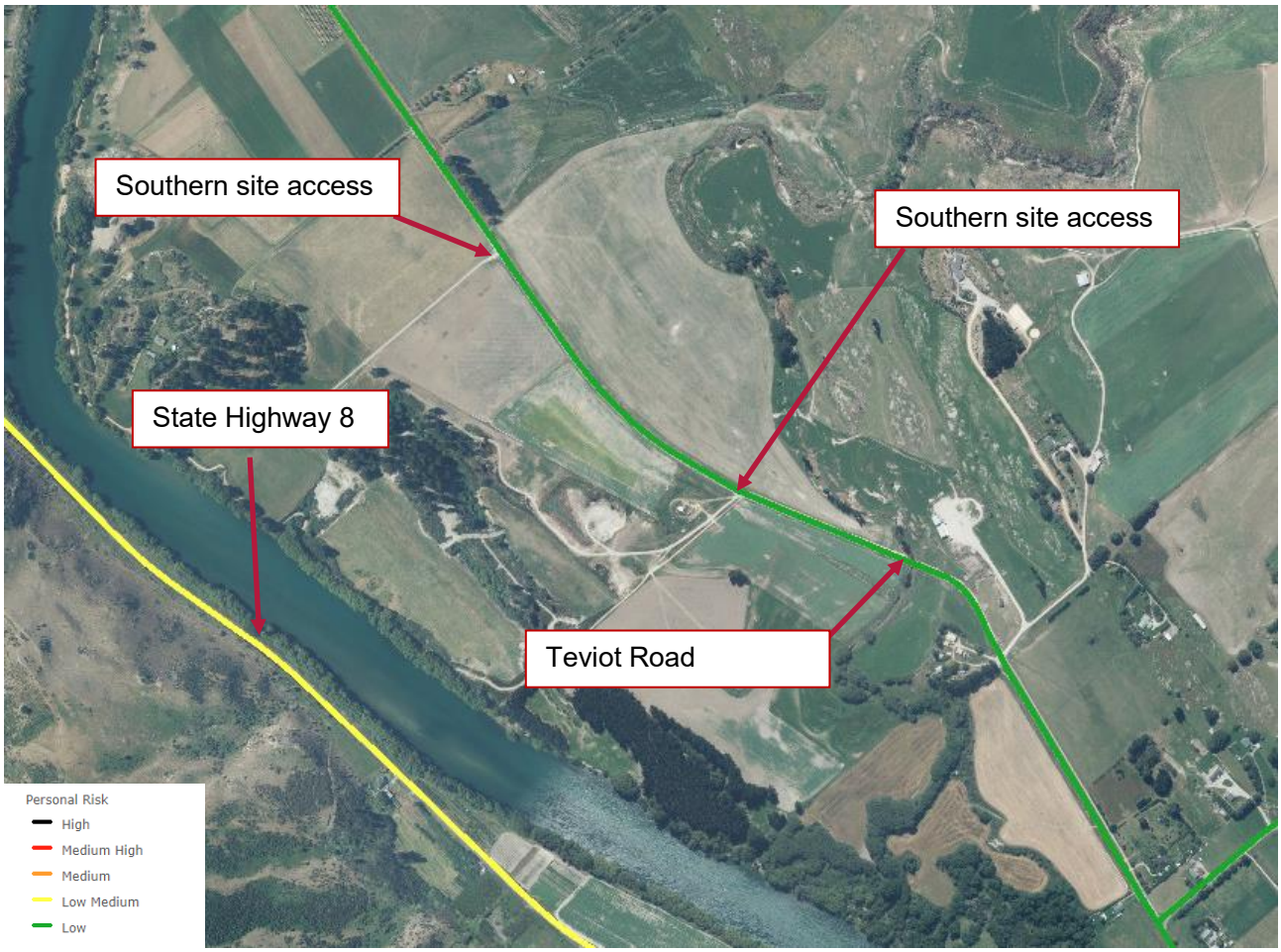


Figure 3.5 Personal risk for surrounding road network

The above analysis shows that the personal and collective risk of Teviot Road as it passes the site are both low. This is supported by the reported crash analysis which confirms that there have been a low number of reported crashes and none resulting in death or serious injuries. Overall, we consider the adjacent road network is operating safety.

3.7 Road Classification

Teviot Road is classed as a 'Rural State Highway or Arterial' within Schedule 19 of the CODP. It is classified as a Rural Connector in the Waka Kotahi One Network Framework.

4. Proposed Activity

It is proposed to establish an alluvial gold mine on the site including on-site processing and stockpiling of overburden. The mine will accommodate up to 20 staff including machinery operators, mechanics, and engineers. The proposed hours of operation are as follows:

Table 4.1 Hours of Operation

Day	Hours
Monday-Friday	0700-1900hrs
Saturday	0700-1300hrs
Sunday	No activity

Processing will occur onsite, including removal of overburden, stockpiling, gold washing and separation and rehabilitation. The lifespan of the mine is anticipated to be 10 years and a 10-year consent duration is therefore requested.

At the outset, it is noted that pursuant to Rule 4.7.4(i), resource consent is required due to there being more than three persons onsite at any one time and is assessed as a discretionary activity.

4.1 Site Access

Access to the site will be obtained directly from Teviot Road via two existing accesses (as identified in Figure 2.1). It is understood that only one access will be used at a time depending on where on the site mining is taking place at that time. The southern-most access is currently used for tipping and is accessed by the public. The sight lines from this vehicle access are shown in Figure 4.1 & Figure 4.2.

Figure 4.1 Looking north from southern vehicle access

Sight distance to the north is in the order of 250m.

Figure 4.2 Looking south-east from southern access

The sight distance to the south in part affected by a sag curve in the road formation, although a vehicle travelling through the sag would still be visible to a driver waiting to leave the access. The sight distance is in excess of 300m.

Figure 4.3 & Figure 4.4 show the view from the existing northern vehicle access.

Figure 4.3 View from northern access looking north

Figure 4.4 Teviot Road looking south, access in view

Due to the level and largely straight geometry (except for a gradual horizontal curve about 310m south-east of the access) of Teviot Road, sight distances in both directions are unobstructed with at least 280m available in each direction.

The vehicle access is currently unsealed above a culvert pipe.

5. Traffic Generation

5.1 Likely Traffic Generation

Trip generation for the proposed mine has been forecast on a 'first principles' basis specifically for this activity. Traffic generated will primarily arise from staff trips, although it is anticipated that there will also be non-staff personnel visiting the site such as contractors and diesel fuel deliveries. It is expected that there will be an increase in heavy vehicle movements during the set-up stage of the project when mining machinery is transported onto the site. However, given the mining operation does not include aggregate importation and that overburden material will be retained onsite the increase in the number of heavy vehicle movements onto the road network will be minimal and on an ongoing basis will be restricted to fuel deliveries and other types of deliveries such as machinery parts. We understand from the applicant that an average of two heavy vehicle movements per day is anticipated.

It is understood that up to 20 staff will operate from the site at any one time and that the mine will operate on a standard day shift. It is assumed that each worker will drive to the site in a single occupant vehicle which is considered to be a conservative assumption as carpooling may occur in practice.

As such, it is estimated there will be up to 20 light vehicle trips arriving at the site in morning with the reverse occurring in the evening. Given the shift timings as set out in Table 4.1, the new trips will not coincide with peak hours of travel on the road network. In addition, there will be occasional visits throughout the day from contractors. The traffic generation is summarised in Table 5.1.

Table 5.1 Anticipated traffic generation

Vehicle type	Trips per day
Light vehicles	50 (40 from staff, and 10 from others)
Heavy vehicles	2

5.2 Network Effects

Assuming all staff arrive at the site within one hour, and then leave the site in a separate hour this translates to an average of about one extra vehicle every three minutes. This level of additional traffic is well within the capacity of the adjacent road network and will not lead to any network capacity constraints.

Similarly, the number of additional heavy vehicle movements is small and given that the traffic flow data indicates 10% of the daily traffic movements are already by heavy vehicles, this will not lead to any noticeable effects or changes to the safe operation of the road.

It is anticipated that during the initial site set up that larger vehicles such as transporters may need to access the site in order to transport the large mining machinery onto the site. This will not be the norm and if required the vehicles could be piloted if they are over-width. This will be determined by the site operator prior to transportation of the machinery and any required approvals from CODC will be obtained as appropriate (which may need to include temporary traffic management).

Overall, the traffic generation arising from the mining activity is low and in our view will not lead to any capacity problems or contribute to a reduction in road safety performance on Teviot Road.

6. Access requirements

The accesses have been assessed against the requirements of the CODP for an access onto a 'Rural State Highway or Arterial'. The analysis has included indicative vehicle tracking to assess compliance with the CODP.

6.1 Compliance Review

Table 6.1 sets out the results of compliance assessment for access onto Teviot Road.

Table 6.1 Access Compliance Assessment

Rule Number	Rule Description	Compliance (Y/N)	Comments
12.7.1(ii)	Minimum sight distance from a vehicle access onto a rural state highway with a posted speed of 100km/h is 280m	N	Refer to assessment under 6.2 of this report.
12.7.1(iii) In addition to the requirements of (i) and (ii) above design and construction of access to rural State highways and arterial roads shall comply with the following standards:			
(a)	The access shall be sealed to the same standard as the adjacent road carriageway.	N	Refer to assessment under Section 6.3 of this report.
(b)	Where the speed limit is 100 kph, spacing between accesses shall be not less than 200 metres (regardless of the side of road on which they are located), and no vehicle access shall be constructed within 100 metres of road intersections AND spacing between intersections (ie road intersections) shall be not less than 800 metres.	N	Refer to assessment under Section 6.4 of this report.
(c)	Except as provided for in (d) below, width of vehicular access ways at the property boundary are to be no greater than 6 metres.	N/A	Refer to (d).
(d) Heavy vehicular accesses shall be designed and constructed to:			
(i)	A minimum width of nine metres.	Y	The width of the entrances will be at least nine metres wide at the road edge.
(ii)	Carry the volume and weight of traffic likely to use the access.	Y	This is a standard requirement and the appropriate design specifications will be issued by Council.
(iii)	Ensure heavy vehicles do not have to cross the road centre line when making a left turn.	N	Refer to assessment in 6.5 of this report.
(iv)	Ensure the surface is constructed to the same standard as the adjacent road carriageway.	N	Refer to assessment in Section 6.3 of this report.
(v)	Have sufficient width to accommodate the swept path of the largest vehicle anticipated to use it.	Y	Refer to assessment in 6.5 of this report.

Rule Number	Rule Description	Compliance (Y/N)	Comments
(e)	Driveways shall not be parallel to and level with roads within 20 metres of the road reserve.	Y	The driveways will be perpendicular to Teviot Road.
(f)	Figures 12.2 and 12.3 on pages 12:32 and 12:33 establish the minimum design standards for access determined by activity type.	Y	Refer assessment under 6.3 of this report.
(g)	Access to State highways shall be to Transit New Zealand design specifications.	N/A	N/A

6.2 Sight Distances

Sight distances at the northern access comply with the minimum requirement of 280m based on an access onto a rural state highway with a 100km/h speed limit and is therefore acceptable.

The southern access is slightly short of the required sight distance when looking to the north with approximately 250m available. It is noted that the access is currently used for green waste tipping and that, despite the shortfall in sight distance to the north (due to the horizontal curve) the reported crash history confirms that this has not created a safety problem in practice. This indicates that the available sight distance at the access is sufficient.

To quantify this further, the effects of the shortfall have been assessed using the stopping sight distance (SSD) calculation from Austroads Guide to Road Design Part 3: Geometric Design. SSD is the distance required to enable a normally alert driver, travelling at the design speed on wet pavement, to perceive, react and brake to a stop before reaching a hazard on the road ahead.

$$SSD = \frac{R_T V}{3.6} + \frac{V^2}{254(d + 0.01a)}$$

Figure 6.1 Stopping Sight Distance Formula. (Source: Austroads Guide to Road Design Part 3: Geometric Design)

Where:

- SSD = Safe Stopping Distance (m)
- Rt = Reaction time: 2.5s
- V = Operating speed: 110km/h
- d = Coefficient of Deceleration = 0.36
- a = Longitudinal Gradient expressed as % = 0.00%

A reaction time of 2.5s has been applied given the rural, high speed road environment. An operating speed of 110km/h has been applied which is considered to be conservatively high based on the mean operating speed being 83km/h.

In this instance, the SSD is 209m which is significantly exceeded in both directions.

It is also noted that the traffic volumes on Teviot Road are very low compared with what might otherwise be expected on an arterial road and that there will be plenty of gaps in the traffic stream when drivers are entering and exiting at the access way.

Overall, it is considered this non-compliance is acceptable and that the access will continue to function without any safety issues.

6.3 Access Standard

Southern Access

This vehicle access is currently sealed from the edge of Teviot Road for approximately 3.0m toward the property. It is considered typical for driveways connecting to sealed roads to be sealed themselves for a distance of not less than 5.0m. It is therefore recommended that the seal be extended by a minimum of a further 2.0m. This small improvement will ensure that any effects relating to loose material or damage to the edge of Teviot Road are suitably managed and will ensure a consistent approach to access design.

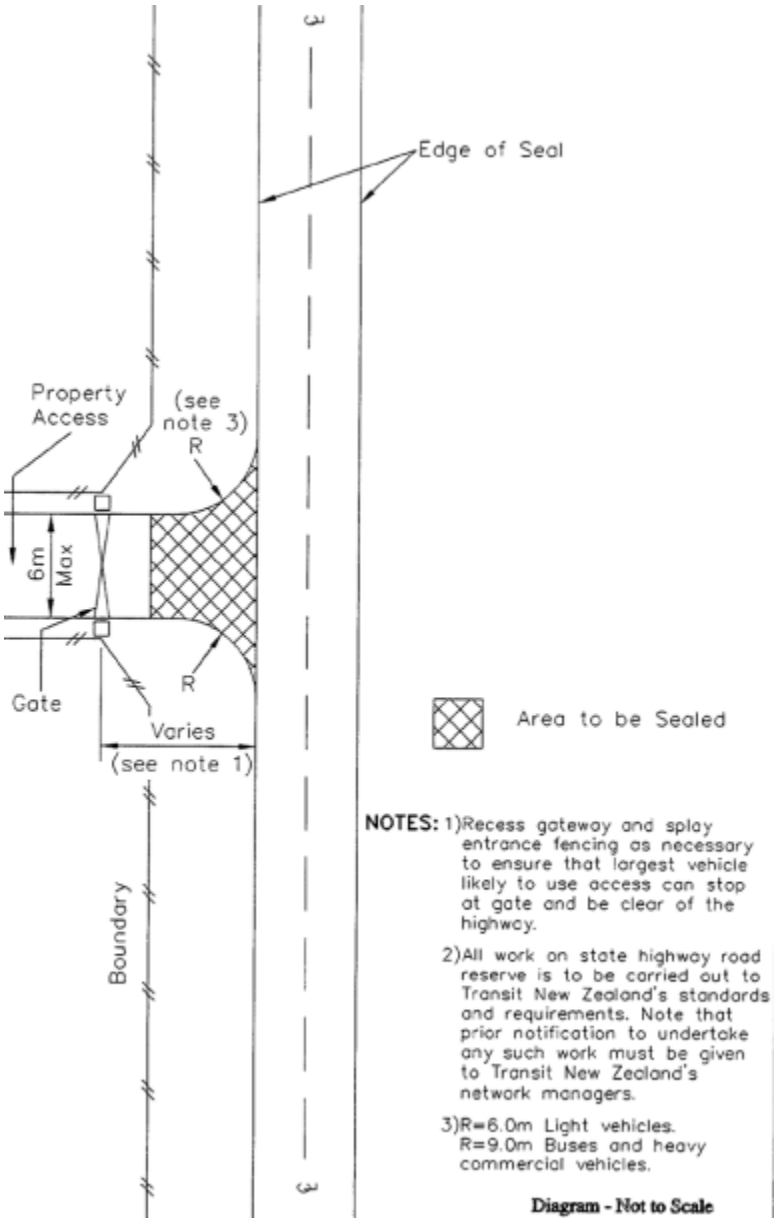


Figure 6.2 Excerpt of Figure 12.2 of the CODP – Access Standard for Low Traffic Generation. (Source: CODP, Section 12)

Northern Access

During the site visit, a small amount of loose material was observed to have been tracked onto the Teviot Road carriageway from the northern access. This can be seen in Figure 4.4. It is noted that the surface material is metalled and has not been compacted, which increases the potential for migration of material. It is understood that both entrances will not be used concurrently, and that the southern entrance will be used in the initial stages.

It is considered that if the northern entrance is to be used that it should be upgraded in general accordance with Figure 12.2 of the CODP, with the exact standard to be set by CODC. Given that Teviot Road has a chip-sealed surface, chip-seal would be an appropriate surface material for the vehicle access. As with the southern entrance, it is considered that only a small amount of sealing is required to mitigate the potential for loose material to migrate onto Teviot Road with a distance of 5.0m recommended.

6.4 Access Spacing

There is an access on the opposite site of the road of the northern access. The separation is approximately 50m. This access is a farm access and will not experience a notable amounts of vehicle movements. This will therefore not create a safety problem and the chances of any conflict occurring in practice are remote.

6.5 Vehicle Tracking

Vehicle tracking has been completed to determine the geometric design requirements for the proposed vehicle accesses, as required by Rule 12.7.1(d). A 19.7m long fuel tanker has been used as the design vehicle as this will be the largest vehicle accessing the site once the mine is operational. Note that a transporter will need to access the site in the initial site set-up / establishment phase, but since there will not be an ongoing need for transporter access, it is not considered practical to base the access design on this vehicle. The results of the tracking for both accesses are shown in Figures 6.3-6.6.

Southern Access

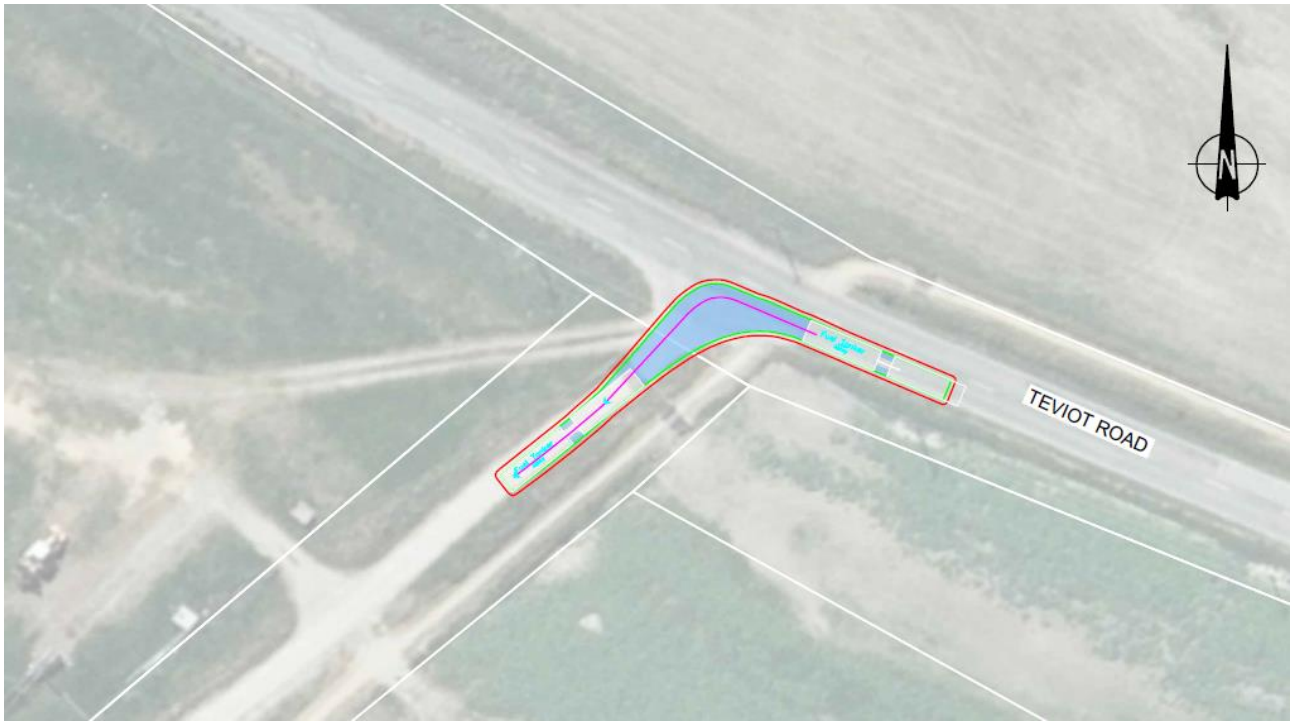


Figure 6.3 Left turn entry movement, southern access

Figure 6.4 Left turn exit movement, southern access

The tracking shows that for a tanker to stay within the correct lane (as is required by the District Plan), some minor access widening would be required on the north-western side of the access only. However, given the stopping distance exceeds the SSD requirements in Austroads and the frequency of the manoeuvre will be very low, it is considered appropriate for the truck to be able to cross the centre line when entering or exiting the site.

Northern Access

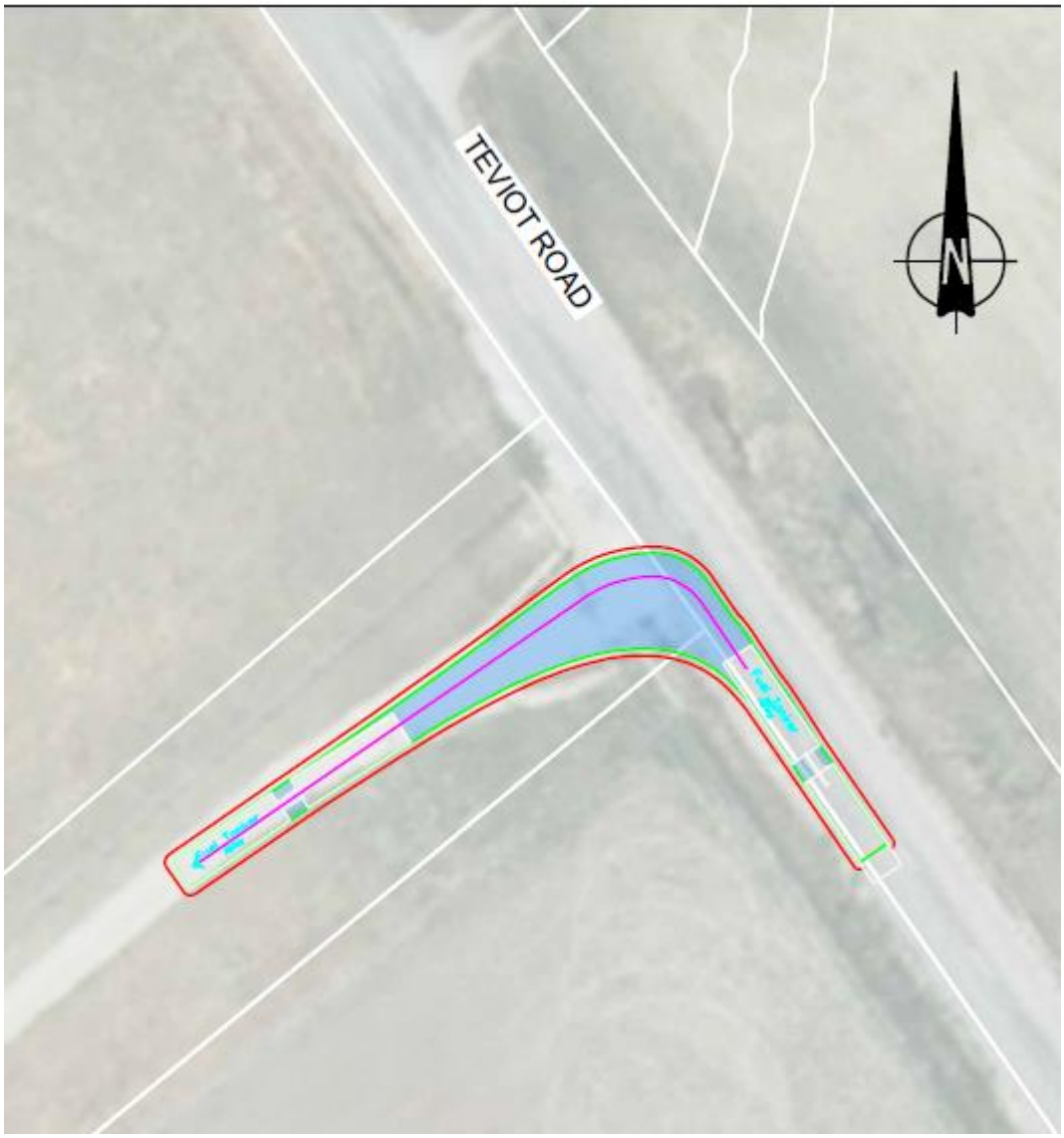


Figure 6.5 Left turn entry movement, northern access

Figure 6.6 Left turn exit movement, northern access

The tracking for the northern access indicates conflict will occur between the fuel tanker and the existing fence line if the truck stays within the correct lane when entering and exiting. This will not occur if the truck is able to cross the centreline whilst turning. Whilst this does not comply with Rule 12.7.1(iii)(d)(iii), the available sight distance to the northwest along Teviot Road is excellent. Given this and noting the low volumes on Teviot Road and the infrequency of this manoeuvre, it is considered acceptable for the truck to cross the centreline when entering and exiting the site at the northern access.

7. Summary and Recommendations

This transport assessment report has assessed the transport aspects of a proposal to establish and operate an alluvial gold mining operation at 1344-1536 Teviot Road, Millers Flat, for a duration of 10 years.

We conclude that the traffic generated by the proposed activity can be accommodated by the existing transport network. Given the excellent safety record, low risk ratings, and acceptable sight distances from the access points, we do not consider that the proposal would lead to adverse road safety effects. We recommended the following to ensure effects on the transport network are sufficiently managed.

Southern Access

- It is recommended that the southern access be hard surfaced from the edge of the seal on Teviot Road for a distance of not less than 5.0m toward the property boundary, and be adequately drained (in general accordance with Figure 12.2 of the CODP).

Northern Access

- If the northern access is to be used to service the mining activity, it is recommended that it be hard surfaced from the edge of the seal on Teviot Road for a distance of not less than 5.0m

toward the property boundary, and adequately drained (in general accordance with Figure 12.2 of the CODP).

General

- It is recommended that if transportation of machinery into / out of the site is anticipated to affect the normal operating conditions of the transport network, that the applicant prepares and submits a traffic management plan to Council for approval.
- The vehicle accesses should be designed to carry the volume and weight of traffic likely to use them.

Subject to the above, it is considered that there are no transport engineering reasons why resource consent could not be granted.

Flood Hazard Assessment

Millers Flat Alluvial Goldmine

1346-1536 Teviot Road, Millers Flat

Roxburgh

Report prepared for:

Hawkeswood Mining Limited

Report prepared by:

GeoSolve Limited

Distribution:

Hawkeswood Mining Limited
Town Planning Group
GeoSolve Limited (File)

September 2023

GeoSolve Ref: 230526

Revision	Issue Date	Purpose	Author	Reviewed
1	31/08/2023	Draft issue for client review	JAS	NW
2	1/09/2023	Client issue	JAS	NW
3	27/09/2023	Revised client issue	JAS	NW
4	29/09/2023	Revised client issue	JAS	NW

GEOTECHNICAL WATER RESOURCES PAVEMENTS

Table of Contents

1 Introduction

1.1 General

Hawkeswood Mining Ltd is seeking resource consents to establish an alluvial gold mining operation near Millers Flat Township, as shown below on Figure 1. The proposed mine site is situated on a sub-horizontal outwash terrace between the Clutha River and Teviot Road.

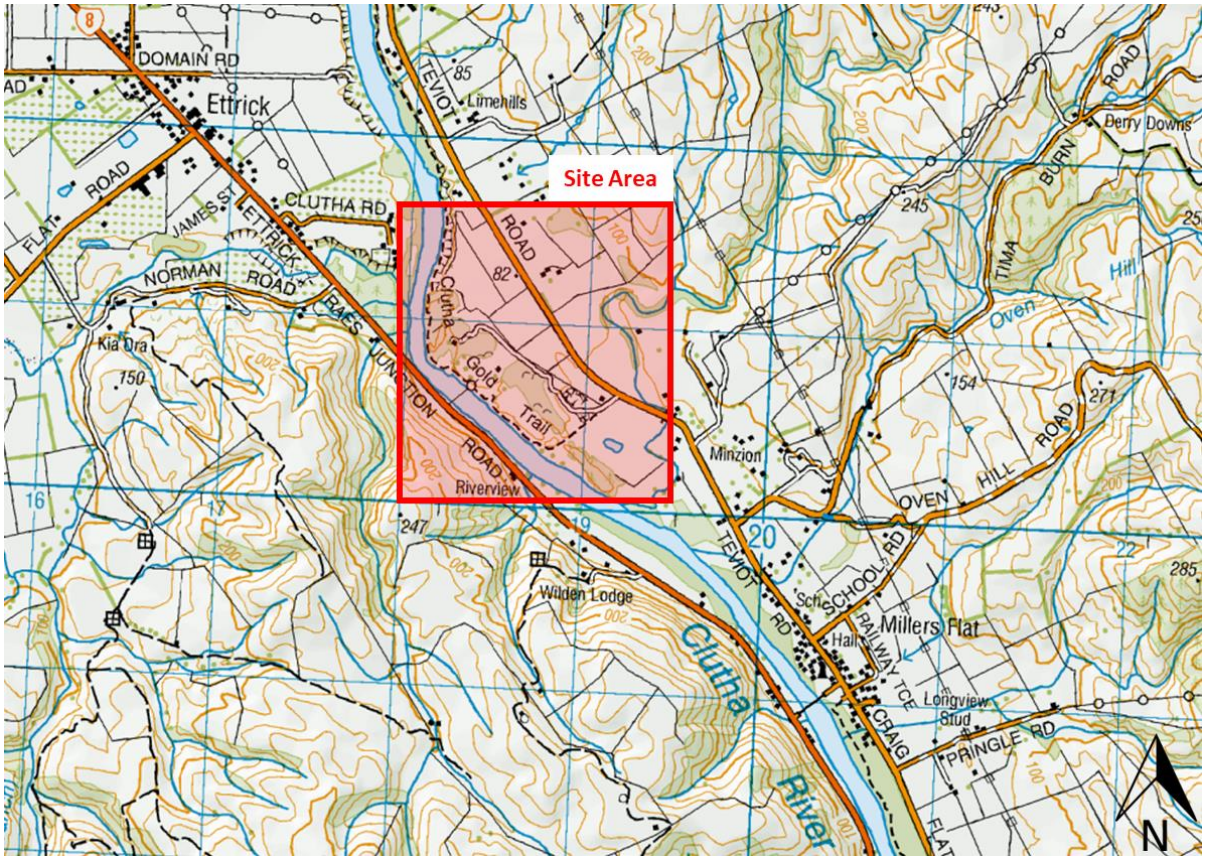


Figure 1. Proposed mine site in relation to Millers Flat Township (Source: www.topomap.co.nz).

GeoSolve has been engaged to assess the potential flood hazard associated with the activity to inform the resource consent application. To assess the flood risk GeoSolve has reviewed Central Otago District Council (CODC) and Otago Regional Council (ORC) natural hazard mapping, historic aerial photographs, contour levels and technical data held on the GeoSolve database. We have had discussions with the mine manager regarding operational procedures, and a Senior Water Resources Engineer inspected the site in September 2023.

The mine layout and staging plan, as applied for in the consent application, is attached as Figure 2, with relevant features annotated.

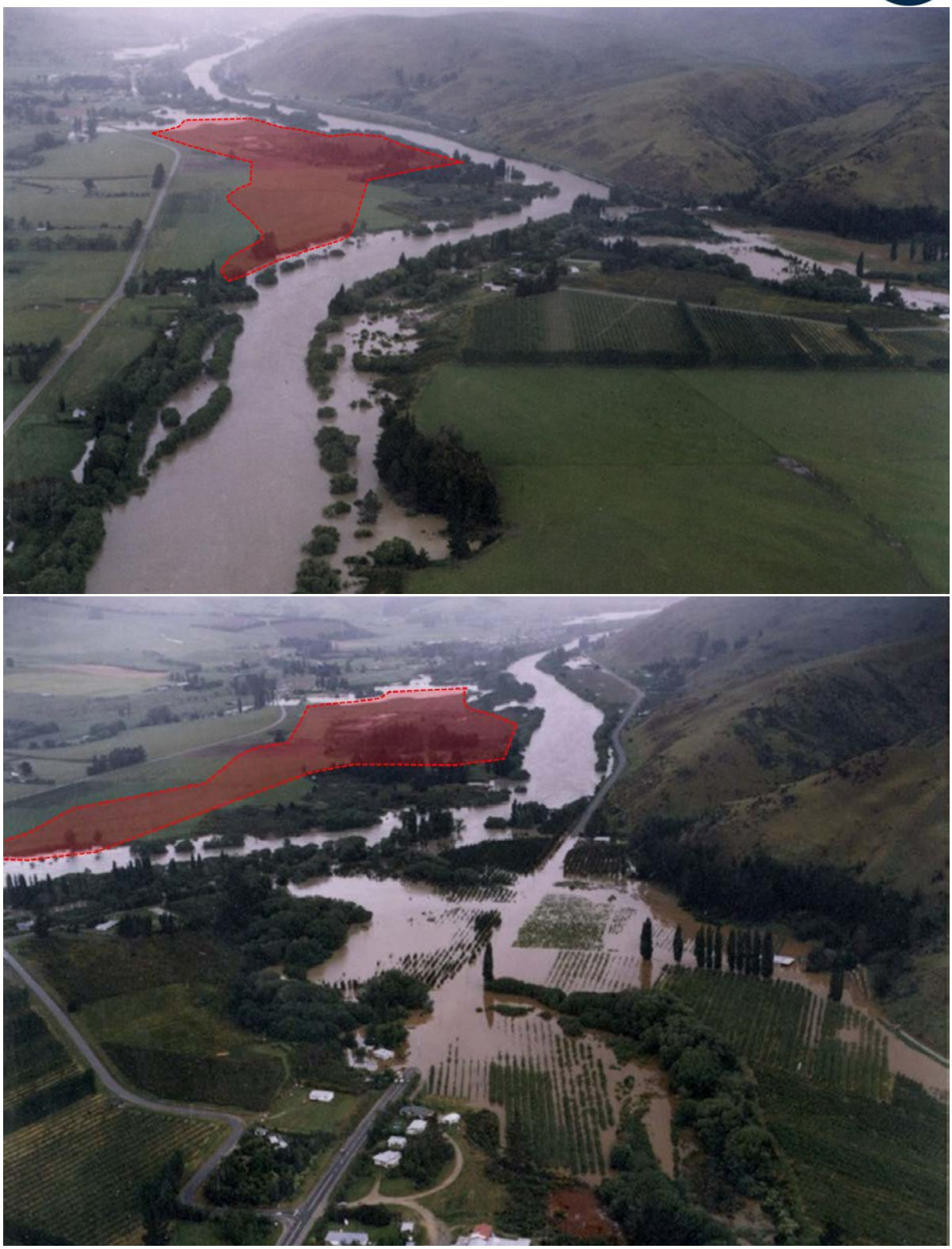
The work described in this report has been completed in accordance with the terms and conditions outlined in GeoSolve Ltd.'s Short Form Agreement (Ref no. 230526) dated 24th of July 2023.

2 Flood Hazard Assessment

2.1 Flooding History

The ORC natural hazards database contains a series of flood photographs and flood hazard mapping. According to the ORC database notable past flood events on the Clutha River include Sep 1878, Oct 1978, Jan 1994, Dec 1995, and Nov 1999. During flooding in Nov 1999 an aerial reconnaissance was undertaken across Otago to photograph the extent of flooding from the air which included the future mine site, as shown below on Photos 1-3.

Photo 1. Aerial photograph looking west from Millers Flat Township during flooding on the Clutha River, 18th Nov 1999. On the upper right of image floodwaters marginally encroach onto the southeastern end of the proposed mine path from the junction of the Tima Burn (approx. mine path indicated in red).



Photos 2 & 3. Aerial photographs taken in the downstream direction from Ettrick during flooding on the Clutha River, 18th Nov 1999. The proposed mine site is situated on the outwash terrace on the upper left of both images and is largely unaffected by adjacent floodwaters (approx. mine path indicated in red).

The ORC mapped flood hazard layer from the Clutha River and Tima Burn is shown on Figure 2 (attached).

2.2 Flood Level Information

The Applicant has had the mine site flown with LiDAR survey, hence detailed contour information is available for the area and is presented on Figure 2 (attached). Comprehensive flood level information is also available from the nearby Millers Flat Bridge, which is ~2 km downstream of the site. Evidence of historic flood levels at that Clutha River bridge site were produced by Contact Energy when seeking consent renewal for their hydro-electric generation facilities. Table 1 below presents the historic flood level information for the Millers Flat Bridge. It is noted that the exact location of the bridge has varied slightly over the ~145-year period of these measurements having been taken, however it is considered that the information provided is appropriate to inform this assessment, especially as the most recent significant flood (1999) was taken with the bridge in its current location.

Table 1 - Records of Historic Flood Levels at Millers Flat Bridge (~2 km downstream of the site).

Millers Flat Bridge Flood Levels ex Waugh/Foster for Contact Energy			
Year	**ORC Flow m^3/s**	**Level RL m***	**ARI (return period)**
1878	Not available	72.63	400-500 years
1919	2700	69.37	-
1946	1950	67.42	-
1948	2450	68.52	-
1995	3550	70.52	-
1999	3800	71.33	100 years
*Reduced levels in terms of the New Zealand Vertical Datum 2016.			

The reduced levels originally provided by Contact Energy were in terms of the Dunedin Vertical Datum 1958. However, the reduced levels presented above have been converted to the New Zealand Vertical Datum 2016 to match the more recent contour data presented on Figure 2. A height difference of around 350 mm exists between the two datums.

The Applicants LiDAR survey was flown on the 8th of March 2022. Since then, any modification of site topography has been confined to their own property on the sub-horizontal terrace, as shown on Figure 2. More recent Google Earth imagery has been incorporated into the high-resolution aerial image obtained during the LiDAR survey.

2.3 Flood Hazard Discussion

2.3.1 ORC Flood Hazard Mapping

The ORC database acknowledges the limitations of the flood hazard mapping which has been interpreted from aerial photos without the benefit of the high-resolution survey performed for this site. On that basis the accuracy of the ORC flood hazard margin shown on Figure 2 is considered indicative only. When overlaid on the recently surveyed LiDAR topography, the mapped flood zone adjacent to the mine site cuts sharply across multiple contours, demonstrating that it is coarsely drawn. Examination of contour data, aerial photos and consideration of hydraulic principles indicate the mapped flood zone to be more conservative than previous major flood events, such as November 1999.

2.3.2 Site Specific Information

The proposed mine path, albeit to a limited degree, is shown to be within the flood hazard layer mapped by ORC; predominantly at the Clutha River and Tima Burn junction, as shown on Figure 2. The vast majority of the mine path and associated operations will be distant from and elevated above potential flood levels. It is considered that flooding would only reach the proposed mine path during extreme events, such as 100-year event observed in 1999, which are statistically unlikely to occur within the relatively short timeframe of mining, proposed to be approximately 5 years duration. To further mitigate flood risk to the mine pit it is recommended that the proposed excavation area in the vicinity of the Tima Burn is backfilled immediately upon completion of mining in that area, which is understood to be ongoing for approximately 6 months.

An event of, or approaching the magnitude of, the 1878 or 1999 floods would be required to impact the mine pit, and the probability of that occurring during the southeastern end of the mine's operation is considered unlikely. This is summarised by the calculation below:

$$P := 1 - \left(1 - \frac{1}{T}\right)^{n}$$

Where:

- n = interval of interest.
- T = event return period / ARI.
- P = probability of event being exceeded at least once during period of interest.

Performing that calculation using a 100-year return period storm and comparing that to the proposed mining operations in the vicinity of the Tima Burn of 0.5 years, this results in a 0.5% chance of the mine being affected by floodwater during operations.

2.3.3 Potential for/Effects of Inundation

It is noted that the active pit will be progressively backfilled as the gold recovery plant advances along the mine path, meaning that any area potentially susceptible to flooding will only be exposed temporarily, further reducing the chance of the mine being affected.

Any entry of flood waters into the active pit is not expected to have a significant effect on staff or machinery, due in part to the extended warning period as the river rises, allowing time for staff to leave the site and/or move machinery to higher ground, if required.

In the unlikely event that a part of the mine was impacted by floodwater, this would attenuate a part of the flood flow, thereby having a net positive effect on potential flood hazard by reducing downstream flows. If any remedial works were necessary, these would be managed internally by the Applicant. The Applicant owns the property, which contains existing earthworks, and there are no significant buildings or infrastructure in the immediate vicinity of the mine site.

We note that the proposed bunds, shown on Figure 2, are temporary features created from overburden and intended for visual screening of the mine site rather than flood protection. These bunds will be constructed and de-constructed contiguous with the active pit.

GeoSolve understands that the Applicant will take responsibility for actively assessing and managing the batter slopes of the mine to minimise the potential for scour or piping failure from groundwater ingress or the unlikely event of floodwaters entering the active pit during mining operations.

2.3.4 Tima Burn

As shown on aerial photo 1 and Figure 2, flooding is predicted to occur in the lower reaches of the Tima Burn at its junction with the Clutha River during extreme rainfall events. However, this appears to result from a backwater effect as flood levels on the Clutha trace the Tima Burn channel contours upstream, rather than as a result of flood flows from the Tima Burn itself.

Mining operations will predominantly avoid the floodplain adjacent to the Tima Burn, as shown on Figure 2. At the southeastern corner of the site the Applicant has nominated a 20 m setback distance between the mine path and the stream bed. Furthermore, the Applicant has opted to exclude visual bunding along the site's southeastern edge, therefore maintaining the existing capacity of the Tima Burn floodplain.

2.3.5 Test Pitting and Trail Mine Site

The Applicant's test pitting and trial mine site area, noted on Figure 2, straddles the Stage 1 & 4 mining areas, and is contained within their property. This area forms part of the initial mine development works and marks the point at which mining will begin within Stage 1.

Part of the ORC mapped flood hazard encroaches into this Stage 1 area from the river via a shallow gully. However, the flood hazard margins at this location appear to be based on

coarse mapping, and are considered to be superseded by the updated topographical survey that has been undertaken, as discussed in Section 2.3.1.

Existing visual bunding constructed along the southwestern edge of Stages 1 & 4, as a part of the test pitting and trial mine site works, will be pulled back to the final bund alignment shown on Figure 2. This will increase the distance between the Clutha River flood mapping and earthworks.

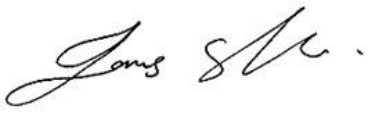
3 Conclusions

- We conclude that the proposed activity is not expected to adversely affect or exacerbate off-site flood hazard. If the mine pit were to be affected by flood water this would attenuate a part of the flood flow, reducing the risk to other properties.
- The vast majority of the mine site is elevated on a sub-horizontal terrace, isolated from the main river channel and would be unaffected in an extreme flood event.
- A small area of the mine site in the vicinity of the Tima Burn (~2% of the site) has the potential to be affected by flood water and would only be affected in a ~100-year ARI storm event or greater. As this area will be backfilled as soon as the mining operations in that location are complete (understood to take ~6 months) the likelihood of flood waters impacting the site was calculated to be 0.5%.
- In the unlikely event that the mining operation is affected by flooding from the Clutha River and/or Tima Burn this will be managed internally by the Applicant. The risk to staff is considered to be low. The Applicant will actively assess and manage slope stability themselves.
- The same conclusions apply for the Applicant's existing test pit and trial mine site area within mining Stages 1 & 4, noted on Figure 2 (attached).
- Following the completion of mining, the ground surface will be rehabilitated and contoured to emulate the previous levels, with no reduction in floodplain capacity.

4 Applicability

This report has been prepared for the benefit of our client, Hawkeswood Mining Limited, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and written agreement.

Our endorsement of any aspect of the proposed activity and any hazard mitigation measures does not suggest there will be no future risk, but rather that any residual risk will be within acceptable levels.

Report prepared by:	Reviewed for GeoSolve Ltd by:
	
.....	.....
James Stewart Engineering Geologist	Neil Williman Senior Water Resources Engineer

Attachments:

- Flood Hazard Site plan (Figure 2).

Direction of Mining
Generally North to South
Stockpile
Earth Bund
Porta Coms Workshop
Site Entrance
Teviot Road
Power Line
Tip Exclusion Zone
Stage 3
29.1ha
20m Setback
Tima Burn
20m Setback
Stage 2
17.4ha
Test Pitting and Trial Mine Site
Stage 1
5.4ha
Stage 4
16.3ha
Clutha River

Notes:
1. These drawings have been prepared for the benefit of Hawkeswood Mining Limited with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

Legend:
- ORC Mapped Flood Hazard
- Site contours, 10 m Major interval, 1 m Minor interval
- Visual Bunding
- Stage 1
- Stage 2
- Stage 3
- Stage 4

SCALE 1:5000
0 50 100 150 200 250 (m)

GEOSOLVE
Level 1, 70 MacAndrew Road, South Dunedin
www.geosolve.co.nz

DRAWN	WCG	Sep.23
DRAFTING CHECKED	JAS	Aug.23
APPROVED	NW	Aug.23
CADFILE: 230526.dwg		
SCALES (AT A3 SIZE): 1:5000		
PROJECT No: 230526	FIG No: Figure 2	REV. 0

Hawkeswood Mining Limited

1346-1536 Teviot Road, Millers Flat

Flood Hazard Assessment

Site Plan

Affected Persons Approval

To: The Manager, Planning and Environment
Central Otago District Council
PO Box 122
Alexandra 9340

TO BE COMPLETED BY THE PERSON(S) REQUESTING APPROVAL

Applicant(s): Hawkeswood Civil Limited

Type of resource consent: Land use consent

Proposed activity: Establish and operate a gold mining activity for the duration of 10 years

Location of site: 1346-1536 Teviot Road, Millers Flat (inclusive of road reserve within the area indicated on the attached plan)

I have sighted all the attached plans and supporting information for the above activity.

I hereby give unconditional approval for the application to be processed without public notification.

I understand that, by giving approval, the Council will not take into account any effects that the proposed activity may have on me, when considering whether this application should be notified (Section 95E of the Resource Management Act 1991) and whether the application should be granted (Section 104(3) of the Resource Management Act 1991).

TO BE COMPLETED BY THE PERSON(S) GIVING THEIR APPROVAL

Name: ANDREW HAWKESWOOD

Organisation: JACKS RIDGE LTD

Address: 1426A 1426B 1426C 1426D 1426E TEVIOT RD MILLERS FLAT. (SEC 90 BLK VIII BENMORE SD)

Signature

30/9/2023.
Date

Name:

Organisation:

Address:

Signature

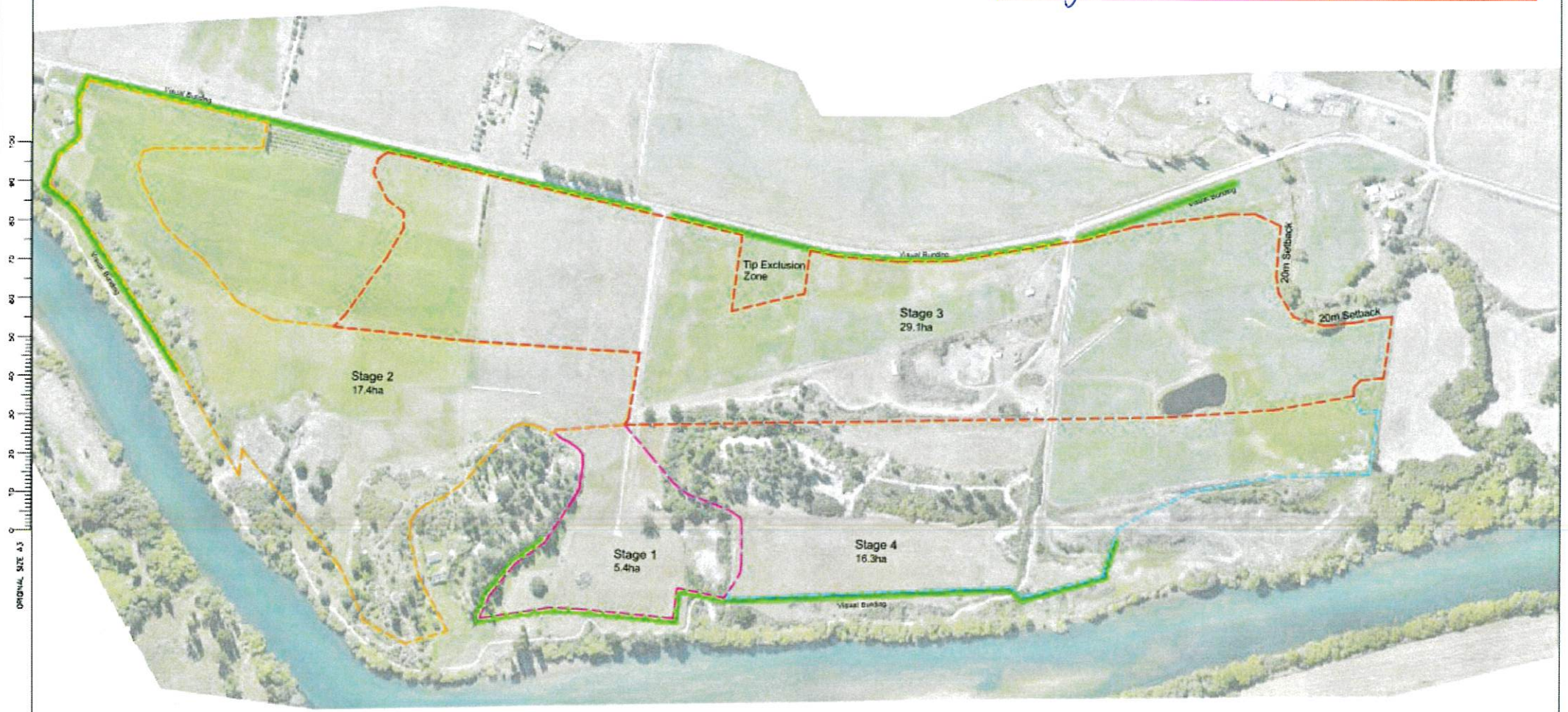
Date

Checklist:

- ☑ Signature of all legal owners
- ☑ Site and/or subdivision plan with all required signatures
- ☐ Elevations with all required signatures (if applicable)

Please sign and date plan in conjunction to the Approval form.

30/9/2023.



ORIGINAL SIZE A3

File Ref:

Prepared For:

Hawkeswood Mining

No.	Amendments	Drawn	Date

Stage Plan

Millers Flat

Project No:	Surveyed: JR
Scale: 1:5000	Designed:
Date: 06/09/23	Drawn: JR
Sheet: 1	Checked: JR

Overview Surveying

Affected Persons Approval

To: The Manager, Planning and Environment
Central Otago District Council
PO Box 122
Alexandra 9340

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TO BE COMPLETED BY THE PERSON(S) GIVING THEIR APPROVAL

Name: GREGORY LIYANARACHCHI

Organisation:

Address: 1403 TEVIOT ROAD, RD2 ROXBURGH

Signature

25/09/2023
Date

Name: CHIKA LIYANARACHCHI

Organisation:

Address: 1403 TEVIOT ROAD, RD2, ROXBURGH

Signature

25/09/2023
Date

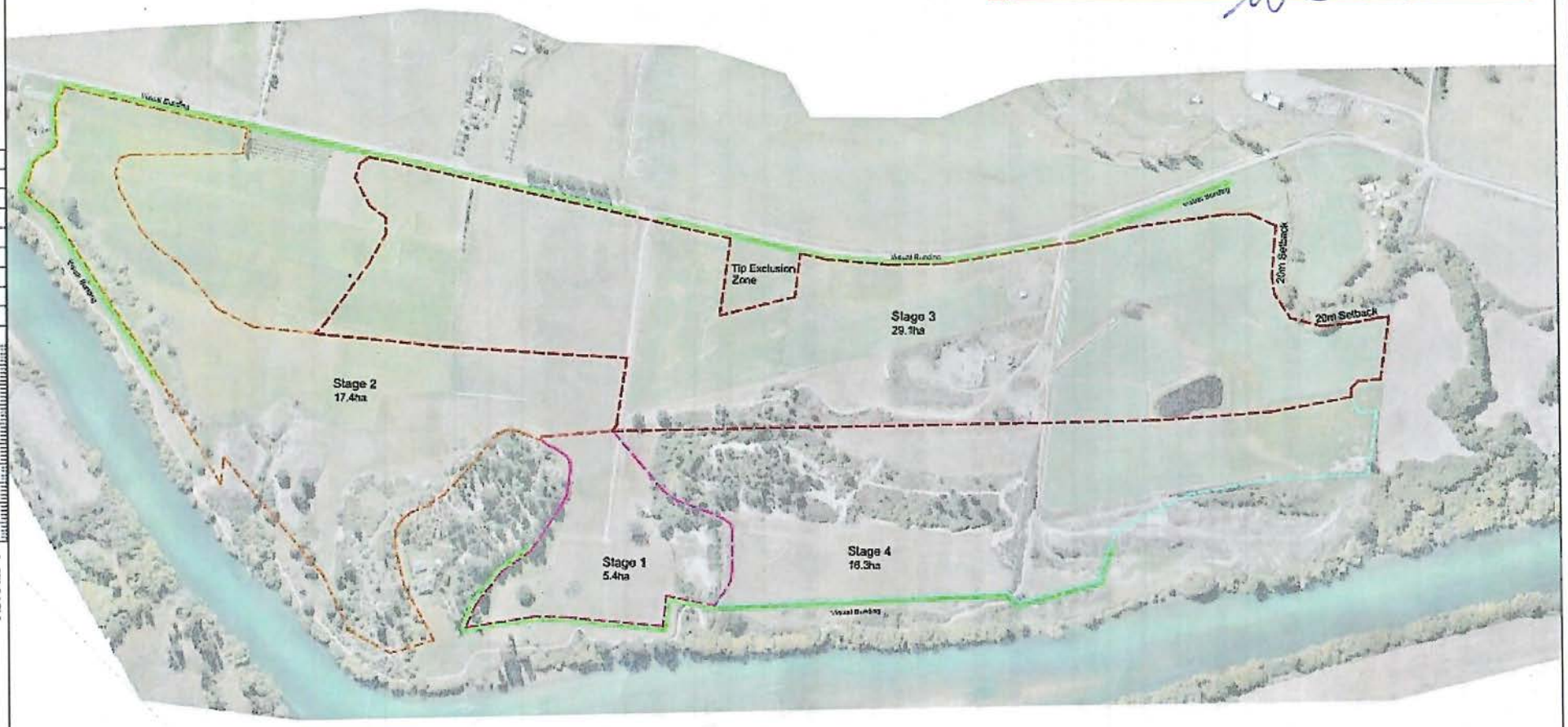
Checklist:

- ☐ Signature of all legal owners
- ☐ Site and/or subdivision plan with all required signatures
- ☐ Elevations with all required signatures (if applicable)

Please sign and date plan in conjunction to the Approval form.

25/09/23

25/09/23



Hawkeswood Mining

No.	Amendments	Drawn	Date

Stage Plan

Millers Flat

Project No.:	Surveyed JR
Scale 1:5000	Designed
Date 06/09/23	Drawn JR
Sheet 1	Checked JR

Overview SURVEYING

Affected Persons Approval

To: The Manager, Planning and Environment
Central Otago District Council
PO Box 122
Alexandra 9340

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TO BE COMPLETED BY THE PERSON(S) GIVING THEIR APPROVAL

Name: Alan Thomas Parker

Organisation:

Address: 1534 Teviot Rd Millers Flat

Alan T Parker — Signature

23/Oct/23 — Date

Name:

Organisation:

Address:

Signature

Date

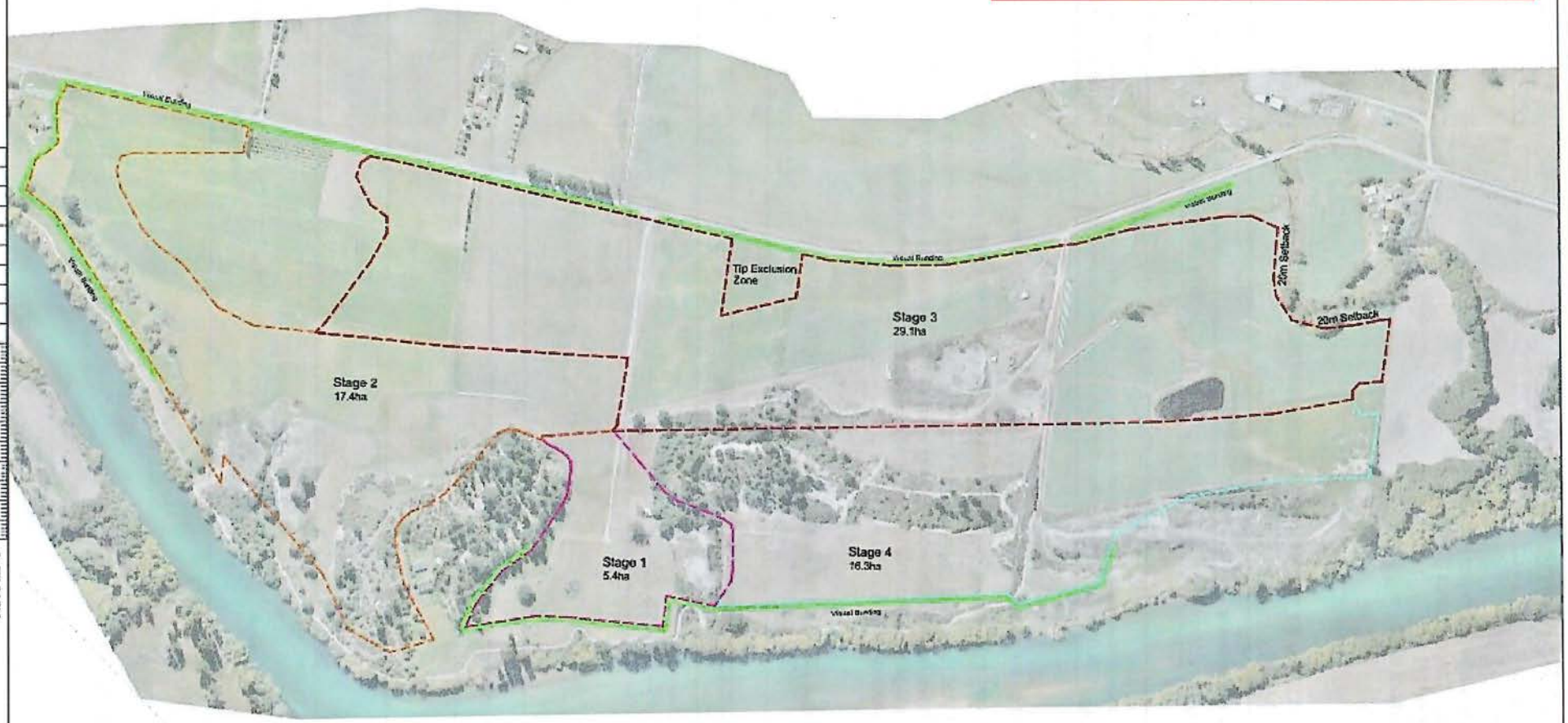
Checklist:

☐ Signature of all legal owners

☐ Site and/or subdivision plan with all required signatures

☐ Elevations with all required signatures (if applicable)

Please sign and date plan in conjunction to the Approval form.



Prepared For:

Hawkeswood Mining

No.	Amendments	Drawn	Date

Stage Plan

Millers Flat

Project No.: -	Surveyed: JR
Scale: 1:5000	Designed:
Date: 06/09/23	Drawn: JR
Sheet: 1	Checked: JR

Overview Surveying

Affected Persons Approval

To: The Manager, Planning and Environment
Central Otago District Council
PO Box 122
Alexandra 9340

TO BE COMPLETED BY THE PERSON(S) REQUESTING APPROVAL

Applicant(s): Hawkeswood Civil Limited

Type of resource consent: Land use consent

Proposed activity: Establish and operate a gold mining activity for the duration of 10 years

Location of site: 1346-1536 Teviot Road, Millers Flat (inclusive of road reserve within the area indicated on the attached plan)

I have sighted all the attached plans and supporting information for the above activity.

I hereby give unconditional approval for the application to be processed without public notification.

I understand that, by giving approval, the Council will not take into account any effects that the proposed activity may have on me, when considering whether this application should be notified (Section 95E of the Resource Management Act 1991) and whether the application should be granted (Section 104(3) of the Resource Management Act 1991).

TO BE COMPLETED BY THE PERSON(S) GIVING THEIR APPROVAL

Name: Matt Hunter

Organisation:

Address: 1534 teviot rd Millers Flat

Signature

25.9.23

Date

Name: Georgia Parker

Organisation:

Address: 1534 Teviot Road Millers Flat

Signature

25.9.23

Date

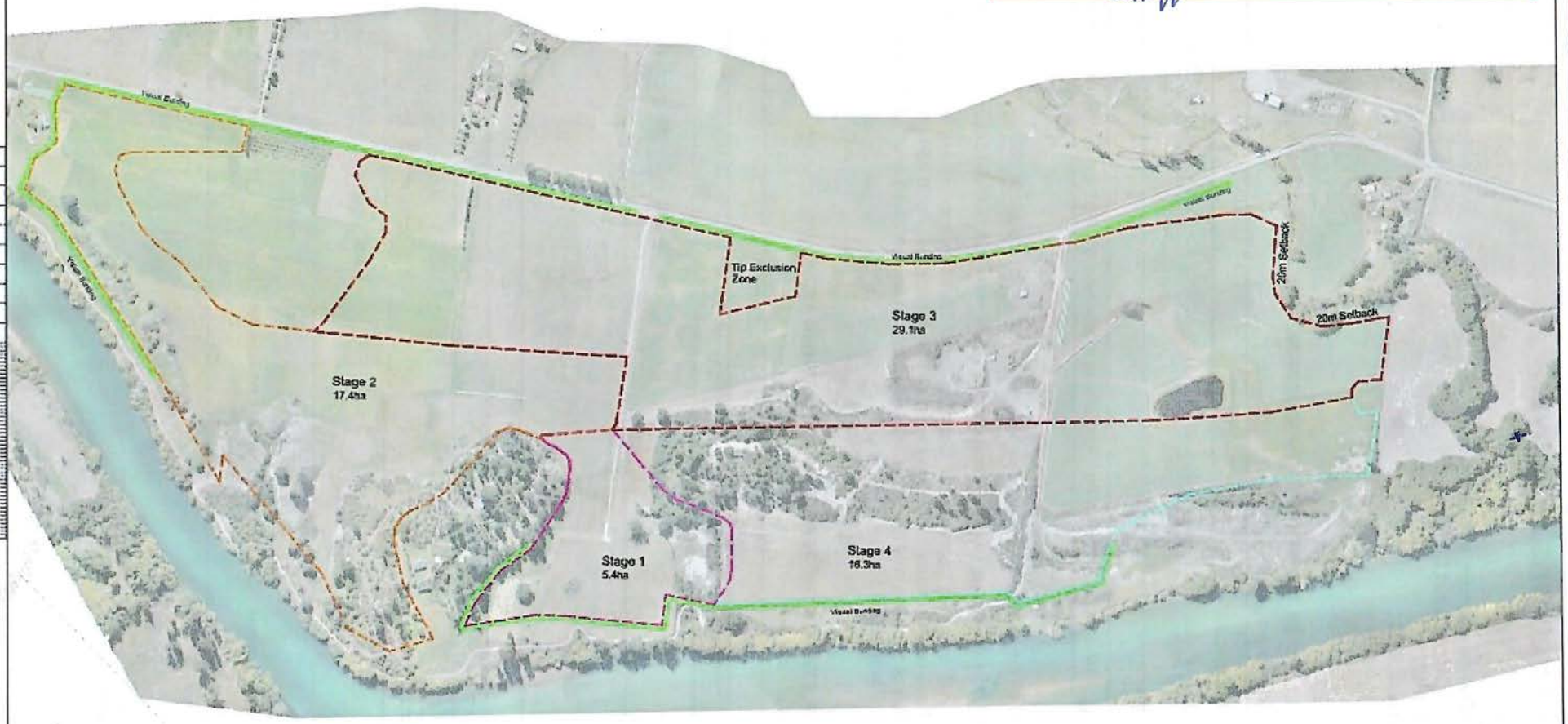
Checklist:

- ☐ Signature of all legal owners
- ☐ Site and/or subdivision plan with all required signatures
- ☐ Elevations with all required signatures (if applicable)

Please sign and date plan in conjunction to the Approval form.

25.9.23

25.9.23



Prepared For:

Hawkeswood Mining

No.	Amendments	Drawn	Date

Stage Plan

Millers Flat

Project No.	Surveyed JR
Scale 1:5000	Designed
Date 06/09/23	Drawn JR
Sheet 1	Checked JR

Overview SURVEYING

Affected Persons Approval

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TO BE COMPLETED BY THE PERSON(S) GIVING THEIR APPROVAL

Name: Laurie Allan Crawford

Organisation:

Address: 1346 Teviot Road

RD2 Roxburgh 9572

Signature

Date 22/9/23.

Name:

Organisation:

Address:

Signature L A Crawford

Date 22/9/23.

Checklist:

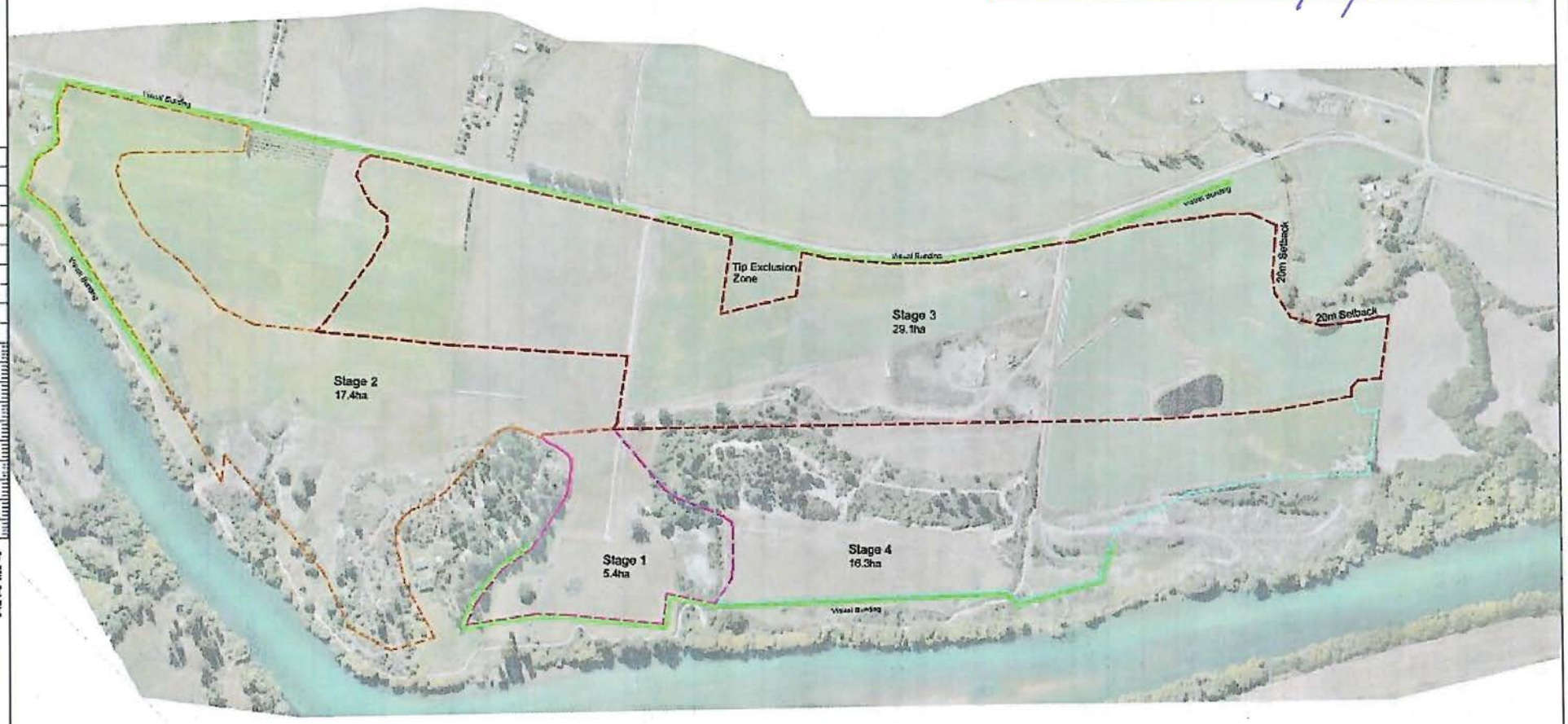
☐ Signature of all legal owners

☐ Site and/or subdivision plan with all required signatures

☐ Elevations with all required signatures (if applicable)

Please sign and date plan in conjunction to the Approval form.

L. J. Crawford 22/9/23.



ORIGINAL SIZE A3

File Ref.

Prepared For

Hawkeswood Mining

No.	Amendments	Drawn	Date

Stage Plan

Millers Flat

Project No. -	Surveyed JR
Scale 1:5000	Designed
Date 06/09/23	Drawn JR
Sheet 1	Checked JR

Overview SURVEYING

Affected Persons Approval

To: The Manager, Planning and Environment
Central Otago District Council
PO Box 122
Alexandra 9340

TO BE COMPLETED BY THE PERSON(S) REQUESTING APPROVAL

Applicant(s): Hawkeswood Civil Limited

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I hereby give unconditional approval for the application to be processed without public notification.

I understand that, by giving approval, the Council will not take into account any effects that the proposed activity may have on me, when considering whether this application should be notified (Section 95E of the Resource Management Act 1991) and whether the application should be granted (Section 104(3) of the Resource Management Act 1991).

TO BE COMPLETED BY THE PERSON(S) GIVING THEIR APPROVAL

Name: Gareth Wilson

Organisation:

Address: 1406 Teviot Road,RD2, Roxburgh. Otago 9572

Signature

Date: 04/10/2023

Name: Gabriel Campbell-Lloyd

Organisation:

Address: 1406 Teviot Road, RD2, Roxburgh. Otago 9572

Signature

Date: 04/10/2023

Checklist:

- ☐ Signature of all legal owners
- ☐ Site and/or subdivision plan with all required signatures
- ☐ Elevations with all required signatures (if applicable)

Please sign and date plan in conjunction to the Approval form.

04/10/2023

File Ref:

Prepared For:

Hawkeswood Mining

No.	Amendments	Drawn	Date

Stage Plan

Millers Flat

Project No.: -	Surveyed: JR
Scale: 1:5000	Designed:
Date: 06/09/23	Drawn: JR
Sheet: 1	Checked: JR

Overview SURVEYING

Crown Minerals Act 1991

Sections 25 and 29A

Minerals Exploration Permit 60712

I, SUSAN CATHERINE BAAS, National Manager Petroleum and Minerals, Energy and Resource Markets, acting pursuant to sections 25 and 29A of the Crown Minerals Act 1991 and acting pursuant to delegated authority under schedule 6, clause 2 of the Public Service Act 2020, grant to:

HAWKESWOOD MINING LIMITED **(Permit Operator)**

the exclusive right to explore for gold in the land described in Schedule 2.

This minerals exploration permit is granted for a term of 3 years commencing on 19 October 2021.

This permit is a Tier 2 permit unless and until a change to the tier status of the permit takes effect in accordance with section 2B or 2D of the Crown Minerals Act 1991.

This permit is granted subject to the Crown Minerals Act 1991 and all regulations made under that Act, and the conditions of the permit.

DATED this 19th day of October 2021

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

SUSAN CATHERINE BAAS

Schedule 1

General Conditions

RIGHTS GRANTED BY THIS PERMIT

1 The permit holder has the right to prospect for the specified minerals, in the permit area.

2 The permit holder has the right to explore for the specified Crown-owned minerals in the permit area.

GOOD INDUSTRY PRACTICE

3 The permit holder must make all reasonable efforts to explore and delineate the mineral resource potential of the land to which the permit relates in a proactive and efficient manner in accordance with this permit and good industry practice.

COMPLIANCE AND CONSENTS

4 In carrying out activities under this permit, the permit holder must:

(a) comply with the Crown Minerals Act 1991 (Act) and all other relevant legislative requirements;

(b) obtain any consents and approvals required under the Resource Management Act 1991, the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012 and any other applicable Acts; and

(c) in accordance with section 33A of the Act, obtain confirmation from the chief executive that WorkSafe has given its approval or consent before carrying out an activity under the permit that requires the approval or consent of WorkSafe (in respect of the requirements of the Health and Safety at Work Act 2015 or regulations made under that Act).

WORK PROGRAMME CONDITIONS

5 Where the permit holder is required to commit to work pursuant to the permit, the permit holder must satisfy the chief executive that the permit holder can fulfil that commitment.

RELINQUISHMENT OBLIGATIONS

6 In addition to any other relinquishment requirement imposed in accordance with the Act, the permit holder must (where required) relinquish an area of the permit determined in accordance with the Act and the Minerals Programme if an extension of duration is granted.

7 Where the permit holder is required to relinquish part of the permit area, the permit holder must submit to the chief executive a map of the proposed relinquishment area not later than 28 days before the relinquishment obligation is due.

SUBCONTRACTING

8 The permit holder is not discharged from any obligation arising under this permit by contracting a third party to perform the relevant obligation.

FEES

9 The permit holder must pay annual fees and any other applicable fees relating to this permit, in accordance with the relevant regulations.

ROYALTIES

10 In the event that minerals are produced from the permit area, the permit holder must notify the chief executive as soon as practicable.

11 The permit holder will be liable for payment of a royalty to the Crown calculated in accordance with the Crown Minerals (Royalties for Minerals Other than Petroleum) Regulations 2013.

12 In the event that royalties become payable under the permit, the Minister will determine the points of valuation for royalty calculation following consultation with the permit holder.

13 The permit holder must report and pay any royalties due in accordance with the relevant regulations.

REPORTING

14 The permit holder must submit reports to the chief executive in accordance with the relevant regulations.

ACTIVITIES OF OTHER OPERATORS IN THE PERMIT AREA

15 The permit holder must not unreasonably interfere with the activities of any other persons lawfully operating in the permit area.

RESTORATION

16 On completion of activities in the permit area, the permit holder must carry out restoration of the permit area in accordance with all regulatory requirements, consents and good industry practice.

Schedule 2

The Land to Which the Permit Relates

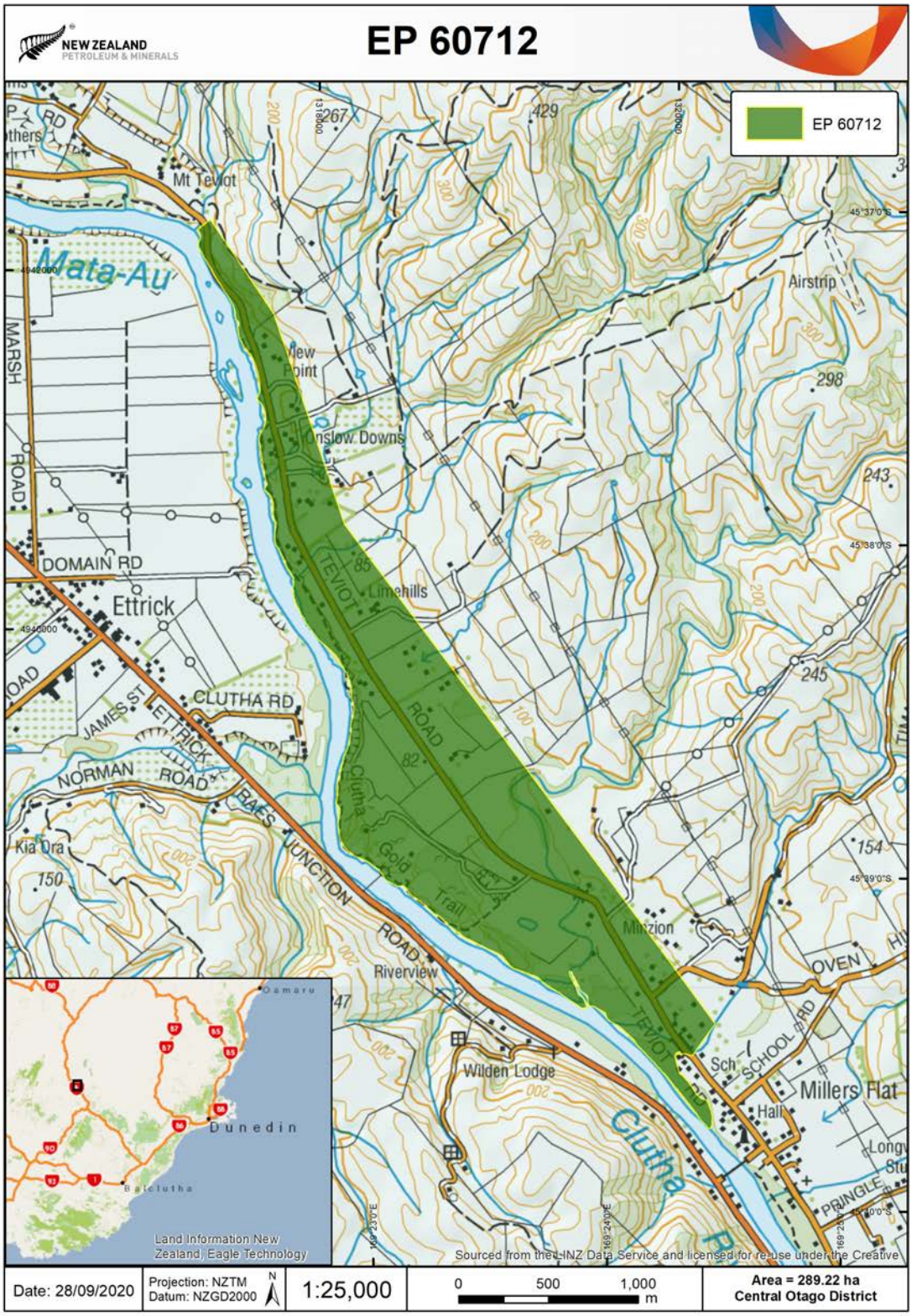
Land Area: 289.22 hectares

Regional Council: Otago Region

Territorial Authority: Central Otago District

Description of Land Area:

All that area of land as shown in the attached map and more particularly identified in the spatial database held by the chief executive.


EP 60712
NEW ZEALAND
PETROLEUM & MINERALS
EP 60712
Mata-Au
Mt Teviot
Onslow Downs
Airstrip
Limehills
Ettrick
DOMAIN RD
CLUTHA RD
JAMES ST
ETTRICK
NORMAN ROAD
RAES JUNCTION ROAD
TEVIOT ROAD
Gold Trail
Riverview
Wilden Lodge
Millers Flat
SCHOOL RD
PRINGLE
Kia Ora
Mt Zion
Clutha River
Dunedin
Balclutha
Oamaru
Land Information New Zealand, Eagle Technology
Sourced from the LINZ Data Service and licensed for re-use under the Creative
Date: 28/09/2020
Projection: NZTM
Datum: NZGD2000
1:25,000
0 500 1,000 m
Area = 289.22 ha
Central Otago District

Schedule 3

Minimum Work Programme

1 Within 36 months of the commencement date of the permit, the permit holder shall (to the satisfaction of the chief executive):

(a) complete a literature review and compile all available geological data into a GIS database;

(b) complete a programme of detailed geological mapping;

(c) complete a programme of bulk sampling for a minimum of 10 test pits;

(d) complete a programme of infill drilling for a minimum of 50 drill holes;

(e) complete a programme of step-out drilling for a minimum of 50 drill holes to determine the extent of the mineral resource;

(f) prepare a geological model;

(g) complete an updated mineral resource estimate;

(h) complete a mine feasibility study; and

(i) prepare a technical report detailing all work completed during this stage of the work programme, including the the submission of digital data in accordance with the regulations with sufficient quality assurance information to demonstrate the precision and accuracy of the data.

Crown Minerals Act 1991

Sections 25, 29A and 32

Minerals Mining Permit 60908

I, JEANNETTE MADELEINE WALKER, Manager Minerals Operations, Energy and Resource Markets, acting pursuant to sections 25, 29A and 32 of the Crown Minerals Act 1991 and acting pursuant to delegated authority under schedule 6, clause 2 of the Public Service Act 2020, grant to:

HAWKESWOOD MINING LIMITED **(Permit Operator)**

a subsequent permit to Minerals Exploration Permit 60712 which gives the exclusive right to mine for gold in the land described in Schedule 2.

This minerals mining permit is granted for a term of 10 years commencing on 17 April 2023.

This permit is a Tier 2 permit unless and until a change to the tier status of the permit takes effect in accordance with section 2B or 2D of the Crown Minerals Act 1991.

This permit is granted subject to the Crown Minerals Act 1991 and all regulations made under that Act, and the conditions of the permit.

DATED this 17th day of April 2023

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

JEANNETTE MADELEINE WALKER

Schedule 1

General Conditions

RIGHTS GRANTED BY THIS PERMIT

1 The permit holder has the right to prospect for the specified minerals, in the permit area.

2 The permit holder has the right to explore for and mine the specified Crown-owned minerals in the permit area.

GOOD INDUSTRY PRACTICE

3 The permit holder must make all reasonable efforts to mine the land to which the permit relates in a proactive and efficient manner in accordance with this permit and good industry practice.

COMPLIANCE AND CONSENTS

4 In carrying out activities under this permit, the permit holder must:

(a) comply with the Crown Minerals Act 1991 (Act) and all other relevant legislative requirements;

(b) obtain any consents and approvals required under the Resource Management Act 1991, the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012 and any other applicable Acts; and

(c) in accordance with section 33A of the Act, obtain confirmation from the chief executive that WorkSafe has given its approval or consent before carrying out an activity under the permit that requires the approval or consent of WorkSafe (in respect of the requirements of the Health and Safety at Work Act 2015 or regulations made under that Act).

WORK PROGRAMME CONDITIONS

5 Where the permit holder is required to commit to work pursuant to the permit, the permit holder must satisfy the chief executive that the permit holder can fulfil that commitment.

RELINQUISHMENT OBLIGATIONS

6 In addition to any other relinquishment requirement imposed in accordance with the Act, the permit holder must (where required) relinquish an area of the permit determined in accordance with the Act and the Minerals Programme if an extension of duration is granted.

7 Where the permit holder is required to relinquish part of the permit area, the permit holder must submit to the chief executive a map of the proposed relinquishment area not later than 28 days before the relinquishment obligation is due.

SUBCONTRACTING

8 The permit holder is not discharged from any obligation arising under this permit by contracting a third party to perform the relevant obligation.

FEES

9 The permit holder must pay annual fees and any other applicable fees relating to this permit, in accordance with the relevant regulations.

ROYALTIES

10 The permit holder will be liable for payment of a royalty to the Crown calculated in accordance with the Crown Minerals (Royalties for Minerals Other than Petroleum) Regulations 2013 and Schedule 4 of this permit.

11 The permit holder must report and pay any royalties due in accordance with the relevant regulations.

REPORTING

12 The permit holder must submit reports to the chief executive in accordance with the relevant regulations.

ACTIVITIES OF OTHER OPERATORS IN THE PERMIT AREA

13 The permit holder must not unreasonably interfere with the activities of any other persons lawfully operating in the permit area.

RESTORATION

14 On completion of activities in the permit area, the permit holder must carry out restoration of the permit area in accordance with all regulatory requirements, consents and good industry practice.

Schedule 2

The Land to Which the Permit Relates

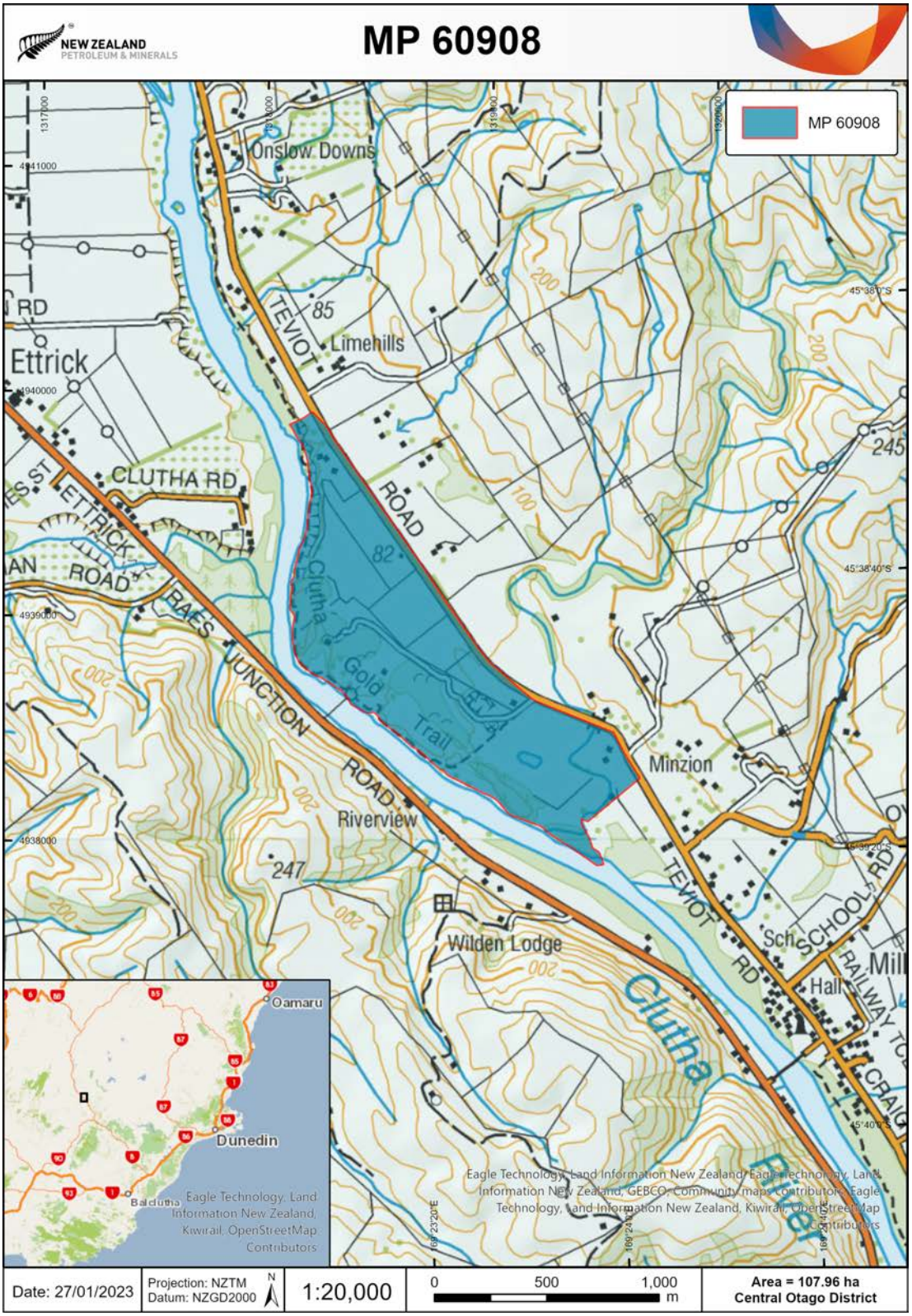
Land Area: 107.96 hectares

Regional Council: Otago Region

Territorial Authority: Central Otago District

Description of Land Area:

All that area of land as shown in the attached map and more particularly identified in the spatial database held by the chief executive.


NEW ZEALAND
PETROLEUM & MINERALS
MP 60908
MP 60908
Onslow Downs
Limehills
Ettrick
CLUTHA RD
ETTRICK ROAD
BAES JUNCTION ROAD
TEVIOT ROAD
Clutha Gold Trail
Minzion
Riverview
Wilden Lodge
SCHOOL RD
RAILWAY
Hall
Clutha River
Oamaru
Dunedin
Balclutha
Eagle Technology, Land Information New Zealand, Kiwirail, OpenStreetMap Contributors
Eagle Technology, Land Information New Zealand, GEBCO, Community maps Contributors, Eagle Technology, Land Information New Zealand, Kiwirail, OpenStreetMap Contributors
Date: 27/01/2023
Projection: NZTM
Datum: NZGD2000
N
1:20,000
0
500
1,000
m
Area = 107.96 ha
Central Otago District

Schedule 3

Minimum Work Programme

1 Within 24 months of the commencement date of the permit, the permit holder shall (to the satisfaction of the chief executive):

(a) commence mining on the permit.

2 The permit holder shall, to the satisfaction of the chief executive, carry out the following work programme:

(a) remove and stockpile overburden for subsequent rehabilitation;

(b) from the commencement of mining date specified in condition 1(a), undertake the mining of gold-bearing wash at the minimum rate of 100,000 cubic metres per year (unless otherwise approved in writing by the chief executive) using earthmoving equipment as required;

(c) undertake further resource test pitting and estimation as appropriate; and

(d) undertake rehabilitation as appropriate.

Schedule 4

Royalties

POINT OF VALUATION

1 Point of valuation is the permit boundary.

2 The annual reporting period for this permit is 1 January to 31 December as specified under the Crown Minerals (Royalties for Minerals Other than Petroleum) Regulations 2013.