1 Resource Consent Application

Otago Regional Council

This application is made under Section 88 of the Resource Management Act 1991.

(For Office Use Only)
Deposit Paid: $

Charges / Deposits

A deposit **must** accompany the application (see page **8** for amounts). The applicant will be invoiced for all costs incurred in processing this application that exceed the deposit.

Council can accept electronic lodgement of applications if sent to consents.applications@orc.govt.nz. Include "consent application" in the subject line.

Please complete the application in pen. For questions marked with an * you will find notes on page 4

1.* Applicant(s) Details

Applicant(s) name(s) in full: OCEANA GOLD (NEW ZEALAND) LIMITED

OR Company Name (in full) _____

OR Names of Trustees (in full) if Applicant is a Trust _____

or Name of Incorporation _____

Postal Address _____

_____ Post Code _____

Street Address (not a P O box number) 22 MACLAGGAN STREET, DUNEDIN

_____ Post Code 9016

Phone Number Business _____ Private _____

Mobile 021 872 488 Fax _____

Email Address gavin.lee@oceanagold.com

Please provide a valid and clear email address. Otago Regional Council is moving to a paperless consenting process – therefore any correspondence including decision documents and consent (if granted) will be sent via email, unless you request a paper copy.

If you do not prefer contact by electronic means, please tick ☐

1(a). Key Contact for Applicant Details

If the applicant consists of multiple parties (e.g. multiple consent holders, Trust etc) please outline who the key contact for the consent will be, if granted.

Key contact name(s) in full: _____

Postal Address _____

_____ Post Code _____

Street Address _____
(not a P O box number) _____
_____ Post Code _____

Phone Number Business _____ Private _____
Mobile _____ Fax _____

Email Address _____

Please provide a valid and clear email address. Otago Regional Council is moving to a paperless consenting process – therefore any correspondence including decision documents and consent (if granted) will be sent via email, unless you request a paper copy.

If you do not prefer contact by electronic means, please tick ☐

2.* Consultant/Contact Details (if not applicant)

Name of Consultant/ Contact Person: PHIL PETERSEN

Postal Address _____
_____
_____ Post Code _____

Phone Number Business _____ Private _____
Mobile 0221532912 Fax _____

Email Address phil.petersen@mitchelldaysh.co.nz

Please provide a valid and clear email address. Otago Regional Council is moving to a paperless consenting process – therefore any correspondence including decision documents and consent (if granted) will be sent via email, unless you request a paper copy.

If you do not prefer contact by electronic means, please tick ☐

3. On Site Supervisor/Manager Contact Details (if applicable)

Name of On Site Supervisor/Manager Person: GAVIN LEE

Postal Address please see 1.
_____
_____ Post Code _____

Phone Number Business _____ Private _____
Mobile _____ Fax _____

Email Address _____

Please provide a valid and clear email address. Otago Regional Council is moving to a paperless consenting process – therefore any correspondence including decision documents and consent (if granted) will be sent via email, unless you request a paper copy.

If you do not prefer contact by electronic means, please tick ☐

4.* a) Are there any current or expired resource consents relating to this proposal?

☑ Yes ☐ No

If yes, give Consent Number(s) and Description: Please see AEE
_____
_____

b) Do you agree to your current consent automatically being surrendered should a replacement consent be issued.

☐ Yes ☑ No

c) Has there been a previous application for this activity that was returned as incomplete?

☐ Yes ☑ No

If yes, give Consent Number(s) and Description: —

d) Have you a pre-application lodged with Council for this activity?

☐ Yes ☐ No

If yes, give pre-application Number(s) and Description: see AEE consultation

e) Have you spoken to a Council staff member about this application prior to lodging this application?

☐ Yes ☐ No If yes, please state name of staff member see AEE consultation

5. The applicant is (tick one): ☑ owner ☐ leasee ☐ prospective purchaser **of the land on which the activity occurs.**

6*. Who is the owner of the land on which the activity occurs/is to occur? (only complete if applicant is not the landowner)

Name of landowner:

Postal Address

Post Code

Phone Number Business Private

Mobile Fax

Email Address

7*. Who is the occupier of the land on which the activity occurs/is to occur? (only complete if the applicant is not the land occupier)

Name of land occupier

Postal Address

Post Code

Phone Number Business Private

Mobile Fax

Email Address

8*. Who leases the land on which the activity occurs/is to occur? (only complete if land is leased and it is not leased to the applicant)

Name of land leasee _____

Postal Address _____

_____

_____ Post Code _____

Phone Number Business _____ Private _____

Mobile _____ Fax _____

Email Address _____

9. Tick the consents required in relation to this proposal:

Water

- [x] Take Surface Water
- [x] Take Groundwater
- [ ] Divert
- [x] Dam

Discharge onto or into:

- [x] Land
- [x] Water
- [x] Air

Land Use:

- [ ] Bore construction
- [ ] Bore alteration
- [x] Activities in or on beds of lakes or rivers or floodbanks
- [ ] Disturbance of contaminated land

Coastal: [ ] Activities in the coastal marine area (i.e., below mean high water spring tide)?

Where you have indicated the type of consent that is required, you must complete the appropriate Application Form before your application can be processed. Application Forms can be found on the Council's website: www.orc.govt.nz.

10. What is the maximum term of consent you are seeking? see AEE years

11.Territorial Local Authority in which activity is situated?

- [ ] Dunedin City Council
- [ ] Clutha District Council
- [ ] Central Otago District Council
- [ ] Queenstown Lakes District Council
- [x] Waitaki District Council

12*. Do you require any other resource consent from any local authority for this activity?

- [x] Yes
- [ ] No

If Yes, please list: see AEE

Have these consents been applied for/issued? [x] Yes [ ] No If Yes

If Yes, please give the date applied for or issued: Concurrent.

Notes on Application Form Details

1. **Applicant(s) Details**

A resource consent can only be held by a legal organisation or fully named individual(s). A legal organisation includes a limited company, incorporated group or registered trust. If the application is for a trust the full names of all trustees are required. If the application is not for a limited company, incorporated group or trust, then you must use fully named individual(s).

2. **Consultant/Contact Details**

If you are using a consultant/agent for this application put their details here. If you are not, leave question 2 blank.

4 Previous Consent

Do you currently have a resource consent to do the activity that you are applying to renew with this application? If so, please enter the permit number if known and a brief description including the date of issue and the expiry date.

6-8 **Landowner, occupier and leasee**

If you are not the landowner, land occupier or leasee of the land where the activity will be undertaken, you may be required to obtain their unconditional written approval to your application. On pg 6 there is a form that can be used.

12. **Additional Consents**

If you are carrying out earthworks or building work you may need other consents from either the ORC or your Territorial Local Authority.

Declaration

Before signing the declaration below, in order to provide a complete application have you remembered to:

Fully completed this Form 1 and the necessary Application Forms ☑

Attached the required deposit.(or pay on line) (see page 8 for deposit that is payable) ☑
Cheques payable to Otago Regional Council

Please note: your deposit may not cover the entire cost of processing your application. At the end of the application process you will be invoiced for any costs that exceed the deposit. Interim invoices may be sent out for applications, where appropriate.
If the required deposit does not accompany your application, staff will contact you on the phone number provided on this form to request payment, and after 3 working days your application will returned if no payment is made for the required deposit.

I/we hereby certify that to the best of my/our knowledge and belief, the information given in this application is true and correct.

I/we undertake to pay all actual and reasonable application processing costs incurred by the Otago Regional Council.

Name/s PHIL PETERSEN
(BLOCK CAPITALS)

Signature/s _____
(or person authorised to sign on behalf of applicant)

Designation Consultant. Date 29 Jan 2020
(e.g., owner, manager, consultant)

Otago Regional Council Postal Address: 70 Stafford St, Private Bag 1954, Dunedin 9054

Consultation

– (consultation is not compulsory, but it can make a process easier and reduce costs).

Under Section 95E of the Resource Management Act 1991 (the Act) the Council will identify affected parties to an application and if the application is to be processed on a non-notified basis the unconditional written approval of affected parties will be required. Consultation with potentially affected parties and interested parties can be commenced prior to lodging the application.

Consultation may be required with the appropriate Tangata Whenua for the area. The address of the local Iwi office is: Aukaha, 258 Stuart Street, P O Box 446, Dunedin, Fax (03)477-0072, Phone (03) 477-0071, email: info@aukaha.co.nz. If you require further advice please contact the Otago Regional Council.

Good consultation practices include:

- Giving people sufficient information to understand your proposal and the likely effects it may have on them
- Allowing sufficient time for them to assess and respond to the information
- Considering and taking into account their responses

Written approval forms are appended to this form on Page 9.

Information Requirements

In order for any consent application to be processed efficiently in the minimum time and at minimum cost, it is critical that as much relevant information as possible is included with the application. **Where an application is significantly incomplete, the Consent Authority may decide not to accept the application for processing.**

Resource Management Act 1991
FOURTH SCHEDULE—ASSESSMENT OF EFFECTS ON THE ENVIRONMENT

(Below are the provisions of the 4th schedule of the Act, which describes what must be in an application for resource consent, as amended in 2015.)

1 Information must be specified in sufficient detail

Any information required by this schedule, including an assessment under clause 2(1)(f) or (g), must be specified in sufficient detail to satisfy the purpose for which it is required.

2 Information required in all applications

(1) An application for a resource consent for an activity (the **activity**) must include the following:

(a) a description of the activity:

(b) a description of the site at which the activity is to occur:

(c) the full name and address of each owner or occupier of the site:

(d) a description of any other activities that are part of the proposal to which the application relates:

(e) a description of any other resource consents required for the proposal to which the application relates:

(f) an assessment of the activity against the matters set out in Part 2:

(g) an assessment of the activity against any relevant provisions of a document referred to in section 104(1)(b). *("document" includes regional & district plans, regulations, national policy statements, iwi plans*)

(2) The assessment under subclause (1)(g) must include an assessment of the activity against—

(a) any relevant objectives, policies, or rules in a document; and

(b) any relevant requirements, conditions, or permissions in any rules in a document; and

(c) any other relevant requirements in a document (for example, in a national environmental standard or other regulations).

(3) An application must also include an assessment of the activity's effects on the environment that—

(a) includes the information required by clause 6; and

(b) addresses the matters specified in clause 7; and

(c) includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

3 Additional information required in some applications

An application must also include any of the following that apply:

(a) if any permitted activity is part of the proposal to which the application relates, a description of the permitted activity that demonstrates that it complies with the requirements, conditions, and permissions for the permitted activity (so that a resource consent is not required for that activity under section 87A(1)):

(b) if the application is affected by section 124 or 165ZH(1)(c) (which relate to existing resource consents), an assessment of the value of the investment of the existing consent holder (for the purposes of section 104(2A)):"(c) if the activity is to occur in an area within the scope of a planning document prepared by a customary marine title group under section 85 of the Marine and Coastal Area (Takutai Moana) Act 2011, an assessment of the activity against any resource management matters set out in that planning document (for the purposes of section 104(2B)

4 (relates to subdivisions- *not included here as subdivisions not ORC jurisdiction.)*

5 Additional information required in application for reclamation

An application for a resource consent for reclamation must also include information to show the area to be reclaimed, including the following:

(a) the location of the area:
(b) if practicable, the position of all new boundaries:
(c) any part of the area to be set aside as an esplanade reserve or esplanade strip.

Assessment of environmental effects

6 Information required in assessment of environmental effects

(1) An assessment of the activity's effects on the environment must include the following information:

(a) if it is likely that the activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity:
(b) an assessment of the actual or potential effect on the environment of the activity:
(c) if the activity includes the use of hazardous substances and installations, an assessment of any risks to the environment that are likely to arise from such use:
(d) if the activity includes the discharge of any contaminant, a description of—

(i) the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and
(ii) any possible alternative methods of discharge, including discharge into any other receiving environment:

(e) a description of the mitigation measures (including safeguards and contingency plans where relevant) to be undertaken to help prevent or reduce the actual or potential effect:
(f) identification of the persons affected by the activity, any consultation undertaken, and any response to the views of any person consulted:
(g) if the scale and significance of the activity's effects are such that monitoring is required, a description of how and by whom the effects will be monitored if the activity is approved:
(h) if the activity will, or is likely to, have adverse effects that are more than minor on the exercise of a protected customary right, a description of possible alternative locations or methods for the exercise of the activity (unless written approval for the activity is given by the protected customary rights group).

(2) A requirement to include information in the assessment of environmental effects is subject to the provisions of any policy statement or plan.

(3) To avoid doubt, subclause (1)(f) obliges an applicant to report as to the persons identified as being affected by the proposal, but does not—

(a) oblige the applicant to consult any person; or
(b) create any ground for expecting that the applicant will consult any person.

7 Matters that must be addressed by assessment of environmental effects

(1) An assessment of the activity's effects on the environment must address the following matters:

(a) any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects:
(b) any physical effect on the locality, including any landscape and visual effects:
(c) any effect on ecosystems, including effects on plants or animals and any physical disturbance of habitats in the vicinity:
(d) any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural value, or other special value, for present or future generations:
(e) any discharge of contaminants into the environment, including any unreasonable emission of noise, and options for the treatment and disposal of contaminants:
(f) any risk to the neighbourhood, the wider community, or the environment through natural hazards or the use of hazardous substances or hazardous installations.

(2) The requirement to address a matter in the assessment of environmental effects is subject to the provisions of any policy statement or plan.

Set out below are details of the amounts payable for those activities to be funded by fees and charges, as authorised by s36(1) of the Resource Management Act 1991.

Resource Consent Application Fees (from 1 July 2018)

Note that the fees shown below are a **deposit** to be paid on lodgement of a consent application and applications for exemptions in respect of water metering devices. This deposit will not usually cover the full cost of processing the application, and further costs are incurred at the rate shown in the scale of charges. GST is included in all fees and charges.

If you wish to make a payment via internet banking, or on line, the details are below. Please note the applicants name and "consent application" should be used as reference when paying the deposit -

For on line payments go to www.orc.govt.nz and go to Home/ Rates/ Way to Pay and follow prompts

	$
Publicly Notified Applications: [3]	
First application	5,000.00
Concurrent applications	225.00
	$
Non Notified Applications and Limited Notified Applications: [3]	
First application (except those below)	1,000.00
Concurrent applications [1]	50.00
Variation to conditions – s127	1,000.00
Administrative variation – s127	500.00
Exemptions from water measuring Regulations	200.00
Bores	500.00
Gravel	500.00
Hearings	Per Note 2 below
Payment for Commissioner request – s100A	Per Note 4 below
Objections	
Payment for Commissioner request – s357AB	Per Note 4 below
	$
Transfers and Certificates Deposits:	
Transfer of permits and consents	100.00
Priority Table	100.00
Section 417 Certificate	200.00
Certificate of Compliance	200.00
Section 125 – Extension of lapse date	100.00
All Other Costs	As per Scale of Charges

	From 1 July 2018 $
Scale of Charges:	
Staff time per hour:	
* Executive staff	235.00
* Senior Technical/Scientist	170.00
* Technical/Scientist	125.00
* Field Staff	100.00
* Administration	85.00
Disbursements	Actual
Additional site notice	Actual
Advertisements	Actual
Vehicle use per kilometre	0.70
Travel and accommodation	Actual
Testing charges	Actual
Consultants	Actual
Commissioners	Actual
Photocopying and printing	Actual
Councillor hearing fees per hour	
*Chairperson	100
*Member	80
*Expenses	Actual

Notes

1. For additional permits in respect of the same site, activity, applicant, time of application, and closely related effect as the first application.

2. The deposit payable shall be 90% of the cost of a hearing as calculated by Council in accordance with information contained in the application file and using the scale of charges. The amount payable will be due at least 10 working days before the commencement of the hearing. If the amount is not paid by the due date, then the Otago Regional Council reserves the right under S36 (7) of the Resource Management Act to stop processing the application. This may include cancellation of the hearing.

Should a hearing be cancelled or postponed due to the non payment of the charge, the applicant will be invoiced for any costs that arise from that cancellation or postponement.

Following completion of the hearing process, any shortfall in the recovery of hearing costs will be invoiced, or any over recovery will be refunded to the applicant.

Under Section 100A of the RMA, one or more submitters may make a request to have a resource consent application heard by one or more hearing commissioners who are not members of Council. In this case the applicant will pay the amount that Council estimates it would cost for the application to be heard had the request not been made, and the submitter(s) who made the request will pay, in equal shares, the cost of the application being heard that exceeds that amount payable by the applicant.

Further, the applicant may request to have a resource consent application heard by one or more hearing commissioners who are not members of Council. In this case, the applicant will pay the full costs.

3. Where actual and reasonable costs are less than the deposit paid, a refund will be given.

4. Where an applicant requests under s100A (for a consent hearing) or under s357AB (for the hearing of an objection) an independent commissioner(s); the applicant will be required to pay any increase in cost of having the commissioner(s).

   Where a submitter(s) requests under s100A an independent commissioner(s) any increase in costs that is in addition to what the applicant would have paid shall be paid by the submitter. If there is more than one submitter who has made such request the costs shall be evenly shared.

Administrative Charges
The following one-off administration charges shall apply to all resource consent applications received:

Publicly Notified and Limited Notified Applications	
	$
First application	100.00
Concurrent applications	50.00

Non-Notified Applications	
	$
First application	50.00
Concurrent applications	25.00

Other	
	$
Certificate of Compliance	25.00
Section 417 Certificate	25.00
Exemptions from water metering regulations	25.00

Review of Consent Conditions
Following the granting of a consent, a subsequent review of consent conditions may be carried out at either request of the consent holder, or, as authorised under Section 128, as a requirement of Council. Costs incurred in undertaking such reviews will be payable by the consent holder at the rates shown in the Scale of Charges above.

Reviews initiated by Council will not be charged to consent holders.

Compliance Monitoring Charges (from 1 July 2017)

1. Performance Monitoring
The following charges will apply to the review of performance monitoring reports for all consent holders, except those listed in section 1.6 below. The charges shown are annual fixed fees per performance monitoring report or plan, and are inclusive of GST.

1.1 Discharge to Air Consent	**From 1 July 2017**
	$
Measurement of contaminants from a Stack report	86.00
Ambient air quality measurement of contaminants report	100.00
Management plans and maintenance records	33.50
Annual Assessment report	66.50

1.2 Discharge to Water, Land and Coast

		$
• Effluent Systems	Environmental Quality report	46.50
	Installation producer statements	60.00
	Return of flow/discharge records	60.00
• Active Landfills	Environmental Quality report	58.00
	Management Plans	130.00
• Industrial Discharges	Effluent quality report	42.00
	Environmental report	92.50
	Return of flow/discharge records	60.00
Annual Assessment report		50.00
Management Plans – minor environmental effects		130.00
Management Plans – major environmental effects		260.00
Maintenance records		30.00

1.3 Water Takes	
Verification reports	60.00
Annual assessment report	50.00
Manual return of data per take	80.00
Datalogger return of data per take sent to the ORC	50.00
Telemetry data per consent	35.00
Administration fee – water regulations	100.00
Low flow monitoring charge*	
- Kakanui at McCones	327.00
- Unnamed Stream at Gemmels	1,431.00

*Charge for monitoring sites established by the ORC specifically to monitor consented activities in relation to river flows.

1.4 Structures	
Inspection reports for small dams	130.00
Inspection reports for large dams	260.00
Structure integrity reports	80.00

1.5 Photographs	
Provision of photos	60.00

1.6 Set Fees for Specific Consent Holders

Performance monitoring fees will be charges as 75% of actual costs for the following consent holders

Dunedin City Council
Central Otago District Council
Clutha District Council
Queenstown Lakes District Council
Waitaki District Council
Ravensdown
Contact Energy
Trustpower
Pioneer Generation

Additional charges may be incurred for new consents granted during the year.

2. Audit

Audit work will be charged at half of the actual cost incurred, with the actual costs being calculated using the Scale of Charges.

3. Non-Compliance, Incidents and Complaints

Enforcement work on consent conditions, and remedying negative effects from permitted activities – Scale of Charges.

Gravel Inspection and Management

Gravel extraction fee – $0.66 per cubic metre (incl. GST). Where more than 10,000 cubic metres of gravel is extracted within a prior notified continuous two month period, the actual inspection and management costs will be charged, as approved by the Director Corporate Services.

2 Application To Dam Water

Otago Regional Council

This form is to be used for applications seeking to dam water within a watercourse, or outside a watercourse where natural runoff will be captured.

(For Office Use Only)
Consent No.: _____
Job No: _____

PLEASE READ THIS PAGE BEFORE COMPLETING THE APPLICATION FORM

A number of resource consents may be required for the construction of a dam and the impoundment of water behind it. This schedule addresses the requirements for a water permit to dam water only.

Depending on the location of your dam structure, and if the dam structure is existing or new, you may not need to fill out all parts of this schedule.

Please note that additional permits may be required when damming water. These include:

- a water permit to take surface water or groundwater, should the dam impound water for which no consent is held to be taken (see Schedule 4 or 5), and
- a water permit to divert water, if flows are to be diverted during construction (see Schedule 3).
- a discharge permit to discharge water from a dam (see Schedule 7),
- a land use consent to disturb the bed of a watercourse and erect a dam structure in the bed of a watercourse, should construction activities occur in the bed of a watercourse (see Schedule 10C), and
- a discharge permit to discharge contaminants to water during dam construction (see Schedule 7) and
- a building consent for the dam structure *Please note that dam structures and dam modifications require a building consent under the Building Act (2004). The Otago Regional Council currently issue building consents for dams. You will need to apply to Council directly for a building consent. Application Forms are available on our website under 'Dams, their safety and building consents'"*

In order for any consent application to be processed efficiently in the minimum time and at minimum cost, it is critical that as much relevant information as possible is included with the application.

Form 1 and Schedule 2, when properly completed, may provide an adequate "Assessment of Effects on the Environment" (AEE) where the adverse effects of the dam proposal are not significant. The required detail for an AEE should reflect the scale and significance of the potential adverse effects the proposed dam may have on the environment. If the size of the proposed dam or scale of its potential effects is significant, a report by a professional advisor in support of your application may be required.

Guidance to answering the questions appear at the end of this schedule: "Notes to provide Guidance on Completing Schedule 2". Details of the information required in an AEE are included in the Fourth Schedule of the Resource Management Act 1991 appended to Form 1: Resource Consent Application.

If all the necessary information is not supplied with the application then Otago Regional Council may return your application, request further information or decline your application. This will lead to delays in the processing of your application and may increase processing costs.

If the effects of your proposal are considered to be minor and written approvals are gained from all parties that may be adversely affected by it, then your application(s) will proceed under non-notified consent provisions. If you are unable to supply the necessary written approvals from the affected parties, or if the effects of the proposal are more than minor, then Council must limited notify or fully notify the application. Such applications take longer to be processed than non-notified applications and may incur additional processing costs. Details of consultation required are presented in this document.

PART A: Description of the Proposed Damming and Associated Activities

A.1 Is the application to dam water:

- [x] a new consent, or
- [ ] to replace an existing consent? _____ **(consent number)**

A.2 Please indicate what provisions of Permitted Activity Rule 12.3.2.1 of the Regional Plan: Water for Otago, cannot be met by the proposed damming activity:

- [ ] The size of the catchment upstream of the dam is greater than 50 hectares in area.
  Size of catchment upstream of dam: _____
- [ ] The water immediately upstream of the dam is more than 3 metres deep.
  Maximum water depth behind dam: N/A
- [ ] The volume stored by the dam is more than 20,000 cubic metres.
  Maximum volume able to be stored behind dam: See AEE
- [ ] A lawful take will be adversely affected by the dam.
  Name whose take will be affected, and water permit number if known: _____
- [ ] A wetland identified in schedule 9 of the Regional Plan: Water or any wetland higher than 800 metres above sea level will be adversely affected by the dam.
  please name/describe wetland: _____
- [ ] The dam will cause either flooding, erosion, land instability, sedimentation or damage of another person's property.
  Name which effect above, and whose property (if relevant): _____

A.3 Purpose for damming water: (Tick as appropriate)

- [ ] Irrigation
- [ ] Water harvesting / storage
- [ ] Stock water
- [ ] Domestic water supply
- [x] Stormwater treatment
- [ ] Hydro-electric power generation
- [ ] Ornamental (specify): _____
- [x] Other (specify): Mining pit is not to be backfilled.

A.4 Other Resource Consents required

A.4.1 (a) Do you hold a water permit or deemed permit / mining privilege to take the water that is dammed?

- [ ] Yes *(permit number):* _____ *(go to Question A.4.2)*
- [x] No *(go to question A.4.1(b))*
- [ ] Not applicable *(specify why):* _____

(e) Attach any appropriate additional information? ❑

Including:

(i) An emergency action plan? ❑

(ii) The dam maintenance and operations manual? ❑

(f) Complete and attach any additional schedules for associated resource consents?

Schedule 3 (to divert water) ❑

Schedule 4 or 5 (to take surface water or groundwater) ❑

Schedule 7 (to discharge contaminants or water to water) ❑

Schedule 10C (to disturb the bed of a watercourse and erect a structure) ❑

Notes to provide guidance on completing Schedule 2

Part A: Description of the Proposed Damming and Associated Activities

Question A.1
If you are unsure whether there is an existing or expired resource consent check with Otago Regional Council. If you know your expiring consent number, or if you are applying to transfer your currently consented dam to another location, please supply the consent number.

Question A.2
The purpose of this question is to determine why the application for consent is required. Section 12.3 of the Regional Plan: Water for Otago outlines the rules relating to the damming of water. Please tick the relevant boxes and refer to the full Permitted Activity Rule 12.3.2.1 in the Regional Plan: Water for a full description of the Rule. Maps identifying wetland areas are identified on Map series F of the Regional Plan: Water for Otago. Please contact Council if you require any assistance.

Question A.3
Tick the boxes that indicate the purpose of your proposed dam.

Question A.4
Additional consents may be required from Council in relation to the damming of surface water depending on the nature of the proposal. These include permits for works in the bed of a river, the discharge of water to water and for the taking of surface water. Staff at the Otago Regional Council will be able to advise you whether your proposal meets the conditions of the Permitted Activity Rules or whether any additional consents are required.

Part B: Location of the Proposed Activity

Questions B.1 and B.2
Please provide the name and address of the owner and occupier (if different to landowner) of the land where the water will be dammed, and the land that will be inundated, or, if owned by the Crown (i.e. Crown riverbed), the land adjacent to the dam. A copy of your certificate of title may be obtained from Land Information New Zealand (www.linz.govt.nz). LINZ may also require a licence for you to occupy the bed of the water body with your intake structure (please contact LINZ directly).

*If the dam is on the bed of a large river (particularly "navigable rivers") the bed will likely be owned by the Crown. The beds of smaller watercourses are sometimes owned by the adjacent landowner(s).

Question B.3
NZTM 2000 maps are generally available from Public Libraries or may be purchased from Government Book Shops.

- ☐ Release of flushing flows
- ☐ Flood attenuation
- ☐ Provision of passage for migratory fish i.e. fish pass, diversion, climbing surface.
- ☐ Wetland creation
- ☐ Fencing of reservoir and riparian planting around the edges of the reservoir
- ☐ Other (Please specify)_____

Explanation:

_____

_____

_____

_____

PART F: Alternative Locations and Methods

F.1 Does your property have alternative locations for the dam (such as off stream locations, or stream of lower environmental value).

- ☑ No
- ☐ Yes *(please detail why your chosen location is considered the best option for you)*

The location of mining is to target ore bodies so location is fixed.

PART G: Consultation

G.1 Please comment on any consultation undertaken with those persons/parties who may be interested in or potentially affected by your proposal to dam water (e.g., other water users, Department of Conservation, Fish and Game Council, Iwi, Transit New Zealand etc).

Please see AEE

F.2 Please provide any written approvals to the activity using Council's standard Form 1 - Resource Consent Application

PART H: Is Your Application Complete?

H.1 In order to provide a complete application have you remembered to:

(a) Fully complete this schedule and Form 1 (Resource Consent Application) ☐

(b) Include a location / site plan? ☐

(c) Include photographs of the proposed/existing dam structure? ☐

(d) Enclose a Certificate of Title? ☐

E.2 Will the proposed damming of water affect any other individuals or organisations that may have an interest in that water?

(a)	Other water users	☐	Yes	☐	No	☑	Not Applicable
(b)	Recreational water users	☐	Yes	☐	No	☑	Not Applicable
(c)	Fish and Game Council	☐	Yes	☐	No	☑	Not Applicable
(d)	Iwi	☐	Yes	☐	No	☐	Not Applicable
(e)	Neighbouring landowners	☐	Yes	☐	No	☐	Not Applicable
(f)	Department of Conservation	☐	Yes	☐	No	☐	Not Applicable
(g)	Other *(e.g. Forest & Bird, LINZ)*	☐	Yes	☐	No	☐	Not Applicable

If you have answered "yes" to any of the above, please explain how they may be affected by your proposed dam:

If you have answered "no" to any of the above, please explain why they will not be affected by your proposed dam:

*If you have answered "yes" to any of the above, you may need that individual or organisation's written approval for your application to proceed under non-notified consent procedures. This is discussed further in Part G.

E.3 What are the positive effects of your proposed dam?

E.4 What monitoring, if any, do you propose to carry out to measure any effects of your proposed dam on the environment?

Water quality monitoring, monitoring of ground water levels and quality.

E.5 Please tick if you are adopting any of the following measures to ensure that any adverse effects will be avoided, remedied or mitigated:

D.5.2 Do you propose to hold public liability insurance for the dam in event of dam failure?

☐ Yes (please describe, including to what value the insurance is held for): _____

_____

_____

_____

_____

☐ No (please describe why not): _____

_____

_____

_____

_____

PART E: Assessment of Environmental Effects of the Proposed Dam

An assessment of effects should be proportional to the scale and significance of the proposed activity. Where your proposed take could have a significant effect on water body flow or levels a detailed environmental assessment is required.

E.1 Effects of the proposed damming of water on the surface water resource:

(a) Please list any known water users that your proposed dam may affect: _____

_____

(b) Will the damming of water have an effect on water availability to neighbouring properties?

☐ Yes ☐ No ☐ Unknown

If yes, please explain the effect

_____

_____

(c) Are there any of the following present within 500 metres of the proposed dam:

(i) Obvious signs or known aquatic biota?	☐ Yes	☐ No	☐ Unknown
(ii) Areas where food is gathered from the water body?	☐ Yes	☐ No	☐ Unknown
(iii) Natural Wetlands?	☐ Yes	☐ No	☐ Unknown
(iv) Waste discharges (e.g., dairy sheds, industrial, sewage)?	☐ Yes	☐ No	☐ Unknown
(v) Recreational activities (e.g., swimming, fishing, canoeing?)	☐ Yes	☐ No	☐ Unknown
(vi) Areas of special aesthetic value (e.g. waterfalls)?	☐ Yes	☐ No	☐ Unknown
(vii) Areas or aspects of significance to Iwi?	☐ Yes	☐ No	☐ Unknown
(viii) Other water takes?	☐ Yes	☐ No	☐ Unknown

If you have answered "Yes" to any of the above, describe what adverse effects your dam may have and the steps you propose to take to minimise (i.e. mitigate) these effects:

_____

_____

_____

_____

D.3.4 Will the public and/or stock be prevented from accessing the dam structure and its banks?

❑ Yes (please describe):_____

_____

_____

❑ No (detail why):_____

_____

_____

D.3.5 Will a Dam Safety Review, in accordance with the NZSOLD Guidelines (2000) be undertaken for the dam at regular intervals?

❑ Yes (please describe, including frequency of review, or the circumstances when review will be initiated, and how the review will occur):_____

_____

_____

_____

❑ No (detail why):_____

_____

_____

D.3.6 Has an Emergency Action Plan been prepared for the dam, in accordance with the NZSOLD Guidelines (2000)?

❑ Yes (please attach a copy to the application

❑ No (detail why):_____

_____

_____

D.4 Dam Operation and Management *(applicable to dams with a risk greater than "low", as defined by NZSOLD)*

Describe the operating regime of the dam on a separate page (or include an up-to-date copy of your operations and maintenance manual), including:

- Management of water levels.
- Management of discharges, including low flows/flow releases and flows over fish passes.
- If the dam will be used for water supply, demonstrate that the dam will provide sufficient storage to meet the projected demand, whilst providing for any proposed flow discharges.
- Maintenance and inspection of the dam embankment and spillways.
- Maintenance of reservoir including water quality control and removal of sediment and aquatic vegetation.

D.5 Dam Break Risk Assessment

D.5.1 Please provide a risk assessment report on downstream impacts in the event of dam failure. This report should be prepared by a suitably qualified person, such as an engineer. For dams with a risk greater than "low", inundation maps should be supplied. Please ensure that the location of any dams or infrastructure is shown.

D.2.3. What are the design flow capacities of the spillway?

_____

_____

D.2.4. Details of any proposed or current mitigation measures, including low flow outlets/bypasses and fish passes:

_____

_____

_____

D.2.5 For dams for the creation of stormwater treatment ponds, please provide details of the ways in which the dam will be operated to allow for appropriate stormwater detention or treatment.

_____

_____

_____

_____

_____

D.2.6. Supply accurate design drawings of the dam, including:

- Profile / elevation showing embankment cross section, design of foundations / key, conduits and drainage, service outlet and flood spillway design, and erosion protection.
- Location and design of any proposed mitigation measures, including low flow outlets / bypasses and fish passes.

D.3 Dam Safety

D.3.1 What is the potential hazard category for the dam in accordance with the NZSOLD Guidelines 2000?

- ☐ High potential impact structure
- ☐ Medium potential impact structure
- ☐ Low potential impact structure
- ☐ Very low potential impact structure

D.3.2 What is the design life of the dam:

_____

D.3.3 What maximum flood event is the dam designed to pass? _____

_____

_____

(note that all dams should be able to pass a probable maximum flood (PMF) event)

Estimated flow rate of design flood event: _____ m^3/s

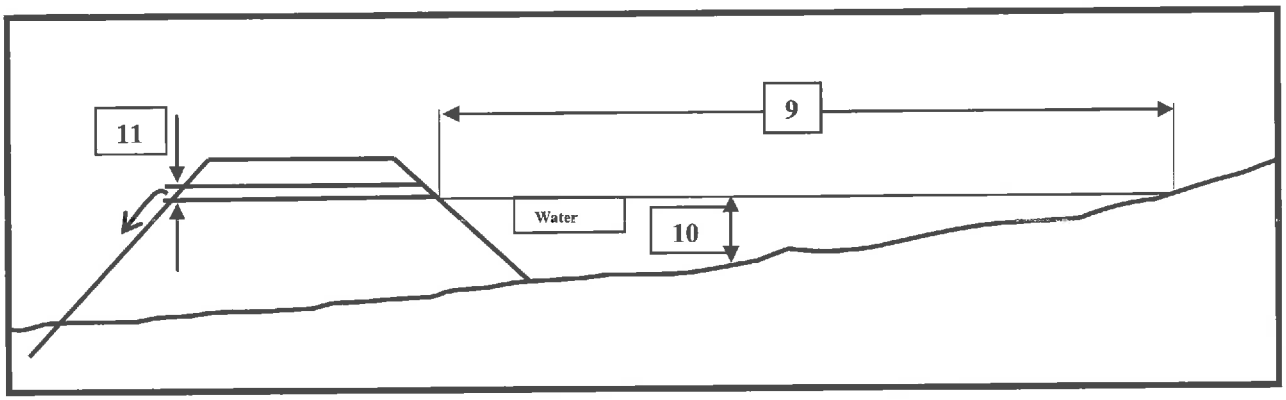
Any other comments:_____

_____

_____

_____

_____



9. Length of pond behind dam _____ m
10. Maximum depth of reservoir _____ m
11. Diameter of overflow pipe _____ m

Other dimensions not shown on diagrams

12. Crest length: _____ m N/A.
13. Spillway width: _____ m
14. Spillway depth: _____ m
15. Spillway inlet height: _____ m
16. Spillway gradient: _____
17. Spillway surface material: _____
18. Material used for erosion protection of dam faces:
    _____
19. Surface area of reservoir behind dam (when water level at overflow pipe or spillway level):
    Normal level _____ m
    Low level _____ m
    Flood level _____ m
20. Volume of water retained by dam (when water level at overflow pipe or spillway level):
    Normal level _____ m
    Low level _____ m
    Flood level _____ m

21. Describe in detail the junction between the shoulders and the dam: _____

_____

_____

_____

_____

D.2.2. What material/materials is the dam made out of (or to be made of)?

_____

_____

(h) Please enclose labelled photographs of the site with this application, including

(i) Proposed dam site, or ❑

(ii) If an existing structure, the upstream batter, downstream batter, abutments, spillway, outflow pipe, dam crest, overflow path; and ❑

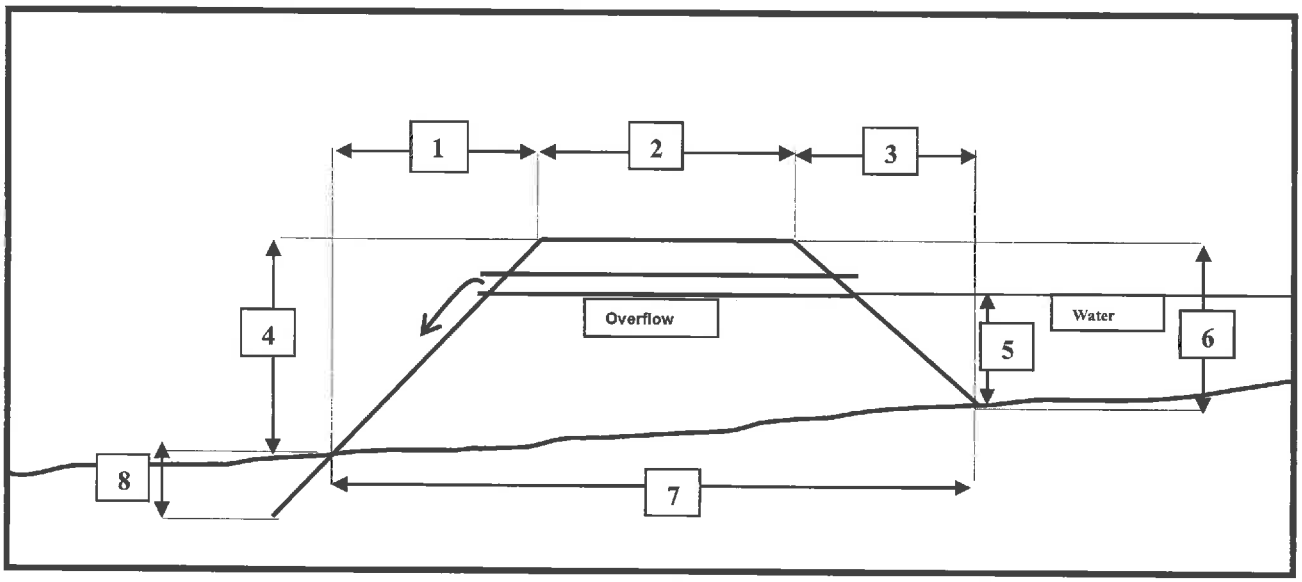
(iii) View upstream of the dam site ❑

(iv) View downstream of the dam site ❑

(v) Other (anything else of relevance) ❑

D.2 Dam Design and Dimensions

D.2.1 Please fill in the dimensions shown on the diagrams in the lists below (if the dam design is different from that shown below, please include a diagram showing all dimensions).



1. Downstream batter width _____ m NA
2. Crest width _____ m
3. Upstream batter _____ m
4. Downstream batter height _____ m
5. Overflow pipe height or spillway crest _____ m
6. Upstream batter height _____ m
7. Dam base width _____ m
8. Depth dam is to be keyed into existing ground _____ m

☐ No

(b) What is the surrounding land used for immediately downstream of the proposed dam? *(please ensure that land use downstream is described to a distance appropriate to the scale of possible downstream effects in the event of dam failure)*

Farming, Historic reserve.

C.3 Have you identified any fault zones, flood zones, landslip areas or other flood hazards that may impact on the dam structure?

☑ Yes (please describe): No 'dam structure' as such as is pit. However please see AEE for Geotech Report.

☐ No

PART D: Dam Design Details

D.1 Design and Construction Methodology

(a) Have you employed a professional advisor to design the dam?

☑ Yes (give details): Not a dam design but a pit for mining.

☐ No

(b) Have the New Zealand Society on Large Dams (NZSOLD) Guidelines (2000) been considered for this dam?

☐ Yes

☐ No (describe why not):_____

(c) What is the estimated start date of dam construction:_____

(d) What is the estimated completion date of dam construction:_____

(e) When will initial filling of the reservoir commence:_____

(f) When will initial filling of the reservoir finish:_____

(g) Give a description of site conditions and construction methodology, including (but not limited to)

- Foundation conditions, including any bore logs, results of shear strength testing etc.
- Excavation and key requirements
- Compaction requirements
- Proposed construction

(please note that for all larger dams of greater than "low" risk (as defined by NZSOLD), a professional engineering report will be required):

(e) The location of any spillway or overflow.
(f) The flow-path of any watercourse(s) *(please indicate the direction of flow with an arrow).*
(g) Any other relevant features that will allow identification of the location of the dam, such as roads, bridges, dwellings, historic or waahi tapu sites, or other landmarks.
(h) Overflow / flood paths *(include buildings and infrastructure that may be within the flood path).*
(i) Any upstream or downstream water users *(include name(s) and distance(s) if known).*
(j) A north symbol; and
(k) A scale

PART C: Description of the Water Resource/Catchment

C.1 If the proposed dam is located in a watercourse:

(a) Is the watercourse:

Perennial (flows all year round) : ☐

Ephemeral (flows intermittently or when there is rain) : ☐

(b) Mean flow of watercourse *(if known)*:_____(l/s or m^3/s)

(c) Mean annual low flow of watercourse (MALF) *(if known)*: _____(l/s or m^3/s)

(d) Describe frequency and duration of flows if ephemeral *(if known)*_____

_____

_____

(e) Flow for 50 year return period flood *(if known)*_____(l/s or m^3/s)

(f) Flow for 100 year return period flood *(if known)*_____(l/s or m^3/s)

(g) Flow for 100 year plus/super design event *(if known)*_____(l/s or m^3/s)

(h) Please describe the gradient of the watercourse or land on which the dam is to be located:_____

_____

_____

(i) Please describe composition of the bed of the watercourse on which the dam is to be located:_____

_____

(j) Please describe any aquatic life present in the watercourse (i.e. fish, invertebrates, aquatic vegetation and riparian vegetation):

_____

_____

_____

_____

(k) Aquatic waterfowl associated with the watercourse?

_____

_____

_____

C.2 If the proposed dam is located outside of a watercourse:

(a) Does the dam receive any natural runoff from the surrounding catchment?

☑ Yes (please describe): Some of WRS catchment will be diverted into pit after closure.

(c) Address/Location See AEE

(d) Legal Description(s) *(as shown on Certificate of Title)*

Lot _____ DP _____ Sec _____

Survey District (SD) _____

Area (Nearby town etc.) _____

Other (specify) _____

Council will obtain a Certificate of Title to confirm details, if necessary.

(e) Is the dam located on Crown Riverbed: Yes: ☐ No ☑

If Yes, give the legal description of the property adjacent to the point of take

—

B.2 If land is to be inundated as a result of the proposed dam structure, please describe the property(s) to be inundated

(a) Full name(s) of owner(s) See AEE

(b) Full name(s) of occupier(s) _____

(c) Address/Location _____

(d) Legal Description(s) *(as shown on Certificate of Title)*

Lot _____ DP _____ Sec _____

Survey District (SD) _____

Area (Nearby town etc.) _____

Other (specify) _____

B.3 Map reference of the proposed dam structure in NZTM 2000:

NZTM 2000: E See AEE N _____

B.4 If your proposed dam to be located within a watercourse, please provide the name of the watercourse:

N/A –

(If the water body is unnamed then note this and give the name of the water body to which it flows into)

B.5 Please provide a plan (A4 or A3 size) with this application that shows the following:

(a) The location of the proposed dam. See AEE

(b) Natural ground contours.

(c) The pattern of land inundation that will occur when the proposed dam is full.

(d) The legal boundaries of all property(s) that will be affected by the proposal, including the names of the owners and/or occupiers of those properties.

(b) Do you comply with the Permitted Activity Rules 12.1.2 or 12.2.2 of the Regional Plan: Water?

☐ Yes *(no resource consent to take water is required)* see AEE

☐ No *(a water permit may be required, see Schedule 4 or 5)*

A.4.2 **(a) Do you intend on discharging water from the dam into water (i.e. not to a pipe or race, but into a natural watercourse).**

☑ Yes *(please specify how):* pit modelled to overflow in year 2100 *(go to Question A.4.2(b))*

☐ No *(go to Question A.4.3)*

☐ Not applicable *(specify why):* _____

(b) Do you hold a Discharge Permit to discharge water to water from the dam?

☐ Yes *(permit number):* _____ *(go to Question A.4.3)*

☑ No *(go to Question A.4.3)*

A.4.3 **(a) Do you propose to construct a new dam in a watercourse?**

☐ Yes *(go to Question A.4.3(b))*

☑ No *(go to Part B)*

(b) For the associated bed disturbance, if consent to dam water is needed you will be unable to comply with the Permitted Activity Rules given in Section 13.5.1 of the Regional Plan: Water. As such a land use consent is required, please fill out Schedule 10C. For the associated discharge of contaminants (sediments, concrete, etc) during bed disturbance, a discharge permit is required, please fill out Schedule 7).

☐ *Please tick if Schedule 10C attached*

☐ *Please tick if Schedule 7 attached*

(c) For the erection/placement/alteration of the proposed dam structure within the bed of a lake or river, if consent to dam water is needed you will be unable to comply with the Permitted Activity Rules given in Section 13.2.1 and 13.3.1 of the Regional Plan: Water, and a land use consent is required, please fill out Schedule 10C).

☐ *Please tick if Schedule 10C attached*

(d) If you propose to divert the flow of the watercourse to construct a dam, are you able to comply with the Permitted Activity Rules given in Section 12.3.2 of the Regional Plan: Water?

☐ Yes (no resource consent to divert water is required)

☐ No (a *water permit for the diversion is required, see Schedule 3)*

PART B: Location of the Proposed Activity

B.1 Describe the property on which the proposed dam structure is to be located *(if the dam is located on Crown Riverbed, please note on (e) below)*

(a) Full name(s) of owner(s) See AEE

(b) Full name(s) of occupier(s) See AEE

Otago Regional Council

Resource Consent Application Form 4

To take and use surface water

This application is made under Section 88 of the Resource Management Act 1991.

1. Note to applicants

The purpose of this form is to provide applicants with guidance on information that is required for your application under the Resource Management Act 1991. This form acts as a guide only and Otago Regional Council reserves the right to request additional information.

Please ensure that you fully complete this form **as well as** a fully completed resource consent application form (form 1) in support of your application, **and** preparation of an **Assessment of Environmental Effects** in terms of the Fourth Schedule of the Resource Management Act 1991. Failure to do so may result in Council rejecting your application, requesting further information, or publicly notifying your application, leading to delays in the processing of your application and potential increases in processing costs.

Acceptance of your application for processing does not constitute a guarantee that water allocation is available.

2. General

2.1 This application is for (please tick any applicable box):

☑ A new surface water take

☐ An application to replace a current Water Permit

Water permit number: *Expiry date:*

☐ An application to replace a Deemed Permit / Mining Privilege

Deemed permit number: *Expiry date:*

2.2 A lapse period of 5 is sought. Provide reasons in application attached.

Note: This is the timeframe within which the consent must be given effect to. The default timeframe is 5 years after the date of commencement of the consent unless stated otherwise.

2.3 A consent term of see AEE is sought. Provide reasons in application attached.

Note: This is the timeframe from the date of commencement of the consent which the consent will expire.

2.4 Provide a map or coloured aerial photograph which outlines the following details (as applicable):

- ☐ The location of the existing and proposed point(s) of take and all associated infrastructure
- ☐ The location of the water measuring device(s) or system(s)
- ☐ The total property area boundary
- ☐ The area(s) to be irrigated (if relevant) by water applied for under this application
- ☐ The area of the community supply (if relevant)
- ☐ Distances to any discharge activities
- ☐ Other surface water bodies and wetlands, and distances from the point of take(s) to them
- ☐ The coastline and the distance to it (if relevant)
- ☐ The location of any dairy shed(s)
- ☐ The location of any known recreational activities, other water takes, areas of significance to iwi and areas where food is obtained from the water body.

see AEE

3. Volume and rates of take applied for

3.1 Quantity and rate of take

Note: 1,000 litres = 1 cubic metre

This is primarily a dewatering take so rate is as required.

a.	Maximum rate of take:	litres per second
b.	Maximum monthly volume:	cubic metres per month
c.	Maximum annual volume:	cubic metres per year

*Note: Some deemed permits refer to hourly/weekly rates. Water permits are issued in litres per second, m^3 per month and m^3 per year. Should you wish to seek hourly or weekly rates **in addition** to those listed on the form, please provide this information including justification for any variances.*

3.2 Frequency of take

Note both the maximum and estimated average take. as above.

	Average	Maximum
How many hours per day?		
How many days per week?		
How many weeks per month?		

3.2.1 In your application describe the timing of your take, including which months of the year you expect to take water in both an average year and a dry year, and what part of day the water take will generally occur.

3.2.2 In your application describe whether the take is from re-charge or is an augmented take, along with whether your activity provides re-charge back into the catchment.

3.3 Storage

3.3.1 Do you intend to store your water before subsequent use?

☐ Yes
☐ No

3.3.2 If yes, what/how much storage will be provided?

m^3

3.3.3 In your application outline the type of storage facilities that are proposed.

Note: You may need a building consent and/or additional resource consents for the construction of storage facilities. If the reservoir is in a water body or captures catchment runoff, you may require resource consents for damming and associated activities.

4. Point(s) of take description

4.1 What are the GPS coordinates of the point(s) you propose to take water from?

Note: if there are more than two points of take, please provide these details on a separate sheet.

Point 1: NZTM 2000 E: N:

Point 2: NZTM 2000 E: N: see AEE

4.2 Please provide photographs of the proposed point(s) of take ☐

4.3 What is the name of the water body/ies from which the proposed take(s) is/are to occur? N/A

Note: if the water body is unnamed please note this and note the water body it flows into.

4.4 If the take is from a river, stream, spring, drain or modified water body, in your application please provide a full description of the water course, including:

☐ The average channel width and depth at various locations including at the point of take and upstream and downstream of the point of take.

☐ Average flow water velocity including source of flow data and any changes to flow velocity above and below the point of take.

☐ Any flow gauging of the water body. A flow gauging report with photographs of the site and methodology to be attached.

☐ Bed of the water body at the point of take and upstream and downstream of the point of take. N/A.

Please also answer the following:

4.4.1 What type of water body **will** the take/s occur from? Pit and silt ponds.

☐ River

☐ Stream

☐ Modified water body

☐ Spring

☐ Drain

4.4.2 Is the water course perennial (flows all year round) or ephemeral?

☐ Perennial

☐ Ephemeral N/A

4.5 If the take is from a lake, pond or wetland please answer the following:

☐ Lake

☐ Pond NA

☐ Wetland

4.5.1 If the take is from a wetland, is the wetland classed as a Regionally Significant Wetland identified in Schedule 9 of the Regional Plan: Water for Otago?

☐ Yes (list the name and provide an assessment of effects on the wetland)

☐ No NA.

4.5.2 Has the wetland been formed by artificial means?

- ☐ Artificial
- ☐ Natural

NA

4.5.3 What is the surface area of the lake/pond/wetland?

4.5.4 How deep is the lake/pond/wetland? N/A

4.5.5 Does the lake/pond/wetland have an outlet? i.e. does water flow out of it?

- ☐ Yes
- ☐ No

N A.

4.5.6 What is the main source of water that fills the lake/pond/wetland?

- ☑ Groundwater
- ☐ Springs
- ☑ Runoff from surrounding land
- ☐ Direct rainfall
- ☐ Stream/river (list name)
- ☐ Other (provide details)

5. Historical water use

5.1 Water abstracted over at least the last 5 years NA

Note: if you are applying to replace an existing water permit for primary allocation, or an existing deemed permit or mining privilege you must provide evidence of the amount of water abstracted under that permit for at least the last five years.

The following usage evidence is provided in support of this application:

- ☐ Water metering records, attached to this application with historical water use summarised and assessed
- ☐ Water metering records sent to Council electronically or recorded on file by Council with historical water use summarised and assessed
- ☐ Detail on alternative water use information, attached to this application

5.2 In your application please analyse and assess the historical volumes and pattern of water use based on the water use evidence.

5.3 Provide a summary of your analysis below:

a. Maximum rate of take: litres per second

b. Maximum monthly volume: cubic metres per month

c. Maximum annual volume: cubic metres per year

5.4 For which years have these rates and volumes been recorded?

6. Water use and management

6.1 For what purpose(s) will the water be used?

- ☐ Stock water and/or dairy shed use
- ☐ Irrigation (provide detail of irrigation use in your application attached)
- ☐ Community supply
- ☐ Commercial/industrial
- ☑ Other

6.2 Will the water take be managed as part of an existing water allocation committee or water management group?

- ☐ Yes (name of committee of group):

NA.

- ☐ No

6.3 If yes, have you described how the allocation committee/management group operates in your application?

- ☐ Yes
- ☐ No

NA.

6.4 In your application describe any water rationing regime that operates in the catchment.

6.5 Will the take applied for be operated in accordance with the rationing regime you have described in question 6.4?

- ☐ Yes
- ☐ No

NA.

6.6 Will you or others "re-take" water from your take (i.e. via a water race)? If yes, please provide details of such re-takes in your application.

- ☐ Yes
- ☐ No

NA.

7. Measuring and reporting

7.1 In your application describe the type of water metering system that is installed or proposed to be installed.

Note: If currently installed provide proof of installation or note below if proof has already been provided to Council.

7.2 Provide information in your application demonstrating that the installation of the measuring device or system shall be undertaken in accordance with Council guidelines.

Note: If the installation is not able to meet these guidelines, you need to fill out and attach to this application form a Non-Standard Installation Form for Water Measuring Devices, available on our website or through the environmental services unit of the Council.

☐ Tick if completed

☐ Tick if completing a Non-Standard Installation Form for Water Measuring Devices

7.3 Is your water measuring device or system installed or proposed to be installed at the point(s) of take?

Note: The council considers the point of take to be within a 100 metre radius of the physical take point. If your answer is No, you need to apply for a Water Measuring Exemption (WEX) by filling out Application Form 24 – Application for Exemption to use a device or system near the location from which water is taken. A fully completed Form 24 should be lodged at the same time as this application to enable dual processing.

☑ Yes

☐ No – complete an Application Form 24 – Application for Exemption

8. Location and Efficiency of Water Use

8.1 Provide details of point/area of use (include legal description(s) and grid references.

☐ Yes (attached to application) SEE AEE

☐ No (please outline reasons why this has not been provided)

8.2 Provide a description of any existing works/infrastructure in place, including value, in your application.

☐ Yes (attached to application) SEE AEE

☐ No (please outline reasons why this has not been provided)

8.3 Provide a description of proposed works/infrastructure to give effect to consent sought, including value of investment, in your application.

☐ Yes (attached to application)

☐ No (please outline reasons why this has not been provided) See AEE

8.4 Provide an assessment of the proposed use against the Aqualinc report for reasonable water requirements[1].

☐ Completed

☐ Not Completed (provide details of alternative assessment and justification for that)

8.5 If you propose to use water to irrigate land, please outline:

a. How many hectares of land will be irrigated?

b. What is the soil type(s) of the land being irrigated? NA

c. What will you be irrigating (i.e. crop, pasture etc in ha)?

d. What is the target application rate (mm/day and mm/year)?

8.6 What type of irrigation system is proposed to be used or is currently being used?

☐ K-line

☐ Centre pivot

☐ Travelling irrigator NA

☐ Border-dyke/flood irrigation

☐ Other – provide details

8.7 Do you have any water distribution infrastructure in place (for example pipes, storage tanks, open races etc.)?

☐ Yes

☐ No NA

If yes, in your application please describe the type of infrastructure in place and how you intend to ensure that it is maintained in good working order (e.g. do you intend to have a

---

1 *"Guidelines for reasonable irrigation water requirements in the Otago Region", Aqualinc, 2017. Note that while this document provides a basis for assessing efficiency of use, other matters may be applicable.*

maintenance or leak detection programme, will the scheme be managed by an external company).

Note: For deemed permits please ensure you have the right to convey water under s417 of the Resource Management Act if that conveyance crosses another party's property, prior to the expiry of the deemed permit.

8.8 Do you intend to install any water distribution infrastructure (for example pipes, storage tanks, open races etc.)?

☐ Yes

☐ No

N/A.

If yes, in your application please describe the type of infrastructure to be installed and how you intend to ensure that it is maintained in good working order (e.g. do you intend to have a maintenance or leak detection programme, will the scheme be managed by an external company).

Note: For deemed permits please ensure you have the right to convey water under s417 of the Resource Management Act if that conveyance crosses another party's property, prior to the expiry of the deemed permit.

8.9 If you propose to use water for stock and/or dairy shed use – please answer the following:

Note: The Council considers the following values as efficient use of water for stock:

Sheep	*5 litres per day per head*
Beef cattle	*45 litres per day per head*
Dairy cows	*70 litres per day per head*
Deer	*15 litres per day per head*
Dairy shed use	*50 litres per day per head*

N/A

8.9.1 What type of animal and numbers of stock will be supplied with water for drinking?

Sheep
Number: Water required: litres/head/day

Beef cattle
Number: Water required: litres/head/day

N/A

Dairy cows
Number: Water required: litres/head/day

Other
Number: Water required: litres/head/day

8.9.2 How much water do you require for your dairy shed?

litres/head/day N/A

8.9.3 If you are seeking more water for stock and/or dairy shed use than that recommended by the Council please state why this is in your application.

Note: please provide the source of any data provided. Also include details of stock water transportation if relevant.

8.10 If you propose to use water for industrial use – in your application state what type of industry will be using the water and how will the water be used.

Please see AEE, Dewatering and dust suppression

8.11 If you propose to use water for community/domestic supply – please answer the following:

a. For households, the number of households to be supplied:

b. For camping grounds, the maximum number of visitors and staff per year:

c. For schools, the maximum number of students and staff per year:

d. For motel units, the number and expected occupancy: N/A

e. Other uses (please describe):

8.12 For all uses, demonstrate in your application how have you calculated the amount of water you need?

Note: Please note that the Council will only grant volumes that have been assessed as efficient, and will assess the volumes sought for efficiency, taking into consideration the local climate, soils, and crop type.

☐ Tick if completed. NA - for dewatering.

8.13 In your application please describe any other sources of water available for the property. How much water is available and what it is used for.

8.14 In your application please describe any measures you are proposing to minimise wastage of water and maximise its efficient use.

N/A.

9. Assessment of Environmental Effects

Note: Pursuant to Schedule 4 of the Resource Management Act, 1991, there are a number of matters that must be addressed by an assessment of environmental effects. These matters are listed in Form 1, with additional or specific matters relating to water permits are listed below.

9.4 Provide an independent ecological assessment/instream assessment of the water body. It is recommended that all takes not from the main stem of a catchment have this assessment carried out.

- [x] Yes (attached to application)
- [ ] No (please outline reasons why an independent ecological assessment has not been undertaken in your application)

9.5 Outline any physical effect on the locality, including any landscape and visual effect.

- [x] Yes (attached to application)
- [ ] No (please outline reasons why this has not been provided)

9.6 Outline any effect on ecosystems, including effects on plants or animals and any physical disturbance of habitats in the vicinity of the point of take.

- [x] Yes (attached to application)
- [ ] No (please outline reasons why this has not been provided)

9.7 ~~Does the taking of water from the water body cause it to dry up during summer~~ or does the water body naturally dry up downstream of the take?

- [x] Yes
- [ ] No

If Yes, your application should explain approximately how far downstream from your this occurs and in approximately which month in a wet year, average year and dry year this happens.

Note: Please discuss and attach any evidence to the application (e.g. photographs of water body downstream):

9.8 Assess effects on cultural values.

- [x] Yes (attached to application) Awaiting CIA for proposal.
- [ ] No (please outline reasons why this has not been provided)

9.8 Assess any effect on other water users or other human use values.

- [x] Yes (attached to application)
- [ ] No (please outline reasons why this has not been provided)

9.9 Describe any positive effects from the take.

- [x] Yes (attached to application)
- [ ] No (please outline reasons why this has not been provided)

9.10 Outline the mitigation you propose in your application. This should include a consideration of the following:

- [ ] A residual flow
- [ ] Fish screening on water intakes
- [ ] Measures for management where there are low flows
- [ ] Flow sharing measures
- [ ] Whether base flow is necessary to maintain the water race
- [ ] Any other applicable measures

see AEE

9.10 Outline if your instantaneous abstraction rate (litres per second) will be reduced by increasing the length of time over which water is taken.

- [ ] Yes (attached to application)
- [ ] No

N/A.

9.11 Provide a description of any possible alternative water sources or methods for undertaking the activity and why these alternatives have not been selected.

- [ ] Yes (attached to application)
- [x] No (please outline reasons why this has not been provided)

Dewatering always required.

10. Consultation

10.1 Include evidence of any consultation undertaken for this application.

see AEE

10.2 Identify persons affected by this application.

see AEE

10.3 Which persons approval have been provided to the application (attach copies of approvals)?

*Note: This **may** include (but not be limited to) consultation with adjoining landowners, other consent holders in the immediate area such as downstream permit holders, iwi (e.g. Te Rūnanga O Ngāi Tahu, Aukaha, Te Ao Marama Inc.), government departments/ministries (e.g. DOC), territorial authorities and recreational associations. To reduce costs and processing times, we recommended that written approval is obtained and submitted with the application for parties which may be affected. Such approval must be unconditional to avoid notification.*

11. Statutory Assessment

See AEE

Please note that in accordance with Schedule 4 of the RMA, you are also be required to provide an assessment against the relevant provisions of the following documents (if relevant):

- ☐ National Policy Statement for Freshwater Management.
- ☐ National Policy Statement for Renewable Electricity Generation.
- ☐ Resource Management (Measurement and Reporting of Water Takes) Regulations 2010.
- ☐ National Environmental Standard for Sources of Human Drinking Water.
- ☐ New Zealand Coastal Policy Statement.
- ☐ Operative Regional Policy Statement 1998, Proposed Regional Policy Statement and Partially Operative Regional Policy Statement 2019.
- ☐ Regional Plan: Water for Otago (including description of permitted activities and compliance with permitted activity standards).
- ☐ Kai Tahu ki Otago Natural Resource Management Plan 2005.
- ☐ Ngāi Tahu ki Murihiku Natural Resource and Environmental Iwi Management Plan 2008 (for takes from the south side of the Clutha River/Mata-Au)
- ☐ Any other relevant plan, proposed plan and any other relevant regulations.

Resource Consent Application Form 5

To Take and Use Groundwater

Otago Regional Council

This application is made under Section 88 of the Resource Management Act 1991

Phone: 0800 474 082

Website: www.orc.govt.nz

IMPORTANT NOTES TO THE APPLICANT

Disclaimer:
If council accepts your application for processing this does not constitute a guarantee that groundwater allocation is available.
You should contact the council's Resource Science Unit in regard to water availability **before** you lodge your application. If no allocation is available then the activity will be prohibited and no resource consent will be granted.

Ensure that you complete this application Form 5 **and** Resource Consent Application Form 1 **in full**

For any consent application to be processed efficiently in the minimum time and at minimum cost, it is critical that as much relevant information as possible is included with the application. If all the necessary information is not entered on the form or supplied with the application then Otago Regional Council may **return your application**, request further information or publicly notify your application. This will lead to delays in the processing of your application and may increase processing costs. The Council advises as a precaution, applications for replacement water permits should be lodged at least **6 months** prior to their expiry, to ensure allocation is retained. Please note that an application to replace an existing water permit that has not been lodged and received by the Council at least **3 months** prior to its expiry, may lose its allocation.

This application form, when properly completed, should provide an adequate "Assessment of Effects on the Environment" (AEE) where the adverse effects of a proposal are not significant. However, this can only be determined on application. Guidance for the minimum aquifer test requirements are located at the end of this form.

PART A: GENERAL

A.1 Is this application for *(tick which applies)*:

☑ a NEW groundwater take; or

☐ an application to REPLACE a current Water Permit?

Water Permit number: .....

Expiry date:

If you are applying to transfer the point of a water take or vary a condition of an existing Water Permit, **stop now** and please use Form 16 or Form 22 instead.

A.2 If you are applying to replace an existing Water Permit, do you have evidence of the amount of water historically abstracted under the permit?

☐ Yes, my records are attached with the application _____years of records attached

☐ Yes, the Otago Regional Council has my records. *Note: You will be charged for all time spent retrieving and analysing records held on Council files*

See AEE

See AEE

☑ I don't have any records but have other evidence of historical use (e.g. description and photos of existing functioning infrastructure, aerial photographs of irrigated area, electricity records for pump). You must provide evidence of the previous use of the permit including how much water has been used each year over what period.

PART B: DESCRIPTION OF THE POINT OF TAKE

IF THE BORE IS NOT YET CONSTRUCTED, OR IS UNCONSENTED, **STOP** NOW AND APPLY FOR THE LAND USE CONSENT TO CONSTRUCT A BORE OR BORES AND OBTAIN THIS BEFORE YOU APPLY TO TAKE GROUNDWATER. FORM 9A IS AVAILABLE ON THE COUNCIL WEBSITE.

B.1 What are the consent and bore tag numbers for the bore(s) where water is proposed to be taken?

Bore 1: Consent Number: ..... Bore tag number .....
Bore 2: Consent Number: ..... Bore tag number .....
If more than 2, please provide details on a separate sheet

B.2 What are the GPS co-ordinates of the location of the bore(s) from which groundwater is proposed to be taken?

Bore 1: NZTM 2000 E ..... N .....
Bore 2: NZTM 2000 E ..... N .....
If more than 2, please provide details on a separate sheet

B.3 Tick the box next to the aquifer that the water is proposed to be taken from. If you are unsure refer to Maps C1-C17 in the Regional Plan: Water for Otago and maps contained in Plan Change 4A (they are available for viewing on www.orc.govt.nz, or at our offices). Information on the location of the 'others' list can be obtained from council's Resource Science Unit.

- ☐ Cardrona Alluvial Ribbon
- ☐ Cromwell Terrace
- ☐ Dunstan Flats
- ☐ Earnscleugh Terrace
- ☐ Ettrick Basin
- ☐ Hawea Basin
- ☐ Inch Clutha River/Mata-Au Gravel
- ☐ Kakanui-Kauru Alluvium
- ☐ Kuriwao Basin
- ☐ Lindis Alluvial Ribbon
- ☐ Lowburn Alluvial Ribbon
- ☐ Lower Taieri
- ☐ Lower Waitaki Plains
- ☐ Maniototo Tertiary
- ☐ Manuherikia Alluvium
- ☐ Manuherikia Claybound
- ☐ North Otago Volcanics
- ☐ Roxburgh Basin
- ☐ Papakaio
- ☐ Pomahaka Basin
- ☐ Shag Alluvium
- ☐ Wanaka Basin Cardrona Gravels
- ☐ Wakatipu Basin
- ☐ Unknown

Others:

- ☐ Bendigo
- ☐ Clydevale
- ☐ Glenorchy
- ☐ Strath Taieri
- ☐ Tarras
- ☐ Wairuna

B.4 Do you have a bore log for your bore(s)?

- ☐ Yes and it is enclosed with this application, go to **Part C**.
- ☐ Yes and it was provided to the Otago Regional Council after the bore was constructed, go to **Part C**
- ☐ No, go to B.5

SEEAEE

B.5 Please complete the following if no bore log is available.

Date bore drilled: .....
Driller: .....
Total depth of bore: .....
Diameter of bore: .....
Static water level: .....
If more than one bore, please provide the information on a separate sheet.

PART C: VOLUME AND RATES OF TAKE

C.1 What quantity of water do you propose to take and at what rate will it be taken? Note: 1,000 litres = 1 cubic metre

(a) maximum rate of take ..... litres per second

(b) maximum daily volume ..... litres per day; **or**

..... cubic metres per day

(c) maximum weekly volume ..... cubic metres per week

(d) maximum monthly volume ..... cubic metres per month

(e) maximum annual volume ..... cubic metres per year

C.2 What is the frequency of your proposed water take?

	Average	**Maximum**
(a) How many hours per day?	.....	.....
(b) How many days per week?	.....	.....
(c) How many weeks per month?	.....	.....

(d) In which months do you expect to take water? *(tick those relevant)*

	July	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
Average												
Dry year												

C.3 Over what part of the day will you typically take water?

☐ During the day
☐ During the night
☐ Other *please specify* .....
☐ 24 hours
☐ 'on demand'

C.4 Are you intending to harvest water for storage before subsequent use?

☐ No, go to question **C.6.**
☐ Yes: Capacity of water storage reservoir(s) ..... cubic metres

See AEE

C.5 Is your water storage reservoir 3 metres or more in depth and impounds more than 20,000 cubic metres of water?

☐ No.

☐ Yes, a building permit may be required, contact the Duty Resource Management Administration Officer or visit the Council website www.orc.govt.nz.

C.6 Is your proposed take from a Schedule 2C Aquifer (of the Regional Plan: Water)?

Schedule 2C Aquifers:

Kakanui Kauru Alluvium Aquifer, Shag Alluvium Aquifer, Lindis Alluvial Ribbon Aquifer, Cardrona Alluvial Ribbon Aquifer, Lowburn Alluvial Ribbon Aquifer

☐ Yes: which one ..... ☐ No, go to question **C.9**.

C.7 For Schedule 2C Aquifers what is the name of the surface water body connected to your proposed point of take?

e.g. for Kakanui-Kauru Alluvium Aquifer is it the Kakanui River, Kauru River, a tributary of these or another named water course?

.....

C.8. Is your proposed point of take(s) within 100 metres of a connected perennial surface water body?

☐ No, go directly to **Part D** ☐ Yes, go to question **C.10**

C.9 What is the name of the surface water body within 100 metres of your proposed point of take?

i.e. Lake Dunstan, Waiareka Creek or a tributary of Stoney Creek, etc

.....

C.10Maximum Allocation Volume – Note to applicant

The Regional Plan: Water manages the volumes of water taken from aquifers to prevent long term depletion of base flow to surface water bodies and salt water intrusion of the aquifer. It does this by either assigning a Maximum Allocation Volume for specific aquifers or by considering the maximum annual take and the expected recharge and requiring that a take should not exceed 50 % of the mean annual recharge of the aquifer.

An assessment of the maximum allocation volume for the Aquifer relevant to your take will be undertaken in processing your application and restrictions may be imposed in accordance with Schedule 4B of the Regional Plan: Water

C.11 For Rivers, Streams, modified water courses, springs or drains answer questions (a)-(g), for Lakes, ponds and wetlands go to Question C.13.

(a) What type of water course is identified in C.9 above. *Tick those relevant*

☐ River ☐ Modified watercourse ☐ Drain

☐ Stream ☐ Spring

(b) Is the water course:

☐ Perennial (flows all year around) ☐ Ephemeral (flows only as a result of rainfall)

(c) What is the average channel **width** nearest to your proposed point of take? ..... metres

(d) What is the average channel **depth** nearest to your proposed point of take? ..... metres

SEE AEE

(e) What is the estimated average water flow velocity? ..... metres/second

(f) How would you describe the bed of the water course? *Tick those relevant*

☐ Muddy ☐ Boulders ☐ Gravels and cobbles ☐ Sandy ☐ Hard rock

(g) Are you able to supply estimated minimum and maximum flow rates for the water course?

☐ No, go to **Part D**

☐ Yes, please complete the following

Minimum: ..... litres per second
Maximum: ..... litres per second
Location of estimate:

☐ adjacent to proposed point of take ☐ Other

Source of flow data:

.....

C.11 For Lakes, Ponds and Wetlands, answer points (a)-(f) below.

(a) What type of water body is identified in C.10 above. *Tick those relevant*

☐ Lake ☐ Pond ☐ Wetland

(b) Has the water body been formed by artificial means?

☐ Yes ☐ No

(c) What is the surface area of the lake/pond/wetland? .....

(d) How deep is the lake/pond/wetland? .....

(e) Does the lake/pond/wetland have an outlet? i.e. does water flow out of it?

☐ Yes ☐ No

(f) What is the main source of water that fills the lake/pond/wetland? *Tick as many boxes as is relevant*

Direct rainfall

☐ Springs ☐ Groundwater ☐ Runoff from surrounding land

☐ Stream/rivers name: .....

☐ Other consented water takes:

consent numbers: .....

PART D: WATER MEASURING AND REPORTING INFORMATION

The Resource Management (Measurement and Reporting of Water Takes) Regulations 2010 apply to water permits where water is taken at more than 5 litres per second. The Regulations require continuous measurement of the water taken and for the daily records to be provided to the Otago Regional Council at the end of the water year. It also requires verification of the device or systems installed.

Note: According to the Regulations the water year is from 1 July through to 30 June in the following year. It is also the Council's policy to require water measuring devices or systems and dataloggers to be fitted on **all** water takes.

D.1 What is the maximum capacity of the pump you propose to install? .....

D.2 Is a water measuring device or system...

☐ Proposed to be installed; or ☐ Already installed

SEE AEE and conditions.

D.3 Is a data logger installed, or proposed to be installed, as part of your water measuring device or system?

☐ No ☐ Yes

If a data logger is required by a Water Permit, it will need a minimum of 24 months data storage.

D.4 Please indicate on a map or aerial photograph, the following details:

- The location of the bore(s) from which water is to be taken
- The location, or proposed location of the water measuring device or system; and
- The location of pipe work and infrastructure associated with the water take, specifically between the point of take and the measuring device, and include distances.

Installation of a Water Measuring Device or System

The Otago Regional Council has Standard Installation specifications for water measuring devices and systems. The Standard Installation of a water measuring device or system is:

The water meter shall be installed in a straight length of pipe, before any diversion of water occurs. The straight length of pipe shall be part of the pump outlet plumbing, easily accessible, have no fittings and obstructions in it. The water meter shall be installed at least 10 times the diameter of the pipe from the pump and at least 5 times the diameter of the pipe.

D.5 Are you proposing to install your Water Measuring Device in accordance with the Otago Regional Council Standard Installation specifications outlined in the paragraph above?

☐ Yes ☐ No

If your answer is NO, you need to fill out and attach to this application form a ***Non-Standard Installation Form*** for Water Measuring Devices available on our Website or through the Environmental Services Unit of the Otago Regional Council.

D.6 The Regulations require the taking of water to be measured at the point of take unless an Exemption is approved by the Otago Regional Council. Is your water measuring device or system installed at the point of take?

☐ Yes ☐ No

If your answer is no, you need to apply for an Exemption by filling out *Application form 24 – Application for Exemption to use a device or system near the location from which water is taken,* which is available on our website www.orc.govt.nz and from our offices.

D.7 The Regulations require the taking of water to be recorded on a daily basis unless an Exemption is approved by the Otago Regional Council. Will you be keeping daily records of your water use?

☐ Yes ☐ No

If your answer is no, you need to apply for an Exemption by filling our *Application form 25 – Application for Exemption to record water use on a weekly basis,* which is available on our website www.orc.govt.nz and from our offices.

D.8 For applications to take water for non-consumptive purposes which are at a rate of less than 5 litres per second, please explain why a water measuring device should not be installed.

.....

.....

.....

.....

.....

see AEE

PART E: WATER USE AND MANAGEMENT

E.1 Will the water take be managed as part of an existing Water Allocation Committee or Water Management Group?

- ☐ Yes – Water Allocation Committee
- ☐ Yes – Water Management Group
- ☐ No

E.2 Please describe the property(s) on which the water is to be used.

(a) Name of owner(s) .....

(b) Address/location .....

(c) Legal description (as shown on certificate of title attached to this application)

.....

If there is more than one property (legal description) please provide these details on a separate sheet.

E.3 Attach Certificates of Title for all properties where water is to be used. They must be less than 3 months old at the time of lodging the application.

☐ Yes - my Certificates are attached ☐ No - the Council may obtain them at my expense

E.4 Show on a map (no smaller than A4 size) or a coloured aerial photograph the following details:

- ○ The location of the bore(s) or proposed bore(s)
- ○ The location of the water measuring device or system
- ○ The total property area boundary
- ○ The area(s) to be irrigated (if relevant)
- ○ Area of the community supply
- ○ Distances to any discharge activities
- ○ Closest neighbouring bore(s)
- ○ Surface water bodies and wetlands and distances from the point of take(s) to them
- ○ The coastline and the distance to it
- ○ Location of any dairy shed

Efficiency of water use

In this section you are required to only answer the questions relevant to your intended use of water. As a guide the questions are as follows:

E.5 Irrigation of land (pasture etc)
E.6 Irrigation of crops or horticulture
E.7 Frost fighting
E.8 Industrial use
E.9 Private community water supply
E.10 Public community water supply
E.11 Stock and/or dairy shed use
E.12 Other

E.5 Irrigation of land– not crops or horticulture
(includes pasture, turf (golf courses), lifestyle blocks and sports fields)

(a) How many hectares of land will be irrigated? .....

(b) What is the total property area (not just that proposed to be irrigated)? .....

SEE AEE

(c) What type of irrigation system is or is proposed to be used?

☐ K-line ☐ Centre pivot ☐ Travelling irrigator

☐ Border-dyke/flood irrigation ☐ Other

(d) How many hectares will be irrigated in one day? .....

(e) For how many hours per day? .....

(f) What is the target (net) application rate? .....

(g) How many days are there between irrigating the same block? .....

(h) Please describe the soil types of the areas to be irrigated and state the source of this information.

.....

.....

.....

.....

.....

(i) How have you calculated the amount of water you need? (a separate sheet may be needed and attached to this application form)

.....

.....

.....

.....

.....

(j) Is the area to be irrigated:

☐ Presently irrigated/developed

☐ Partly irrigated/developed (..... ha complete ..... ha under development)

☐ Proposed to be irrigated/developed (..... likely completion date)

E.6 Irrigation of crops or horticulture

(a) What is the total area to be irrigated? .....

(b) Show the area of land to be irrigated on the map specified in **E.4** and attach to this application.

(c) What is the total property area (not just that proposed to be irrigated)? .....

(d) If glass/plastic houses are used, what area do they cover? .....

(e) What type of crops will be irrigated or are proposed to be used?

☐ Grain/wheat ☐ Pip fruit ☐ Stone fruit

☐ Market garden ☐ Flowers ☐ Nursery

SEE AEE

☐ Viticulture ..... (vines/hectare)
☐ Nuts
☐ Other .....

(k) What type of irrigation system is or is proposed to be used?
☐ Trickle ☐ Sprinkler ☐ Other .....

(f) How many hectares will be irrigated in one day? .....

(g) For how many hours per day? .....

(h) What is the target (net) application rate? .....

(i) How many days will there be between irrigating the same block? .....

(j) Please describe the soil types of the areas to be irrigated and state the source of this information.
.....
.....
.....
.....
.....

(k) How have you calculated the amount of water you need? (a separate sheet may be needed and attached to this application form)
.....
.....
.....
.....
.....

(l) Is the area to be irrigated:
☐ Presently irrigated/developed
☐ Partly irrigated/developed (..... ha complete .....ha under development)
☐ Proposed to be irrigated/developed (..... likely completion date)

E.7 Frost Fighting

(a) List the crops, and the area (ha) of each crop, for which frost fighting may be undertaken.
.....
.....

(b) How many hours a day? .....

(c) How many days per year? .....

(d) How many days on average do you expect a frost?

SEE AEE

(e) How have you calculated the amount of water you need? (a separate sheet may be needed and attached to this application form)

.....

.....

.....

.....

.....

E.8 Industrial Use

(a) What type of industry/process will be using the water?

.....

.....

.....

.....

(b) How will the water be used?

.....

.....

.....

.....

(c) How have you calculated the amount of water you need? (a separate sheet may be needed and attached to this application form)

.....

.....

.....

.....

.....

E.9 Private Community Water Supply

As a guide only the council considers efficient water use for a household is 1,000 litres per day in winter and 3,000 litres per day in Summer (average 2,000 litres per day). This is derived from wastewater volumes in ASNZ 1547:2000.

(a) What type of institution uses the water?

- ☐ Households – number of households to be supplied: .....
- ☐ Camping grounds – maximum number of visitors and staff per year: .....
- ☐ Schools - maximum number of students and staff per year: .....
- ☐ Other: .....

(b) For applications to supply water to households what is the minimum, maximum and average lot size?

..... Square metres (minimum)
..... Square metres (average)
..... Square metres (maximum)

See AEE

(c) How have you calculated the amount of water you need? (a separate sheet may be needed and attached to this application form)

.....

.....

.....

.....

.....

E.10 Private Community Water Supply

As a guide only the council considers efficient water use for a household is 1,000 litres per day in winter and 3,000 litres per day in Summer (average 2,000 litres per day). This is derived from wastewater volumes in ASNZ 1547:2000.

(a) What population will be served by the supply?

..... General location of population

..... Approximate number of households

(b) How have you calculated the amount of water you need? (a separate sheet may be needed and attached to this application form)

.....

.....

.....

.....

.....

E.11 Stock Water and / or Dairy Shed Use

The Council considers the following values as efficient use of water for stock.

Sheep	5 litres per day per head
Beef cattle	40 litres per day per head
Dairy cows	70 litres per day per head
Deer	1.5 litres per day per head
Dairy shed use	50 litres per day per head

(a) What type and how much stock will be supplied with water?

☐ Sheep number: .....water required: .....litres/head/day

☐ Beef cattle number: .....water required: .....litres/head/day

☐ Dairy cows* number: .....water required: .....litres/head/day

☐ Other number: .....water required: .....litres/head/day

* excluding dairy shed usage

(b) If you have dairy cows, and require water for your dairy shed, please state the estimated volume required

.....Litres/head/day

E.12 Other

(a) Please describe the proposed water use: Dewatering and Dust Suppression.

See AEE

.....

.....

.....

.....

.....

(b) How have you calculated the amount of water you need? (a separate sheet may be needed and attached to this application form)

.....

.....

.....

.....

.....

PART F: ASSESSMENT OF ENVIRONMENTAL EFFECTS (AEE)

An AEE should be proportional to the scale and significance of the proposed activity. Where your proposed take could have significant effects on the groundwater resource a more detailed environmental assessment is required.

Note: Environment includes ecosystems, people, communities, all natural and physical resources and amenity values, and social and economic, aesthetic and cultural conditions that affect them.

F.1 An Aquifer test (pumping test) is required to be submitted with your application. Instructions on the minimum requirements are attached to this application form.

☐ Yes a copy of the results are attached

F.2 Provide details of all known neighbouring bores assessed under Schedule 5B* of the Regional Plan: Water which may be potentially affected by your application or within 1 kilometre of the proposed point of take.
** within the calculated interference radius based on the aquifer properties from testing and proposed volume*

Owner name	Bore number (if known)	Distance (m)	Depth (m)	Use (e.g. domestic irrigation etc)

F.3 Have you undertaken an assessment of effect on water availability to neighbouring bores in accordance with Schedule 5 of the Regional Plan: Water for Otago? (available on our website www.orc.govt.nz)

☐ Yes and it is attached to the application ☐ No, go to F.6

SEE AER

F.4 If the answer to F.3 was yes, then at what distance may calculated effects on water availability be experienced?

..... metres

F.5 Are there any of the following present within 500 metres* of the proposed point(s) of take:
** or within the calculated interference radius based on the aquifer properties from testing and proposed volume*

(i) Surface water bodies? ☐ Yes ☐ No

(ii) Natural wetlands or springs? ☐ Yes ☐ No

If you have answered 'yes' to any of the above, describe what adverse effects your take may have and the steps you propose to mitigate these effects:

.....

.....

.....

.....

.....

For water takes in Schedule 2C Aquifers or within 100 metres of a surface water resource only
If your groundwater take is not from a Schedule 2C Aquifer or within 100 metres of a surface water resource, go to **F.8.**

F.6 Will the taking of water have an effect on <u>surface water</u> availability to neighbouring properties?

☐ Yes ☐ No ☐ Unknown

F.7 Are there any of the following present within 500 metres of the proposed point of take?

(i) Obvious signs or known aquatic biota? ☐ Yes ☐ No

(ii) Areas where food is obtained from a water body? ☐ Yes ☐ No

(iii) Natural wetlands? ☐ Yes ☐ No

(iv) Waste discharges? ☐ Yes ☐ No

(v) Recreational activities? ☐ Yes ☐ No

(vi) Areas of special aesthetic value? ☐ Yes ☐ No

(vii) Areas or aspects of significance to iwi? ☐ Yes ☐ No

(viii) Other water takes (ground or surface)? ☐ Yes ☐ No

If you have answered 'yes' to any of the above, describe what adverse effects your take may have and the steps you propose to mitigate these effects:

.....

.....

.....

.....

.....

SEE AEE

F.8 Has any water quality analysis been undertaken on groundwater taken from your bores??

☐ Yes – *attach a copy of the results* ☐ No ☐ Unknown

F.9 Are there any waste disposal sites *(e.g. septic tanks, offal pits, landfills etc)* **within 100 metres of your proposed point of take(s) ?**

☐ Yes – *show on the site plan required by question E.4 and state distances*

☐ No

F.10 Is your proposed take point(s) (bores) within 1 kilometre of the coastline?

☐ Yes – *show on the site plan required by question E.4 and state distances*

☐ No

F.11 Do you anticipate that your proposed water take will affect the water quality of the groundwater resource? (e.g. contamination from septic tanks or saltwater intrusion)

☐ Yes ☐ No

If you have answered 'yes', describe what adverse effects your take may have and the steps you propose to mitigate these effects:

.....

.....

.....

.....

.....

F.12 Can your maximum abstraction rate (litres per second) be reduced by increasing the length of time over which water is taken?

☐ Yes

Over what time period would you take water and at what rate?

.....

.....

.....

☐ No

Why not?

.....

.....

.....

F.13 What are the positive effects of your proposed take and use? This could include any environmental, social and economic benefits that management by a Water Management Group could provide.

.....

.....

.....

.....

SEE AEE

F.14 What measures are you proposing to minimise wastage of water and maximise its efficient use?

.....

.....

.....

.....

.....

PART G: ALTERNATIVE WATER SUPPLIES

G.1 Does your property have alternative water sources available? (such as other water bodies, reticulated supplies, groundwater bores, other water permits, irrigation schemes?

☐ No

☐ Yes

If yes, Please detail the sources, quantities, uses and any current Water Permit numbers or any takes authorised by permitted activity rules in the Regional Plan: Water for Otago.

.....

.....

.....

G.2 Have you considered the option of using other sources of water?

☐ No

☐ Yes

If yes, Please detail the sources, quantities, uses and any Water Permit numbers

.....

.....

.....

G.3 Explain why you have decided to take water from the proposed groundwater source rather than any alternative source?

.....

.....

.....

PART H: CONSULTATION

H.1 Please describe any consultation undertaken with persons/parties potentially affected by your proposed groundwater take. This should include parties you identified in F.2 and using Schedule 5B of the Regional Plan: Water.

.....

.....

.....

SEE AEE

Schedule 5B of the Regional Plan: Water for Otago provides a method to identify groundwater takes potentially affected by bore interference. Use this Schedule (found on our website) to assist you in determining who may be affected by your application and thus who to obtain written approval from.

Written approvals are required from parties who are considered by the Otago Regional Council to be affected by your proposed water take. To reduce costs and processing times, it is recommended that written approval is obtained, and submitted with the application, for parties who may be affected.

H.2 Provide any written approvals using the Council's standard Form 1 – Resource Consent Application available on our website.

PART I: CHECK LIST

I.1 In order to submit a complete application, have you remembered to?

- ☐ Fully completed this application form and Form 1?
- ☐ For replacement applications, provide evidence of how much water has historically been accessed under that consent (unless held by Council). *refer A.2*
- ☐ Attached a bore log (unless held by Council)? *refer B.4*
- ☐ Attached a Non-Standard installation form if required? *refer D.5*
- ☐ Attached an Exemption Application Form for the point of take? *refer D.6*
- ☐ Attached an Exemption application form for weekly records? *refer D.7*
- ☐ For water management groups, provide evidence that the group meets the requirements of Appendix 2A of the Regional Plan: Water for Otago? *refer E.1*
- ☐ A detailed site map or aerial photograph? *refer E.3*
- ☐ A copy of an Aquifer test (pumping test) results? *refer F.1*
- ☐ A copy of the Regional Plan: Water Schedule 5 Assessment? Refer F.3
- ☐ A copy of water quality analysis? *refer F.8*
- ☐ Attached any written approvals? *refer H.2*
- ☐ Paid your deposit or attached a cheque? *refer I.1*
- ☐ Attached Certificate of Title(s) less than 3 months old? *refer E.3*

Or

- ☐ Council to obtain Certificate of Title(s) at your expense

To keep consent processing costs to a minimum it is strongly recommended that the checklist is complete and all items required are attached **before** you lodge your application to the Otago Regional Council.

8 Application To Discharge Contaminants To Air

Otago Regional Council

(For Office Use Only)
Consent No.: _____

Please provide an accurate plan showing the location of the site, existing works or works to be constructed, property boundaries and neighbouring properties.

Part A: General

1. **Process Details**

   (a) Please supply a detailed flow chart and description of the process that results in either a discharge to the atmosphere, or could potentially result in a discharge to air.

2. **Discharge Details**

   (a) Describe the contaminant discharged and quantities: Dust.

   (b) Has there been carried out, or do you have access to, any discharge, monitoring, or monitoring of impacts of the discharges? Yes ☑ No ☐
   (If yes, please supply a copy of the information obtained.)

   (c) Has any meteorological data relevant to the site been obtained? Yes ☑ No ☐
   (If yes, please give details and, if possible, a copy/summary of the information obtained.)

   (d) Describe the type of land use surrounding the site (eg. north, residential – closest 500m; south, industrial, etc): SEE AEE and Expert report.

   (e) What alternative methods of disposal or discharge have you considered?

   (f) How is the equipment controlling the discharge operated and maintained to prevent equipment failure, and what measures are implemented to ensure that the effects of any malfunction are remedied?

   (g) What, if any, monitoring do you carry out to ensure that the discharge does not have an adverse effect?

   (h) Please provide the following discharge information relevant to your process.
   (See overleaf)

Air Discharge Permit Information

Combustion Processes (metric units should be used)

- Type of fuel, sulphur content, amount used.
- Describe combustion processes and details of boiler or heat unit.
- Maximum heat release rate (kilowatts, megawatts).
- Concentration of contaminants in discharge (mg/m^3).
- Height of discharge point (chimney(s)).
- Height of building the chimney is attached to.
- Describe fitting on top of chimney(s), cone, rain excluded, Chinaman's hat).
- Frequency of discharge (hours of operation).
- Describe air pollution control equipment.
- Velocity of flue gas (m/s).
- Monitoring system (for checking and recording discharge).
- Location of discharge points in relation to factory and boundaries.
- Condition of boiler or heat unit, chimney and details of last service.
- Insulation of chimney.

Quarries

- Describe quarrying process.
- Type of rock being mined.
- Open cast extraction capacity (tonnes/hour).
- Size reduction and screening capacity (tonnes/hour).
- Storage capacity (tonnes/hour).
- Dust control measures.
- Monitoring systems (for checking and recording dust emissions).
- Frequency of discharge (i.e., hours of operation).
- Quarry management plan.

See AEE

Wood Processing Industries

- Describe the process.
- Describe air pollution control equipment (including height of discharge point(s), exhaust flow and velocity).
- Monitoring system (for checking and recording discharge(s)).
- Particulate emission test (to determine dust concentration and mass emission levels discharged from the vent, measured over three runs, with all wood sanding equipment working at the same time).
- Frequency of discharge (i.e., hours of operation).
- Location of discharge points in relation to the premises and neighbouring premises.

Chemical Manufacturing Blending Processes/Electroplating

- Describe the process.
- Describe air pollution control equipment including fan flow rates.
- Monitoring system (for checking and recording discharge).
- Frequency of discharge (i.e., hours of operation).
- Distance of discharge points from neighbouring premises.
- Raw material capacity of operation? or product rate.
- Height of discharge points.

Air Discharge Permit Information (continued)

Abrasive Blasting

- Describe the process and details of blasting chamber, blasting media used.
- Describe air pollution control equipment and height of discharge points, velocity of gases, fitting on top of vent(s).
- Particulate emission tests (to determine dust concentration and mass emission levels discharged from the vent, measured over three runs).
- Monitoring system (for checking and recording discharge).
- Frequency of discharge (i.e., hours of operation).
- Distance of discharge points from neighbouring premises.

Wool Scourers and Tanneries

- Describe the process.
- Describe air pollution control equipment and height of discharge point(s), fitting on top of vent(s).
- Monitoring system (for checking and recording discharge).
- Describe raw material capacity of operation.
- Frequency of discharge (i.e., hours of operation).
- Distance of discharge points from neighbouring premises.

Spray Painting Process

- Describe the process and details of spray painting booth.
- Describe air pollution control equipment and height of discharge point(s), velocity of gases, fitting on top of vent(s).
- Describe paints and solvents used (provide MSDS where available).
- Paint and solvent usage rates.
- Distance of discharge points from neighbouring premises.

Concrete Manufacturing Plants

- Describe the process.
- Give details of raw material capacity (tonnes/hour).
- Dust control measures.
- Hours of operation.
- Monitoring system (for checking and recording dust).

Foundries

- Describe the process, raw materials used, products made and equipment used.
- Give details of raw material capacity (tonnes/hour) and tonnes/hour product made.
- Hours of operation.
- Describe air pollution control equipment and height of discharge point(s), velocity of gases, fitting on top of vent(s).
- Monitoring system for discharges.

Air Discharge Permit Information (continued)

Rendering Process

- Describe the rendering process (high/low temperature, drying, etc.).
- Describe combustion process (if applicable, i.e., type of combustion process, fuel used, fuel combustion rate, contaminants released to air, exit velocity, concentration).
- Describe air pollution control equipment.
- Height and number of discharge point(s) and any fitting on top of vent(s).
- Hours of operation.
- Distance of discharge points from neighbouring premises.

Asphalt Production

- Describe the process, including dust control equipment.
- Give details of raw material capacity (tonnes/hour).
- Hours of operation.
- Monitoring systems.

Coffee Roasting Processes/Vegetable Frying Processes

- Describe roasting process (roast or frying cycle, maximum raw material capacity (kg/hr).
- Describe combustion process (if applicable, i.e., type of combustion processes, fuel used, fuel combustion rate).
- Describe air pollution control equipment.
- Height and number of discharge point(s) describe fitting on top of vent(s).
- Hours of operation.
- Monitoring system (for checking and recording discharge).
- Distance of discharge points from neighbouring premises.

Other Processes

- Describe the process.
- Describe air pollution control equipment.
- Hours of operation.
- Monitoring systems, for recording discharges.

Part B: Assessment of Effects on the Environment

Where your activity could have an effect on the environment an assessment of environmental effects is required in accordance with the Fourth Schedule of the Resource Management Act 1991.

1. Comment on all possible effects the discharge may have on the quality of the receiving air, persons living in the area and local plant and animal life:

SEE AEE

(Continue on a separate sheet if necessary)

2. In the vicinity of the discharge are there any:

		Yes	No
(a)	Residential developments?	☐	☐
(b)	Production land (eg., crops, dairy farming)?	☐	☐
(c)	Recreational activities carried out (eg sports grounds, parks etc)?	☐	☐
(d)	Sources of similar on other discharges to air?	☐	☐
(e)	Areas of particular aesthetic or scientific value (e.g., scenic views etc)?	☐	☐
(f)	Areas or aspects of significance to Iwi?	☐	☐
(g)	Commercial activities (eg. office blocks)?	☐	☐

If you have answered yes to any of the above, describe what effects your discharge may have and the steps you propose to mitigate these:

(Continue on a separate sheet if necessary)

6 Application To Discharge Contaminants to Land

Otago Regional Council

(For Office Use Only)
Consent No.: _____

Show the location of the discharge and adjoining properties on your map on Form 1.

Part A: General

1. What is the source of the contaminant (e.g., sewage, treatment, industry, water treatment, rural activity, solid waste, etc)?

   Mining.

2. Describe the contaminant, including, where appropriate, the physical and chemical content and their toxicity to the receiving environment.

   Waste rock, sediment.

3. Is the contaminant treated in any way before being discharged? Yes ☑ No ☐

   If yes, describe treatment SEE AEE

3. What is the location of the discharge, including map reference in NZTM 2000?

   SEE AEE

   NZTM 2000: E _____ N _____

5. For liquid contaminants, what method of discharge will be used (e.g., spray irrigation, soakage, etc)

6. Describe the soils, topography and vegetation cover of the land onto which the discharge will be made:

   SEE AEE

7. What is the total area of land onto which the discharge is to be made? _____ hectares

   What is the area of land over which the discharge is made each day? see AEE hectares

Part A: General (continued)

8. **Discharge Rate Information:** SEE AEE

Maximum flow rate: _____ litres per second

Maximum discharge rate: _____ cubic metres per day

or _____ cubic metres per week

Is the discharge: continuous ☐ or intermittent ☐

What will be the maximum discharging period? _____ hours per day

_____ days per week

_____ weeks per month

_____ months per year

9. For animal manure, what is the source of the manure?

Cows ☐ Pigs ☐ Poultry ☐ Other, specify, _____

How many animals in your herd: _____

What maximum herd size are you planning? _____

What is the volume of waste produced daily: _____

If you have treatment ponds, how many do you have: _____

What are their dimensions?

_____ metres long, _____ metres wide _____ metres deep

10. For septic tanks, what is the source of waste?

Multiple dwelling ☐ Motel/Restaurant ☐ Park/Recreation facility ☐

Other, specify _____

Is the waste: Toilet and hand washing ☐ Toilet, bathroom and kitchen waste? ☐

Other, specify _____

What is the estimated number of people using the facility per day? _____

Please provide details of your design, design calculations, soils, percolation tests and site plan which justify your choice of septic tank size, type and layout.

11. Does the discharge also involve	Yes	No
Outlet structure?	☐	☐
Diversion?	☐	☐
Discharge to air?	☐	☐
Discharge to water?	☐	☐

If you have answered "Yes" to any of 11. above, another schedule to this consent application may be required.

SEE AEE.

Part B: Assessment of Effects on the Environment

1. Comment on the possible effects the discharge may have on the drainage capacity, fertility, ground or surface water of or near the site:

_____

_____

_____

2. Within the vicinity of the discharge are there any:

	Yes	No	Not Known
(a) Waterbodies, groundwater or groundwater bore(s)?	☐	☐	☐
(b) Water abstractions?	☐	☐	☐
(c) Obvious signs of fish, eels, insect life, aquatic plants, etc?	☐	☐	☐
(d) Wetlands (e.g., swamp areas)?	☐	☐	☐
(e) Recreational activities carried out (eg., swimming, fishing, canoeing)?	☐	☐	☐
(f) Areas of particular aesthetic or scientific value (eg., scenic waterfall, rapids, archaeological sites)?	☐	☐	☐
(g) Areas or aspects of significance to Iwi?	☐	☐	☐

If you have answered "Yes" to any of the above, describe what effects your operation may have and the steps you propose to take to mitigate these.

_____

_____

_____

_____

_____

(Continue on a separate page if necessary)

3. What alternative methods of disposal or discharge locations have you considered?

_____

_____

_____

_____

_____

4. Why did you choose the proposed method of disposal and location point?

_____

_____

_____

_____

SEE AEE

Part B: Assessment of Effects on the Environment (Contd.)

5. How will the equipment controlling the discharge be operated and maintained to prevent equipment failure, and what measures will be implemented to ensure that the effects of any malfunction are remedied?

6. What, if any, monitoring do you propose to carry out to ensure that the discharges does not have any adverse effect?

10A Schedule for Culvert Works in or on the Bed or Bank of a Watercourse

Otago Regional Council

This form is to be used for applications to use, erect, place, extend, alter or replace a culvert in or on the beds or banks of lakes or rivers, which are unable to meet Permitted Activity Rules 13.2.1.7, 13.3.1.2 or 13.5.1.3 of the Regional Plan Water

(For Office Use Only)
Consent No.: _____
Job No: _____

PLEASE READ THIS PAGE BEFORE COMPLETING THE APPLICATION FORM

In order for any consent application to be processed efficiently in the minimum time and at minimum cost, it is critical that as much relevant information as possible is included with the application.

Form 1 and Schedule 10A, when properly completed, may provide an adequate "Assessment of Effects on the Environment" (AEE) where the adverse effects of culvert works are not significant. Guidance to answering the questions appear at the end of this schedule. Details of information required in an AEE are included in the Fourth Schedule of the Resource Management Act 1991 appended to Form 1: Resource Consent Application. However this can only be determined on application. If for any reason the scale of the culvert works or scale of its potential effects is significant, a report by a professional advisor in support of your application may be required.

If all the necessary information is not supplied with the application then the Otago Regional Council may return your application, request further information or decline your application. This will lead to delays in the processing of your application and may increase processing costs.

If the effects of the proposed culvert works are considered minor and written approvals are gained from all parties that may be adversely affected by the disturbance, then your application will proceed under non-notified consent provisions. If you are unable to supply the necessary written approvals from the affected parties, or if the effects of the culvert works are more than minor, then Council must limited notify or fully notify the application. Such applications take longer to be processed than non-notified applications and may incur additional processing costs. Details of consultation required are presented in this document.

Which of the following activities are you seeking to undertake

- ☑ Erect or place a new culvert
- ☐ Extend an existing culvert
- ☐ Alter an existing culvert
- ☐ Replace an existing culvert

Part A - Location of Proposed/Existing Culvert

A.1 What is the name of the water body(s) in which you propose to erect / place / extend / alter / replace / reconstruct the culvert?

Unnamed tributary of Highlay Creek

(If the water body is unnamed then please note this and give the name of the water body to which it flows in to)

A.2 Describe the property on which the proposed/existing culvert is located
(if the proposed/existing culvert is located on Crown Riverbed, please note on (d) below)

(a) Full name(s) of owner(s) See AEE

(b) Address/Location _____

(c) Legal Description(s) *(as shown on Certificate of Title)*

Lot See AEE DP _____ Sec _____

Survey District (SD) _____

Other (specify) _____

Council will obtain a Certificate of Title to confirm details, if necessary.

(d) Is the proposed/existing culvert located on Crown Riverbed: Yes ☐ No ☑

If Yes, give the legal description of the property adjacent to the proposed/existing culvert

_____

A.3 Map reference of the proposed/existing culvert in NZTM 2000 (New Zealand Transverse Mercator):

NZTM 2000: E See AEE N _____

A.4 Please include a plan showing the location of the proposed/existing culvert ☑ See AEE

A.5 Include with this application form ***labelled colour photographs*** (6" x 4" minimum size) of the site in its present form which include:

- Any existing structures at the site.
- The view of the waterway downstream of the site.
- The view of the waterway upstream of the site.
- A cross section at the site
- Cross sections 50 metres upstream and downstream of the site

A.6 Please describe the current nature of the waterway at the proposed site for the works:

- Width of watercourse: _____ See AEE
- Approximate maximum depth of water: _____ See AEE
- Bed material *(e.g., rocky, sandy, silty):* _____ See Aquatic ecology report.
- Flows (estimates of minimum and maximum): _____
- Water colour/clarity: _____
- Bank material *(weathered rock, clay):* _____
- Vegetation: _____
- Erosion: _____
- Fish and invertebrate life: _____
- Catchment characteristics *(for example, steep, forested catchment, easy pastoral catchment)*

_____

_____

A.7 Does the site of the proposed/existing culvert (including the area 100 m upstream and downstream) have any of the following values?

(a) Obvious signs or known aquatic biota?	☑ Yes	☐ No	☐ Unknown
(b) Areas where food is gathered from the water body?	☐ Yes	☑ No	☐ Unknown
(c) Natural Wetlands?	☐ Yes	☑ No	☐ Unknown
(d) Waste discharges (e.g., dairy sheds, industrial, sewage)?	☐ Yes	☑ No	☐ Unknown
(e) Recreational activities (e.g., swimming, fishing, canoeing?)	☐ Yes	☑ No	☐ Unknown
(f) Areas of special aesthetic value (e.g. waterfalls)?	☐ Yes	☑ No	☐ Unknown

(g) Areas or aspects of significance to Iwi? ☐ Yes ☐ No ☑ Unknown

(h) Other water takes? ☐ Yes ☑ No ☐ Unknown

If you have answered "yes" to any of the above, please describe below:

See AEE

A.8 What is the catchment area upstream of the proposed location for the works, if known?
(If unknown please ensure that the location of the works is marked clearly on an enclosed plan or map)

see AEE hectares / acres / square kilometres *(please circle the units you use)*

Part B – Design of the Proposed/Existing Culvert

B.1 Please describe the **purpose** of the culvert or other works:

to provide road crossing for new alignment of horse flat road.

B.2 What is the proposed/existing culvert made of? _____

B.3 What is the length of the proposed/existing culvert? 51 m

For existing culverts, what is the length of the culvert after alteration or extension? ~~51m~~ N/A.

B.4 What is the proposed fill material to be used over the culvert?

EARTH, Rock

B.5 At what gradient will the culvert be laid in the stream bed? SEE AEE report for culvert.
(If at same gradient as existing stream bed then please state this.)

B.6 If a secondary flow path is included in the design then please describe:

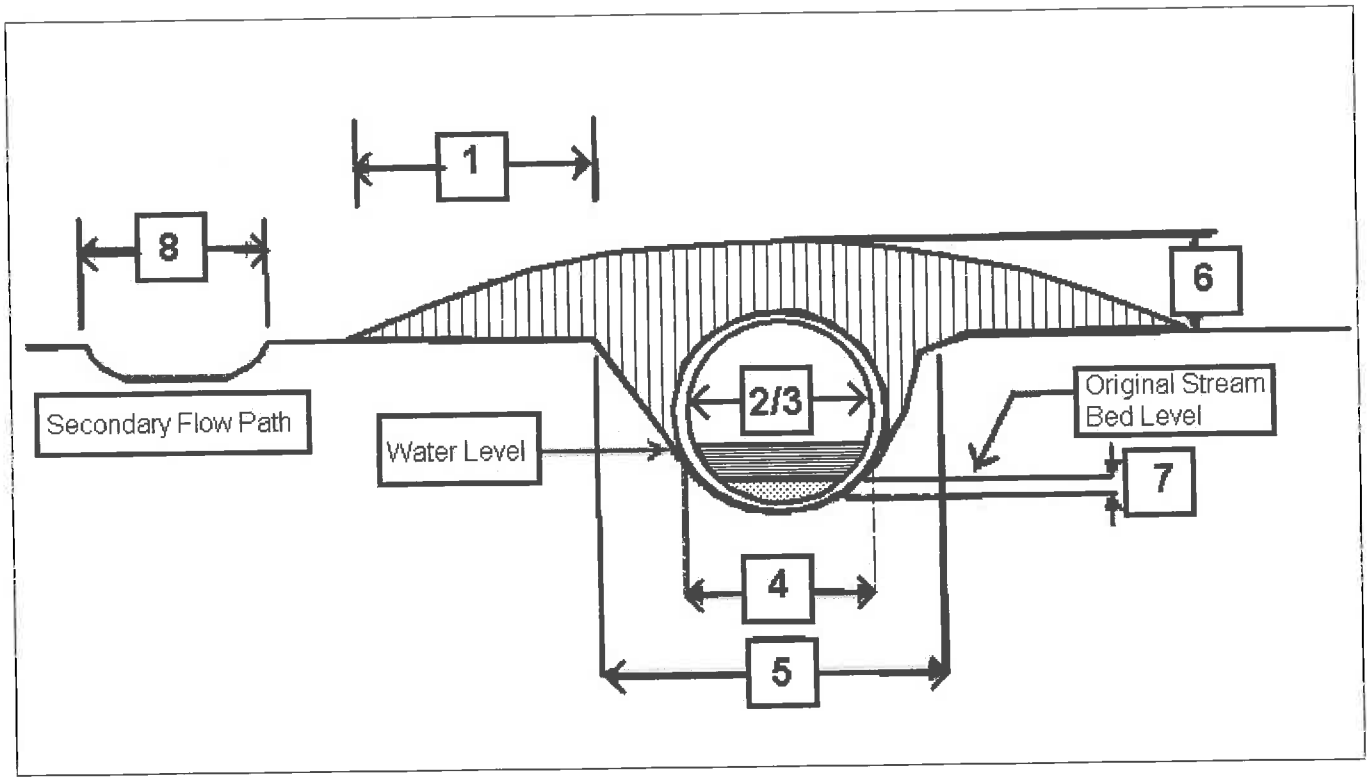
B.7 Please fill in the dimensions shown on the cross-sectional diagram in the list below.
(If the culvert design is different from that shown below please include a diagram showing all dimensions.)

See culvert technical report.

	Of New/Altered Culvert *(as it is proposed to be installed, or if existing, as it is proposed to be altered to)*	**Of Existing Culvert** *(that is proposed to be altered)*
1. Length of culvert approach:	_____ m	_____ m
2. Diameter of culvert (if circular):	_____ m	_____ m
3. If box culvert:		
width:	_____ m	_____ m
height:	_____ m	_____ m
4. Bed width of original stream channel:	_____ m	_____ m
5. Top width of original stream channel:	_____ m	_____ m
6. Depth of fill over culvert:	_____ m	_____ m

See culvert technical report.

7. Depth of culvert base below original stream bed level:	_____ m	_____ m
8. Secondary flow path dimensions:		
width:	_____ m	_____ m
depth:	_____ m	_____ m



B.8 If there are engineering plans of the proposed culvert please enclose a copy with the application. Please include your own diagram on a separate page, if this will assist in describing the proposal, and attach it to this application form.

B.9 Please provide hydrological and hydraulic design details and calculations
(Use a separate sheet if necessary)

with culvert technical report

Part C – Works Associated with the Proposed/Existing Culvert

C.1 Please describe how the culvert will be placed in the bed of the watercourse, or otherwise extended or altered, including:

(a) Machinery to be used: All of c below to be provided in erosion and sediment control plan

(b) Where the machinery will be operated from: _____

(c) The extent of any bed disturbance that will occur: _____

(d) The duration of the proposed works *(e.g. 12 hours, 5 days):* _____

(e) The timing of the proposed works *(e.g. 8 am – 5 pm Mon-Fri, Dec-Jan):* _____

_____

(f) Will the works be undertaken in flowing water, or will the water be diverted in any way to provide a dry working area: _____

_____

(g) Other: _____

_____

_____

_____

C.2 Please comment on the extent of bank disturbance required to undertake the works, including road/track construction

_____

_____

_____

C.3 Please describe the extent of vegetation removal from the banks of the watercourse to be undertaken in relation to this proposal:

_____

_____

_____

C.4 Have any alternatives been considered when planning the proposal?

❑ Yes *(Please explain why the proposed site was chosen)*

_____

_____

_____

❑ No *(Please state why no alternatives have been considered)*

_____

_____

_____

C.5 What term of consent is sought to undertake these works? _____

Part D - Types of Resource Consent Sought

D.1 **Which aspect of permitted activity Rules 13.2.1.7 or 13.3.1.2 of the Regional Plan: Water does the erection, placement, extension, alteration, replacement or reconstruction of the culvert not comply with?**

❑ upstream catchment exceeds 50 hectares

- ☐ placement will cause flooding or erosion
- ☐ site will not be left tidy upon completion
- ☐ culvert will not be replaced or reconstructed in same location as original
- ☐ scale, nature or function of culvert will change
- ☐ will comply with permitted activity rule
- ☑ not applicable *(specify why):* length of crossing, height of crossing.

D.2 Which aspect of permitted activity Rule 13.5.1.1 of the Regional Plan: Water does the disturbance of the bed of the watercourse associated with the erection, placement, extension, alteration, replacement or reconstruction of the culvert, not comply with? SEE AEE

- ☐ bed disturbance wider than general area of culvert
- ☐ will cause flooding or erosion
- ☐ time to undertake the work will exceed 10 hours
- ☐ sediment discharge associated with bed disturbance will result in a conspicuous change in colour or water clarity 250 m downstream
- ☐ a lawful water take will be adversely affected
- ☐ site will not be left tidy upon completion
- ☐ will comply with permitted activity rule
- ☐ not applicable *(specify why):* _____

D.3 Will there be any discharge of sediment or cement or any other contaminant to water, as a result of the culvert works?

- ☑ Yes
- ☐ No *(specify why)* _____

D.4 Will water be diverted as a result of the culvert works?

- ☑ Yes
- ☐ No

D.5 If you answered yes to question D.4, does the diversion comply with permitted activity Rules 12.3.2.1 or 12.3.2.3 of the Regional Plan: Water?

- ☑ Yes
- ☐ No *(specify why)*
  - ☐ the course of water will not remain within the bed of the watercourse
  - ☐ the course of water will not be returned to its normal course
  - ☐ the diversion will occur for more than one month
  - ☐ a lawful water take will be adversely affected

☐ a wetland identified in Schedule 9 or above 800 m will be affected

☐ the diversion will cause erosion, land instability, sedimentation or property damage

Part E - Assessment of Environmental Effects of Culvert Works and Mitigation Measures

Culvert works have the potential to affect a number of matters listed below. Some typical solutions to avoid, remedy or mitigate these adverse effects have been provided below. If you intend on using these typical solutions, check the box provided. If the typical solutions are not relevant to your application, please state this. If you are proposing an alternative solution, please provide detail (and on a separate sheet if required). **Note that all actual *and potential* adverse effects must be addressed.**

E.1 Water Quality See AEE

Yes	No	Not Applicable	
☐	☐	☐	Fuel storage tanks and machinery working and stored in the construction area shall be maintained at all times to prevent leakage of oil and other contaminants into water, and no refuelling of machinery shall occur within the watercourse.
☐	☐	☐	All machinery shall be water-blasted prior to being brought on site, to reduce the potential for pest species being introduced to water.
☐	☐	☐	At no time during the proposed works shall machinery be washed within the bed of the watercourse.
☐	☐	☐	All reasonable steps shall be taken to minimise the release of sediment to water by undertaking the following methods *(please list):*

- ☐ sediment traps
- ☐ undertaking work when flows are low / watercourse is dry
- ☐ diverting water from the working area
- ☐ Other *(please specify)*_____

_____

Yes	No	Not Applicable	
☐	☐	☐	Where wet cement may be used in the waterway:

- ☐ Avoid flowing water coming into contact with the concrete until the concrete is firmly set.
- ☐ Use boxing or other similar devices to contain wet cement during construction.
- ☐ Ensure that the handling of cement is undertaken in a manner that does not result in spillage into any watercourse.
- ☐ No equipment used in the pouring of concrete shall be washed out on site.

If you have answered "NO" to any of the measures above, you MUST explain why:

_____

_____

_____

E.2 Bed/Habitat Disturbance

Yes	No	Not Applicable	
☐	☐	☐	Works shall be undertaken when flows in the watercourse are low.
☐	☐	☐	Works shall not be undertaken between certain months avoid disturbing spawning habitat *(please specify months*: _____)
☐	☐	☐	Fish passage will be provided for.
☐	☐	☐	Bed disturbance will be limited only to the extent necessary to carry out the works.
☐	☐	☐	Machinery used to undertake the works shall not be operated from the wet bed.

If you have answered "NO" to any of the measures above, you MUST explain why:

_____

_____

_____

E.3 Erosion

Yes	No	Not Applicable	
☐	☐	☐	Damage to riparian vegetation shall be minimised when undertaking culvert works.
☐	☐	☐	Any damage to the stream banks, including riparian vegetation, as a result of culvert works will be reinstated within one month.
☐	☐	☐	Where permanent diversions of water are undertaken:
		☐	All reasonable measures will be undertaken to promote bank stability of any new channel as rapidly as possible.
		☐	There shall be no reduction in the surface flow of the watercourse as a result of the diversion

SEE AEE

If you have answered "NO" to any of the measures above, you MUST explain why:

_____

_____

_____

E.4 Other Water Users

Yes	No	Not Applicable	
☐	☐	☐	Lawful water takes downstream of the proposed culvert will be adversely affected
☐	☐	☐	Recreational users of the watercourse will be affected by the proposed culvert

If lawful water takers or recreational users will be affected, please provide measures to avoid, remedy or mitigate adverse effects on them:

_____

_____

_____

E.5 Other Waterway Values SEE AEE

Yes	No	Not Applicable	
☐	☐	☐	Amenity and natural character of the watercourse will not be significantly affected by the proposed culvert
☐	☐	☐	The site shall be tidied upon completion of works.
☐	☐	☐	Public Access to the watercourse will not be impeded by the proposed culvert
☐	☐	☐	Hours of work shall be between 7.00 am to 7.00 pm, Monday to Friday, and shall not be undertaken on Public Holidays. If hours of work to differ from that given, please state here: _____
☐	☐	☐	If koiwi tangata (human skeletal remains), Maori artefact material, or archaeological material that predates 1900 is found, work will stop until an inspection by the appropriate authorities can be made

If you have answered "NO" to any of the measures above, you MUST explain why:

_____

_____

_____

Yes	No	Not Applicable	
☐	☑	☐	Heritage values will be affected by the proposed culvert
☐	☐	☐	Cultural values will be affected by the proposed culvert unknown, CIA to come.

If heritage or cultural values will be affected, please provide measures to avoid, remedy or mitigate adverse effects on them:

_____

_____

_____

E.6 Other

Are there any other effects of the proposed culvert works that could adversely impact on water quality, not identified above? Please list and discuss any proposed measures to avoid, remedy or mitigate those effects:

_____

_____

_____

_____

_____

Part F - Consultation

F.1 - Please comment on any consultation undertaken with those persons/parties who may be interested in, or potentially affected by your proposal. (e.g., other water users, neighbours, The Department of Conservation, The Otago Fish and Game Council, Aukaha, Te Ao Marama (for activities located south of the Clutha River/Mata-Au)).

SEE AEE

F.2 - Please attach any written approvals obtained using Council's standard Form 1 - Resource Consent Application.

Part G - Is Your Application Complete?

In order to provide a complete application have you remembered to:

(a) Fully complete this schedule and Form 1 *(Resource Consent Application)* ☑

(b) Include a location / site plan? ☑

(c) Include labelled colour photographs ☑

(d) Include any technical plans or drawings of the culvert ☑

(e) Attach any appropriate additional information? ☑

FORM 9

APPLICATION FOR RESOURCE CONSENT

Sections 88 and 145, Resource Management Act 1991

To Chief Executive
Otago Regional Council
Private Bag 1954,
Dunedin 9054

1. **OceanaGold (New Zealand) Limited** apply for the following type(s) of resource consent:

   - *Discharge permits*
   - *Water permits*
   - *Land use consents*

2. The activity to which the application relates (the proposed activity) is as follows:

   - *The Deepdell North Stage III Pit;*
   - *The Deepdell East Waste Rock Stack and access road;*
   - *The Deepdell South Backfill Waste Rock Stack;*
   - *Noise bunds and rehabilitation material stockpiles;*
   - *Temporary site facilities.*
   - *Realignment of a ~900m section of Horse Flat Road*
   - *To take surface water and ground water from the Deepdell North Stage III Pit for the purpose of dewatering and for dust suppression.*
   - *To discharge rainfall run off water and associated contaminants to land where it may enter ground water from the mined pit surface within the Deepdell North Stage III Pit for the purpose of constructing and operating an open pit mine.*
   - *To disturb, deposit onto or into and reclaim an approximately 480 metre length of the bed of an unnamed intermittent, modified tributary of Camp Creek for the purpose of establishing a drainage network and stockpiles.*
   - *To dam water in Deepdell North Stage III Pit for the purpose of creating the Deepdell North Pit Lake.*
   - *To take surface water for the purpose of creating the Deepdell North Pit Lake*
   - *To discharge waste rock to land where it (and resulting contaminants) may enter ground and surface water for the purposes of constructing and operating a waste rock stack*

- *To disturb, deposit onto or into and reclaim approximately 350 metres of the ephemeral bed and approximately 130 metres of the intermittent bed of an unnamed tributary of Highlay Creek for the purposes of constructing a waste rock stack and silt ponds.*
- *To disturb the bed, deposit into the bed and place a 51m long culvert and embankment structure into the bed of an unnamed tributary of Highlay Creek for the purposes of a realignment of Horse Flat Road.*
- *To discharge contaminants from mining operations and post mining rehabilitation to air for the purpose of undertaking mining operations.*

3. The site at which the proposed activity is to occur is as follows:

(a) 470 Horse Flat Road, Horse Flat, Macraes, Waitaki District. The centre of the proposed pit is approximately (NZTM) E 1397605 N 4975718.

The legal descriptions of the land parcels on which the proposal elements are located are outlined below:

Deepdell North Stage III project element	Land Parcel	Record of Title	Owner
Deepdell North Stage III Pit	Part Section 12 Block VII Highlay SD	OT16B/855	OceanaGold
Horse Flat WRS	Part Section 11 Block VII Highlay SD	OT16B/855	OceanaGold
	Section 10 Block VII Highlay SD	OT18C/1099	OceanaGold
Deepdell South Backfill	Part Section 1 Block VIII Highlay SD	OT16B/854	OceanaGold
	Part Section 12 Block VII Highlay SD	OT16B/855	OceanaGold
Noise bund	Lot 1 DP 22318	OT14C/1088	CH and ML Howard
Noise bund	Part Section 11 Block VII Highlay SD	OT16B/855	OceanaGold

(b) The site is a plateau at approximately 500m above sea level and is adjacent to and within large scale mining activities which are surrounded by low intensity pastoral farming.

4. There are no other activities that are part of the proposal to which this application relates.

5. No additional resource consents are needed for the proposal to which this application relates.

6. I attach an assessment of the proposed activity's effect on the environment that—

(a) includes the information required by clause 6 of Schedule 4 of the Resource Management Act 1991; and

(b) addresses the matters specified in clause 7 of Schedule 4 of the Resource Management Act 1991; and

(c) includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

7. I attach an assessment of the proposed activity against the matters set out in Part 2 of the Resource Management Act 1991.

8. I attach an assessment of the proposed activity against any relevant provisions of a document referred to in section 104(1)(b) of the Resource Management Act 1991, including the information required by clause 2(2) of Schedule 4 of that Act.

9. I attach the following further 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 that Act:

Assessment of Environmental Effects

LIST OF APPENDICES

Appendix A: Records of Title
Appendix B: Plan Drawings of Proposal
Appendix C: Relevant existing consent certificates
Appendix D: Terrestrial Ecology Reports
Appendix E: Water Quality Effects Assessment
Appendix F: Noise Assessment Report
Appendix G: Air Blast and Vibration Report
Appendix H: Heritage Report
Appendix I: Health, Safety and Environment Compliance Standards
Appendix J: Geotechnical Assessment Reports for Pit and WRS
Appendix K: Road Embankment and Culvert Report
Appendix L: Air Effects Report
Appendix M: Landscape, Natural Character and Visual Amenity Assessment Report
Appendix N: Rehabilitation Report
Appendix O: Aquatic Ecology Effects Assessment
Appendix P: Traffic Assessment Report

Appendix Q: Economic Assessment

Appendix R: Erosion and Sediment Control Report

Appendix S: Proposed Consent Conditions

Appendix T: Groundwater Effects Assessment

Date: 29 January 2020

Signature: 

(Person authorised to sign on behalf of applicant)

Address for Service: Mitchell Daysh Limited
PO Box 489
Dunedin 9054

Telephone: 022 1532912
Email: phil.petersen@mitchelldaysh.co.nz

Contact person: Phil Petersen

Note to applicant

You must include all information required by this form. The information must be specified in sufficient detail to satisfy the purpose for which it is required.

You may apply for 2 or more resource consents that are needed for the same activity on the same form. If you lodge the application with the Environmental Protection Authority, you must also lodge a notice in form 16A at the same time.

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

If your application is to the Environmental Protection Agency, you may be required to pay actual and reasonable costs incurred in dealing with this matter (see section 149ZD of the Resource Management Act 1991)

PO Box 489, Dunedin 9054
New Zealand
+64 3 477 7884

Reference: 000778

29 January 2020

Otago Regional Council
Consents Department

Attention: Elyse Neville
By e-mail to: elyse.neville@orc.govt.nz

Dear Elyse

RE: RM19.440 - OceanaGold NZ Limited – Resource Consent Application for Deepdell North Stage III

Please find enclosed an updated Assessment of Environmental Effects (AEE) and additional information relating to **OceanaGold NZ Limited** resource application for a gold mine and associated waste rock stack at Horse Flat, Macraes.

An updated AEE (new application) has been provided on the basis of required information that was requested by the Otago Regional Council relating to groundwater. The additions in this new application therefore relate primarily to such matters, For consistency purposes it was deemed necessary to provide both Council's with an updated version of all reports and the AEE and this application has also been provided to Waitaki District Council. This will be important as a joint Council processing process has been discussed.

The key additions sit within section 5.2.11 of the AEE, along with a new technical report covering groundwater effects (Appendix T).

Further, more minor amendments to the updated application include:

- An additional geotechnical assessment report that was omitted from the original application (within Appendix J);
- Additional text in the existing environment Chapter 2 concerning groundwater (see section 2.15);
- Additional text in the AEE (Section 5.6) concerning proposal geotechnical matters and technical reports;

- Additions to Table 22 in Chapter 6 outlining management and monitoring of groundwater effects;
- Additions to the ORC conditions monitoring schedule (Appendix S) concerning groundwater monitoring ;
- Some renumbering of proposed ORC conditions in (Appendix S);
- A correction regarding average groundwater levels at DDB01 in Table 7 (48mRL changed to 480mRL); and
- A handful of appendix reference corrections within the wider body of the AEE text.

Please advise if the Council will require a hard copy of this updated AEE.

As indicated in earlier correspondence, it is anticipated that the joint process requires that ORC and WDC notify the application at the same time. It is therefore appreciated that the applications currently being processed by the WDC may be at a different stage in this process. Given this it is likely a section 37 extension will be required and OceanaGold Limited would be happy to discuss how best to manage this.

As arranged, we will deposit $3,000.00 to the Council bank account today for this application fee (reference "OceanaGold Deepdell"). Please forward a tax invoice/receipt in due course to sharon.aitchison@mitchelldaysh.co.nz.

Yours sincerely,

Phil Petersen

phil.petersen@mitchelldaysh.co.nz

Encl.
Updated Assessment of Environmental Effects
Form 9
ORC online application forms

OCEANA GOLD (NZ) LTD

DEEPDELL NORTH STAGE III PROJECT

Assessment of Environmental Effects

29 January 2020

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

REPORT INFORMATION

Report Status	Final
Our Reference	MDL000778
File Location	OceanaGold / 000778 Macraes Secondment / 04 Deepdell North Stage III / 03 Application
Author	Phil Petersen
Review By	Claire Hunter

EXECUTIVE SUMMARY

OceanaGold (New Zealand) Limited ("OceanaGold") is a significant multinational gold producer and New Zealand's largest producer of gold. OceanaGold's current operating assets in New Zealand consist of two large open pit mines (at Macraes in the South Island and at Waihi in the North Island), and four underground mines (Frasers at Macraes and Favona, Trio and Correnso at Waihi). Further OceanaGold has a large open pit mine at Reefton in the South Island which was placed into care and maintenance in 2016 and has subsequently been closed. OceanaGold also owns and operates a mine at Didipio in the Northern Philippines, and in South Carolina, United States.

The ore produced by the mines at Macraes is processed on-site. OceanaGold commenced operations in New Zealand at Macraes Flat in 1990 and has been operating continuously since that time, for over 29 years now. Presently, the company directly employs approximately 570 people at Macraes, as well as further staff based in the Dunedin office.

As part of the ongoing mining operations at Macraes Gold Project, there is a need to develop new sources of ore to supply the ore processing plant. As such, the current gold price and the additional geological drilling has facilitated the decision to develop the gold resource located on the edge of the backfilled Deepdell North Pit. Moreover, the opportunity to backfill the current Deepdell South Pit and the proximity of relatively flat and developed pastureland allows for efficient disposal of waste rock. In addition, the proposed waste rock stack location will have less effects on terrestrial and aquatic ecological values than it would if located in the adjacent Highlay Creek catchment or other less developed farmland.

As such, the Deepdell North Stage III Pit proposal allows financially viable mining of gold bearing ore within a site that is already affected by surface activities and presents a logical and efficient site for further mining and waste rock disposal. OceanaGold requests that this is a publicly notified resource consent application.

Potential adverse effects are of a similar nature to those managed by OceanaGold on a daily basis as part of operating its existing mining operations. The site is within the Macraes Mining Zone of the Waitaki District Plan and extends across the zone boundary into the Rural Scenic Zone, but within an area of that zone which is more intensively farmed, and which has no private residences. The technical assessments have identified that the existing natural values within the subject site vary but the proposal can be carried out with no remaining significant adverse effects on these values after avoidance, mitigation and offsetting measures are taken into account.

1. INTRODUCTION

1.1 OVERVIEW OF THE PROPOSAL

The Macraes Gold Project is located approximately 30 kilometres (**km**) to the northwest of Palmerston in the Otago Region of New Zealand's South Island (Figure 1). It located in a rural area and surrounded by low intensity pastoral farming. Macraes township/village, which includes approximately 15 houses, a school and a historic hotel, is located immediately to the west of the Macraes Gold Project mining area.

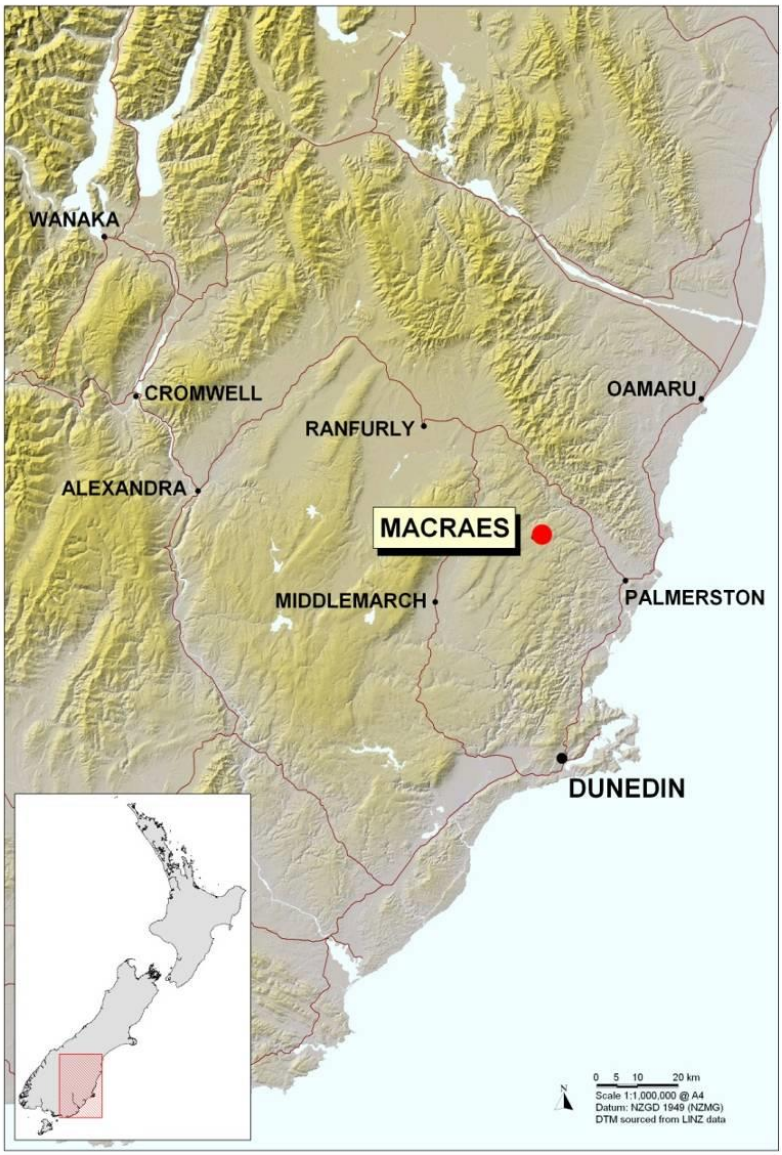


Figure 1: General Location of Macraes Gold Operation

The Macraes Gold Project is the largest goldmine in New Zealand and since it was commissioned in 1990, over 5 million ounces of gold have been produced. The existing and consented mining infrastructure at Macraes Gold Project includes:

- Various open pits;
- The Frasers Underground mine;
- Numerous waste rocks stacks (active and rehabilitated);
- A network of haul roads and service tracks;
- A Processing Plant;
- Tailings storage facilities; and
- A comprehensive network of water management infrastructure.

OceanaGold (New Zealand) Ltd (OceanaGold) is continually reviewing the life of the Macraes Gold Project in light of current knowledge of the gold resource and the economic value of mining. Recent exploration success has highlighted opportunities to re-mine and expand a previously mined area known as the Deepdell North Pit.

This new project is known as the Deepdell North Stage III Project (**the Project**) and includes the following key components:

- **The Deepdell North Stage III Pit** – which involves re-mining the Deepdell North Pit and expanding it from 18.7ha to 38ha;
- **The Deepdell East Waste Rock Stack** - comprises backfilling of the existing Deepdell South Pit and will approximately re-establish the original ground contours, before raising the ground profile to the north. At the WRS northern extent the WRS crosses Horse Flat Road and the road is to be realigned. Overall the WRS has a footprint of 70.6ha and a storage capacity of 59.5Mt.

The Deepdell North Stage III Pit is estimated to contain approximately 3.5Mt of ore and will produce 9.4Mt of backfill waste, 2.4Mt of in-situ oxide waste and 41.5Mt of fresh waste. Total movement of material will be approximately 57Mt and the Project is expected to take approximately two years to complete.

An overview of the Deepdell North Stage III Project is provided in Figure 2 below. Key points to note are:

- Access will be via the existing Coronation haul road and Deepdell South haul road.
- The existing and consented Processing Plant and tailings storage facilities will be used to process ore from the Deepdell North Stage III Pit and to manage processing waste.

- The mining rate at the Macraes Gold Project when the Deepdell North Stage III Project is being undertaken will be similar to current and past operations at the Macraes Gold Project site.
- The mining methods and means of managing environmental effects will be similar to those used for the existing and consented activities at the Macraes Gold Project.
- The establishment of noise bunds toward the north west of the site to mitigate potential noise effects on the residents of a habitable dwelling.
- The Deepdell North Stage III Project will be progressively rehabilitated on substantially the same basis as the recently consented Coronation North project. At closure, a pit lake will be formed, and the haul road will be rehabilitated.
- All water from the Deepdell North Stage III Project will drain to the catchment of Deepdell Creek, a tributary of the Waihemo (Shag) River.
- Some areas to be mined are HAIL sites due to previous mining and as such, mining will require a land use consent from Waitaki District Council pursuant to Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011
- A realignment of approximately 900m of Horse Flat Road is required to bypass the northern extent of the proposed Deepdell East Waste Rock Stack and this includes a culverted vehicle crossing embankment in an unnamed ephemeral tributary of Highlay Creek.
- To facilitate the proposal, OceanaGold seeks a change to consent conditions on existing Waitaki District Council resource consents relating to Coronation, Coronation North and Coronation North extension and timing of requirements to reopen the road to the public for unrestricted entry.
- OceanaGold requests that this proposal is publicly notified.

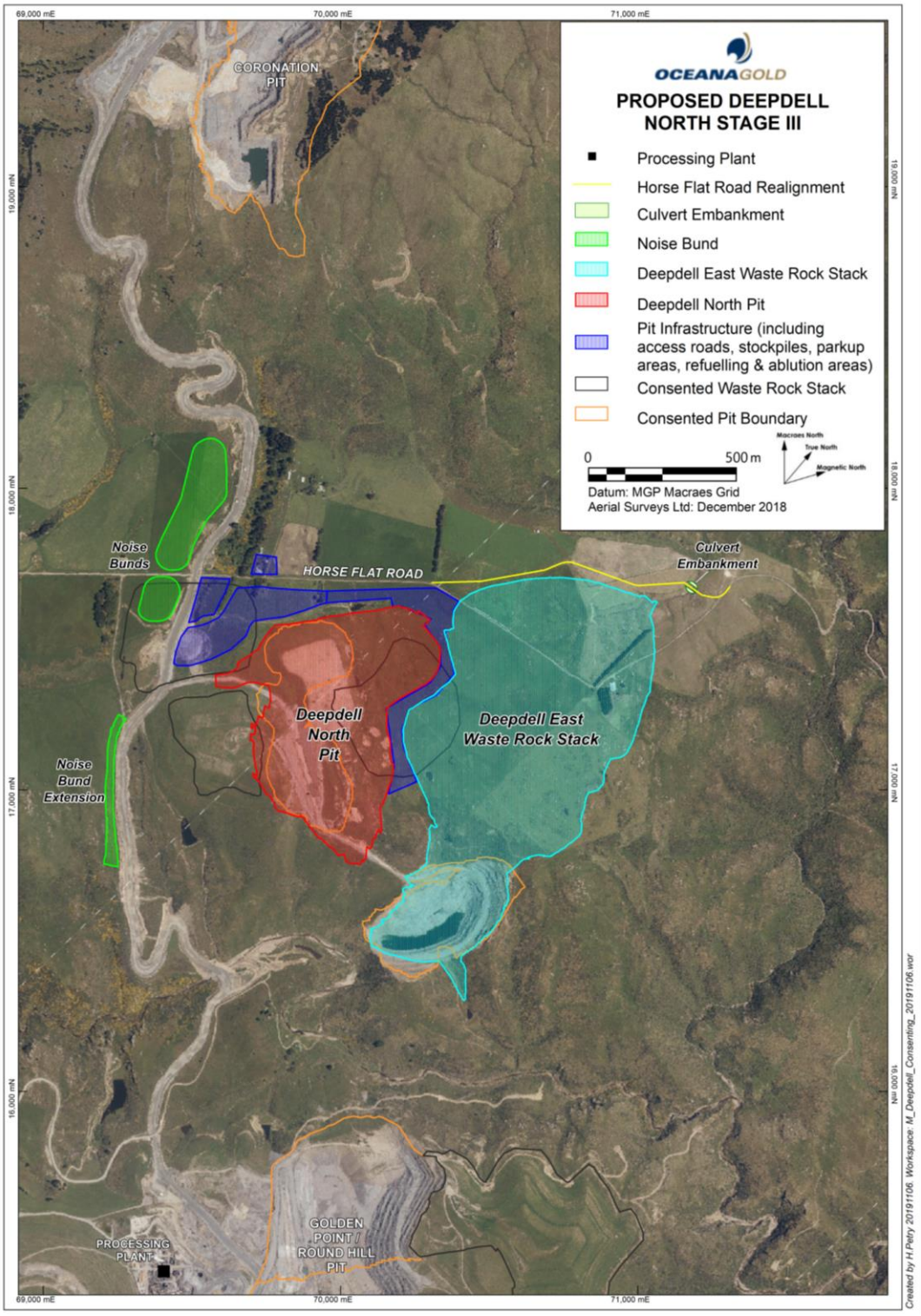


Figure 2: **Deepdell North Stage III Project Elements.**

1.2 BACKGROUND

Macraes Gold Project commenced operations in 1990 following the granting of initial consents in 1988. In 1992, 1997, 2000, 2001, 2002, 2004 and 2006 further consents were issued in relation to various expansions in both the rate of production and physical elements of the mine (pits, waste rock stacks and storage facilities for tailings and process water).

In 2011, OceanaGold sought and was granted an extension to the consented life of the Macraes Gold Project. The extension, called the Macraes Phase III Project, was expected to take the consented mine life through to 2020, instead of the mine closing as previously proposed in 2012. Under the Macraes Phase III Project, production at the Fraser's underground mine has continued in parallel with the open pits. The Macraes opencast mining operations were to be scaled back towards the end of the mine's life (i.e. in 2019 and 2020).

In 2013 OceanaGold sought and was granted another extension to the life of the Macraes Gold Project. The Coronation Project was expected to add approximately 1 year to the overall Macraes Gold Project's mine life. In other words, rather than the Macraes opencast mining operations being scaled back in 2019 and 2020 as was previously proposed, this was to be delayed until 2020 and 2021. The year 2019 would see a continuation of the same level of economic activity at the site as was proposed previously for the period 2015 to 2018 (inclusive) under the Macraes Phase III Project.

In 2016 OceanaGold sought and was granted a further extension called the Coronation North Project. This extension was to add 3 full years to the operational life of the mine – i.e. in terms of the economic effects of the Project the operating life of the mine was to continue at current levels into the years 2020, 2021 and 2022, with the scaling back of activities and rehabilitation pushed back to 2023 and 2024.

Currently consented activities are now (October 2019) expected to allow mining operations to continue at current levels into 2023, with the scaling back of activities and rehabilitation expected around 2024 and 2025. A further extension of the Macraes Gold Project is now proposed called the Deepdell North Stage III Project. The estimated duration of the operation and rehabilitation activities of the Project will be approximately 3 years, with the Project effectively adding an additional full year to the operational life of the Macraes Gold Project. This likely means that the operating life of the mine will continue at current levels into the year 2024, with the scaling back of activities and rehabilitation pushed back to 2025 and 2026. Further exploratory drilling may result in the operational life of the mine being further extended but that is uncertain at this time.

1.3 THE APPLICANT – OCEANA GOLD (NEW ZEALAND) LIMITED

OceanaGold (New Zealand) Limited (OceanaGold) is a wholly owned subsidiary of OceanaGold Corporation (OGC). OGC is a publicly listed company on the Australian and Toronto stock exchanges.

OceanaGold considers that strong environmental performance, and its social licence to operate, are an integral part of being a successful business. The company is committed to working collaboratively with the local community to create opportunities, build resilience and leave a positive, long-lasting legacy well beyond the mining lifecycle. This commitment is detailed in a suite of company policies which are available on the OceanaGold website.

In addition to the mines at the Macraes Gold Project, OceanaGold:

- Owns and operates surface and underground mines at Waihi in New Zealand's North Island; and
- Owns the Reefton Mine in the West Coast Region, which is currently undergoing closure and rehabilitation.

OceanaGold currently provides approximately 620 jobs for permanent staff between its Macraes, Reefton and Waihi operations. Of this total, the Macraes operation has approximately 571 employees engaged at the site and approximately a further 22 staff at the Dunedin Office.

OceanaGold owns part of the land on which the prospecting/exploration tenements are located at Macraes and enters access arrangements with landowners to enable prospecting/ exploration activities on any privately-owned land.

1.4 RESOURCE CONSENTS REQUIRED

OceanaGold is seeking all necessary resource consents from the Waitaki District Council (**WDC**) and Otago Regional Council (**ORC**) for the Deepdell North Stage III Project. Summaries of the resource consents required are provided in Table 1 and Table 2 below.

Table 1: Land use consents sought from the Waitaki District Council for the Deepdell North Stage III Project.

Activity		Plan Rule	Activity Status
a)	Extraction of minerals and overburden by mechanical means from Deepdell North Stage III Open Pit (centered at NZTM grid reference 1397786E, 4975675N);	Rule 6.3.3(3) (Where within MMP Mineral Zone[1])	Non-Complying
b)	Deposition of waste rock produced by the operation into a waste rock stack (centered at NZTM grid reference 1398218E, 4975926N) and the deposit of waste rock as backfill into the open Deepdell South Pit; (centered at NZTM grid reference 1398447E, 4975397N);	Rule 4.3.3(4) (Where within Rural Scenic Zone)[2]	
c)	Construction, operation and maintenance of various silt ponds and silt control facilities necessary for controlling runoff from the Deepdell North Stage III Project mining operation.		
d)	The construction use, maintenance and operation of a haul road from the Coronation Haul Road to the Deepdell East WRS;		
e)	The transport, treatment and processing of minerals extracted from the Deepdell North Stage III Pit;		
f)	Use and storage of hazardous substances (diesel) and use of explosives;[3]	Rule 16.1.2 (1)	Discretionary
g)	Construction, use and maintenance of temporary buildings;	Rule 10.1.1.2	
h)	Decommissioning and rehabilitation of the structures and works listed above.	Rule 6.3.3(3) (within MMP Mineral Zone) Rule 4.3.3(4) (within Rural Scenic Zone)	Non-Complying
i)	Realignment and construction of approximately 900m of Horse Flat Road	Rule 6.3.2.(3)[4] Discretionary activity (Within Mining Zone) and Rule 4.3.2.(1) Controlled activity in the	Discretionary

[2] Although the mining activities meet discretionary activity Rule where they occur in the rural zone, Section 1.8.4 of the Waitaki District Plan states that any activity that does not meet critical zone standards is a non-complying activity. The activities in both the mining zone and the rural zone are therefore bundled as non-complying activities.

[3] Explosives will be stored off-site at existing authorised sites.

[4] For the purposes of this assessment in the Mining and Rural Scenic Zones, the Horse Flat Road realignment is necessitated by mining activities but being a public road, is not considered as a road associated with mining (which would necessitate inclusion under the rules for mining activities).

		Rural Scenic Zone	
j)	Disturbance of soil within a HAIL site.		Discretionary activity pursuant to NES soil 2011

Table 2: Resource consents sought from the Otago Regional Council for the Deepdell North Stage III Project

Type	Purpose	Rule and Activity Status	Proposed Consent Duration
Deepdell North Stage III Pit			
Water permit	To take surface water and ground water from the Deepdell North Stage III Pit for the purpose of dewatering and for dust suppression.	Rule 12.1.4.2 (Water Plan) Restricted Discretionary Rule 12.2.4.1 (Water Plan) Discretionary	10 years
Discharge Permit	To discharge rainfall run off water and associated contaminants to land where it may enter ground water from the mined pit surface within the Deepdell North Stage III Pit for the purpose of constructing and operating an open pit mine.[5]	Rule 12.B.4.2 (Water Plan) Rule 6.6.1(1) (Waste Plan) – Discretionary	35 years
Landuse Consent	To disturb, deposit onto or into and reclaim an approximately 480 metre length of the bed of an unnamed intermittent, modified tributary of Camp Creek for the purpose of establishing a drainage network and stockpiles.	Rule 13.5.3.1 (Water Plan) (Discretionary)	Unlimited
Deepdell North Stage III Pit Lake			
Water permit	To dam water in Deepdell North Stage III Pit for the purpose of creating the Deepdell North Pit Lake.	Rule 12.3.4.1 (Water Plan) (Discretionary)	35 years
Water Permit	To take surface water for the purpose of creating the Deepdell North Pit Lake[6]	Rule 12.1.4.2 (Water Plan) Restricted Discretionary	35 years
Deepdell East Waste Rock Stack and Deepdell South (Pit Backfill) Waste Rock Stacks			
Discharge Permit	To discharge waste rock to land where it (and resulting contaminants) may enter ground and surface water for the	Rule 12.B.4.2 (Water Plan) Rule 6.6.1(1) (Waste Plan) – Discretionary	35 years

[5] This discharge will continue after the mining and rehabilitation has finished and will effectively end once the rock is weathered.

[6] This is a passive take involving WRS runoff being directed into the pit after closure.

Type	Purpose	Rule and Activity Status	Proposed Consent Duration
	purposes of constructing and operating a waste rock stack. [7]		
Landuse Consent	To disturb, deposit onto or into and reclaim approximately 350 metres of the ephemeral bed and approximately 130 metres of the intermittent bed of an unnamed tributary of Highlay Creek for the purposes of constructing a waste rock stack and silt ponds.	Rule 13.5.3.1 (Water Plan) (Discretionary)	Unlimited
Landuse Consent	To disturb the bed, deposit into the bed and place a 51m long culvert and embankment structure into the bed of an unnamed tributary of Highlay Creek for the purposes of a realignment of Horse Flat Road.	Rule 13.2.3.1 (Water Plan) Discretionary	35 years
Air			
Discharge Permit	To discharge contaminants from mining operations and post mining rehabilitation to air for the purpose of undertaking mining operations.	Rule 16.3.5.9. (Air Plan) Discretionary.	10 years

Additional approvals may be required[8] pursuant to the Building Act 2004. These will be sought via a separate process.

The diversion of water associated with the clear water diversions around the proposal and the diversion of runoff water from the waste rock stack to the Deepdell North silt pond are permitted activities under Rule 12.3.2.1 of the Otago Regional Council Water Plan.

OceanaGold is also seeking a change of consent conditions for the Coronation, Coronation North and Coronation North Extension land use resource consents (Waitaki District Council) in order to allow the haul road to remain closed to open public access which will allow the Deepdell North Stage III proposal to be completed. This relates to the

[7] The discharge application is for the discharge of the following:
- Waste rock to land for the purpose of constructing a waste rock stack,
- Waste rock contaminants to land where it may enter ground and surface water (Including discharges of sediment laden rainfall runoff and water and the discharge of water from the toe of the waste rock stack to land where it may enter surface water via the silt ponds or enter ground water via infiltration in the drains conveying WRS run off to the silt ponds) for the purposes of operating a waste rock stack
- Treated sediment laden water from silt ponds to land where it way enters surface water.
- Water to land from the pit and the silt ponds for the purposes of dust suppression

[8] Additional approvals under the Heritage New Zealand Pouhere Taonga Act 2014 are not required in this case.

consents issued from the Waitaki District Council reference: 201.2013.360, 201.2016.779, 201.2019.1241.

OceanaGold requests that this proposal is publicly notified.

1.5 DOCUMENT STRUCTURE

This document is an Assessment of Environmental Effects (**AEE**) in support of resource consent applications under the Resource Management Act 1991 (**RMA** or **the Act**) to authorise the activities associated with the Deepdell North Stage III Project.

All matters required to be addressed in accordance with the RMA are contained within this AEE, and are set out in nine chapters, as follows:

Chapter 1 Is this introduction.

Chapter 2 Describes the existing environment for the Deepdell North Stage III Project.

Chapter 3 Provides an overview of the Deepdell North Stage III Project.

Chapter 4 Sets out the resource consent requirements for the Deepdell North Stage III Project.

Chapter 5 Addresses the actual and potential environmental effects of the Deepdell North Stage III Project on the environment. It also sets out how OceanaGold proposes to avoid, remedy or mitigate the actual and potential effects of the Project on the environment, the measures proposed or agreed to by OceanaGold for the purpose of ensuring positive effects on the environment to off-set or compensate for any adverse effects on the environment, and proposed monitoring.

Chapter 6 Management and monitoring of actual and potential environmental effects

Chapter 7 Provides a consideration of alternatives in accordance with the requirements of the RMA.

Chapter 8 Describes the consultation undertaken by OceanaGold in relation the Deepdell North Stage III Project, the feedback received during that consultation and how that feedback has been addressed.

Chapter 9 Sets out the statutory framework within which these applications have been made and describes the project in relation to the provisions of the RMA and the relevant statutory planning documents.

Various technical assessments commissioned by OceanaGold provide the detailed technical information to support this AEE. These are appended to this AEE, are referenced throughout, and include:

Appendix A: Records of Title
Appendix B: Plan Drawings of Proposal
Appendix C: Relevant Existing Consent Certificates
Appendix D: Terrestrial Ecology Reports
Appendix E: Water Quality Effects Assessment
Appendix F: Noise Assessment Report
Appendix G: Air Blast and Vibration Report
Appendix H: Heritage Report
Appendix I: Health, Safety and Environment Compliance Standards
Appendix J: Geotechnical Assessment Reports for Pit and WRS
Appendix K: Road Embankment and Culvert Report
Appendix L: Air Effects Report
Appendix M: Landscape, Natural Character and Visual Amenity Assessment Report
Appendix N: Rehabilitation Report
Appendix O: Aquatic Ecology Effects Assessment
Appendix P: Traffic Assessment Report
Appendix Q: Economic Assessment
Appendix R: Erosion and Sediment Control Report
Appendix S: Proposed Consent Conditions
Appendix T: Groundwater Effects Assessment

2. THE EXISTING ENVIRONMENT

This chapter describes the existing environment against which actual and potential effects of the Deepdell North Stage III Project are to be assessed. It addresses:

- The environmental setting;
- Takata Whenua values;
- Heritage values;
- Current land ownership;
- Current land use and zoning;
- Existing and authorised mining activities;
- Socio-economic context;
- Geology;
- Landscape context and character;
- Transportation network;
- Noise and vibration;
- Air quality, meteorology and climate;
- Surface water and aquatic ecology;
- Groundwater; and
- Terrestrial ecology

2.1 ENVIRONMENTAL SETTING

The Deepdell North Stage III Project is located upon the northern flanks of the incised Deepdell Creek valley that runs from west to east and is located north of the Macraes Township. The overall Macraes Operation is located approximately 30km inland from Palmerston, East Otago. Macraes Flat is flanked by the Taieri Ridge to the north west, Shag Valley and Horse Range to the east, and the coastal hills and extinct volcanic cones of Palmerston and Waikouaiti to the south east.

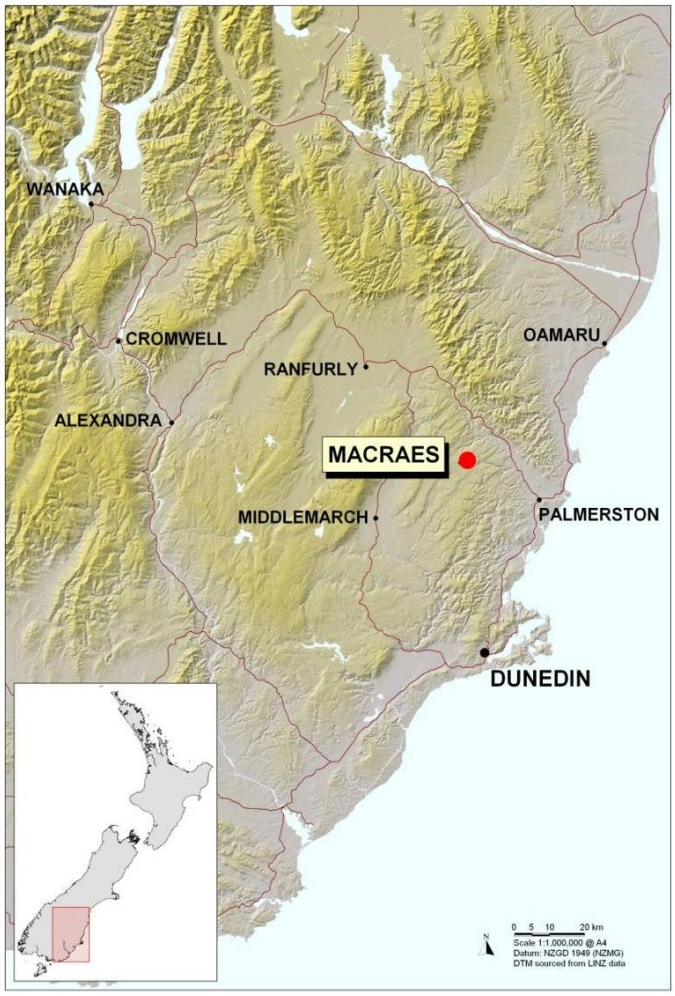


Figure 3: Environmental setting for the Macraes Operation

Macraes Flat is situated on an elevated plateau at approximately 500m above sea level that is isolated from the main highways and towns of East Otago. One sealed, local authority road, Macraes-Dunback Road, connects Macraes Flat and the associated Macraes Operation with State Highway 85 to the east and State Highway 87 (SH87, the Middlemarch-Hyde road) to the west.

2.2 CURRENT LAND OWNERSHIP

OceanaGold is the sole owner of the land on which the proposed Deepdell North Stage III Project will be located[9] (see Figure 4). As shown on Figure 4 and in Figure 40, OceanaGold leases some of that land to the Howard's, Peddie's, and Appin Farms. The properties are actively farmed.

[9] Except for a small part of a noise bund.

The legal description of the land parcels affected by the Deepdell North Stage III Project are provided in Table 3 below and how the project elements fit within these parcels can be viewed in Figure 4.

Table 3: Deepdell North Stage III Project land ownership and legal description.

Deepdell North Stage III project element	Land Parcel	Record of Title	Owner
Deepdell North Stage III Pit	Part Section 12 Block VII Highlay SD	OT16B/855	OceanaGold
Horse Flat WRS	Part Section 11 Block VII Highlay SD	OT16B/855	OceanaGold
	Section 10 Block VII Highlay SD	OT18C/1099	OceanaGold
Deepdell South Backfill	Part Section 1 Block VIII Highlay SD	OT16B/854	OceanaGold
	Part Section 12 Block VII Highlay SD	OT16B/855	OceanaGold
Noise bund	Lot 1 DP 22318	OT14C/1088	CH and ML Howard
Noise bund	Part Section 11 Block VII Highlay SD	OT16B/855	OceanaGold

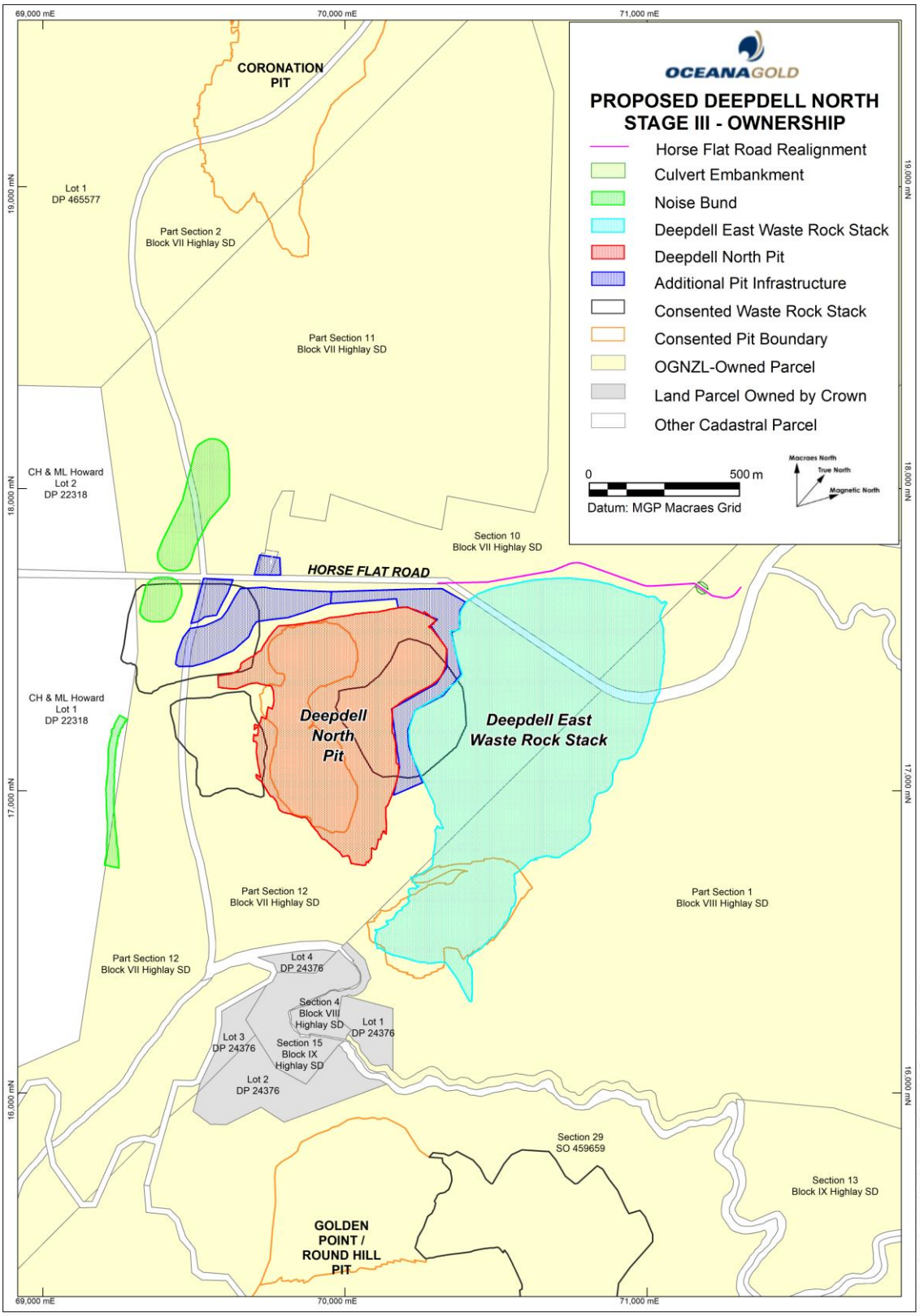


Figure 4: **Deepdell North Stage III Project land ownership.**

2.3 CURRENT LAND USE

2.3.1 Zoning

The Waitaki District Plan attributes different areas of land a specific zoning which reflects the intended purpose and dominant land use of that area.

The zoning attributed to the Deepdell North Stage III Project is shown in Figure 5 below. By way of summary:

- The Deepdell North Stage III Pit is in the Macraes Mining Project Mineral Zone ("**MMPMZ**").
- The Deepdell East WRS and Deepdell South Backfill is in the MMPMZ and the Rural Scenic Zone.
- The haul road is in the MMPMZ.
- The margins of the southernmost noise bund extend partially into the Rural General Zone from the MMPMZ. [10]

[10] Note that figure 3 does not show the boundary between the Rural General and Rural Scenic Zone boundary and this boundary runs left to right in the left of the image at the northern extent of the flat paddocks.

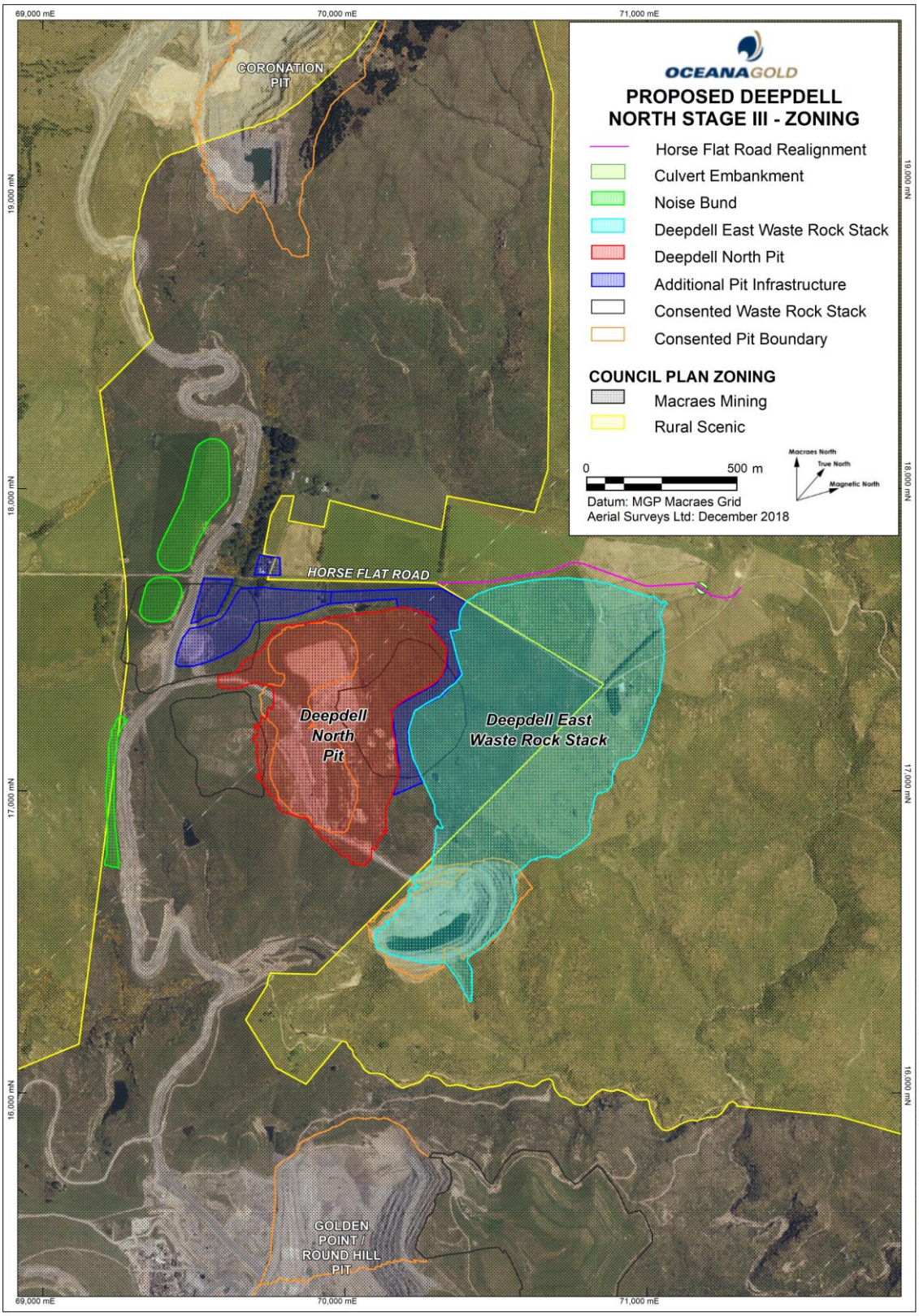


Figure 5: District Plan Zoning - Deepdell North Stage III Project.

The majority of the land adjacent to the Deepdell North Stage III Project area is in the MMPMZ and the Rural Scenic Zone. However, the area to the west and south west of the Project Area on the other side of the haul road, is in the Rural General Zone.[11]

2.3.2 Habitable dwellings

The closest habitable dwellings to the Deepdell North Stage III Project are shown in Figure 6 and include:

- Howard residence – Bellfield - located on Horse Flat Road approximately 1.5km to the west of the proposed Deepdell North Stage III Pit boundary and approximately 1.1km to the west of the existing haul road. This is the closest habitable dwelling.
- O'Connell residence – located at the northern end of Hyde Street in the Macraes Village, approximately 3.6km to the south of the Deepdell North Stage III Pit boundary.
- Vanderley residence – Deepdell Station - located on Horse Flat Road approximately 4.8km to the south west of the proposed pit.
- Tisdall and Roy residences - located beyond Deepdell Station, near the intersection of the Hyde-Macraes Road and Moonlight Road, approximately 5.5km to the south west of the proposed project area.

The above residences are in the Rural General Zone.

[11] Note that figure 3 does not show the boundary between the Rural General and Rural Scenic Zone boundary and this boundary runs left to right in the left of the image at the northern extent of the areas of flat paddocks.

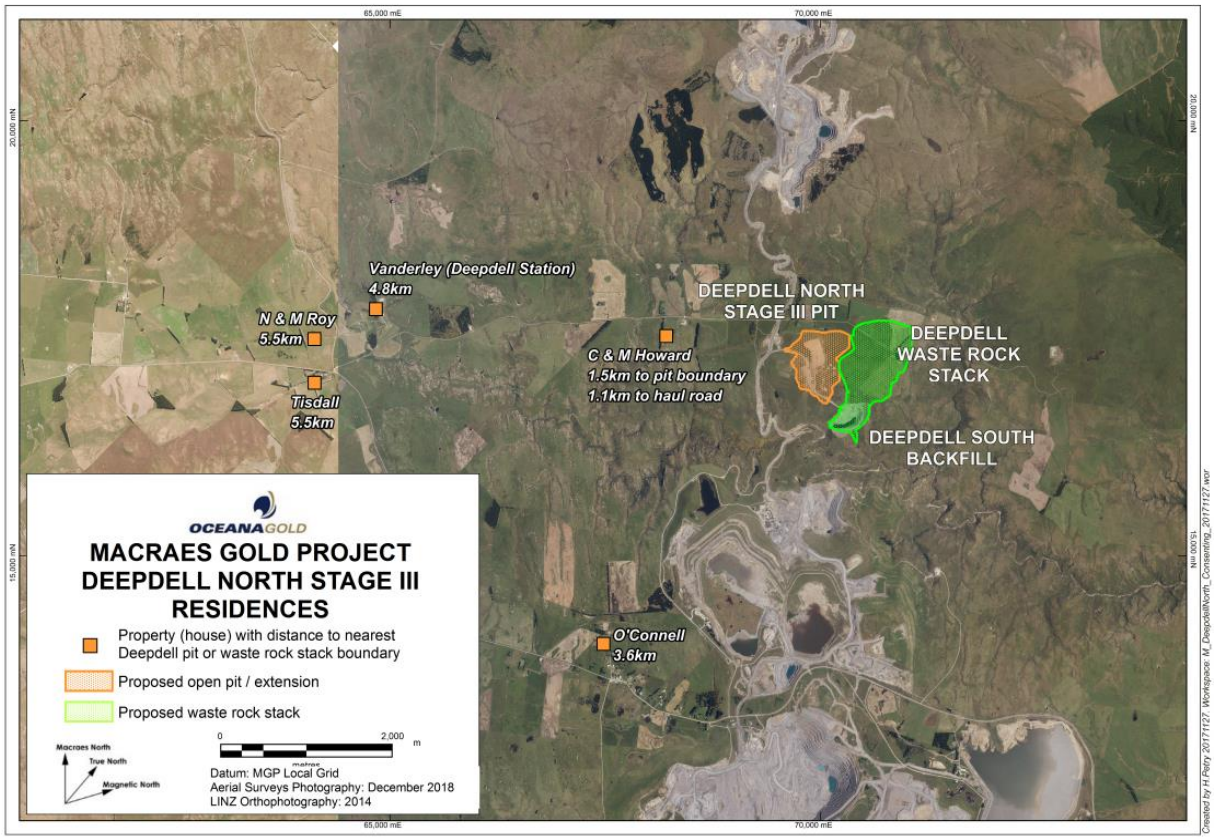


Figure 6: Closest habitable dwellings to the Deepdell North Stage III Project.

2.4 EXISTING AND AUTHORISED MINING ACTIVITIES

A dominant feature of the existing environment are the various mining activities at the Macraes Operation (Figure 7 below). These activities include:

- various open pits;
- the Frasers Underground mine;
- numerous waste rock stacks (both active and rehabilitated);
- a network of haul roads;
- a processing plant;
- tailings storage facilities; and
- a comprehensive network of water management infrastructure.

A brief description of each is provided below.

2.4.1 Open pits and waste rock stacks (WRS)

There are currently three active open pits operating at the MGP with associated WRS. These are:

- *Frasers Pit and Frasers West WRS, Frasers East WRS, Frasers South WRS*
- *Coronation Pit and Coronation WRS,*
- *Coronation North Pit and Coronation North and West WRS*

There are also six currently inactive open pits at the MGP with associated WRS, these are:

- *Round Hill Pit and Golden Point Pit and Back Road, Northern Gully WRS*
- *Innes Mills Pit and Innes Mills West Pit*
- *Deepdell South Pit and Deepdell WRS*
- *Golden Bar Pit and Golden Bar WRS*

2.4.2 The Frasers Underground Mine

The Frasers Underground Mine is an underground mine operation which was commissioned in 2006. It consists of tunnels down to a depth of 800m below the surface. This underground mine is in its last few years of operation and OceanaGold is in the process of planning a new underground mine at the Macraes site which will overlap temporally with the Frasers Underground operation.

2.4.3 Haul Roads

There are active haul roads running in a north to south direction through the wider site area from Coronation North to the processing plant, from the processing plant south to Frasers pit and out to the various waste rock stacks and pits. Where haul roads are no longer in use, they are rehabilitated.

2.4.4 The Processing Plant and Tailings Storage Facilities

The processing plant uses a large quantity of water and grinds the ore into fine particles before subjecting it to a large number of processing steps to remove and refine the gold. The tailings waste is pumped to the Tailings Storage Facilities (**TSF**) where settlement and natural evaporation dries the tailings and allows safe and stable permanent storage. Excess water is decanted off the surface and pumped back for reuse in the processing plant.

2.4.5 Mine Water Management Infrastructure

The mine water management system effectively prevents discharges of waste rock stack water and water from pits to the wider environment. Surface water run-off and ground water which collects in pits and waste rock stack silt dams is used for dust management practices or pumped back for use in the processing plant. Water used in the processing plant is then discharged as tailings slurry to the tailings storage facilities where some is lost

through evaporation and the remainder of tailings water is recycled to the processing plant after settlement to separate it from tailings materials.

The system is constantly being managed by OceanaGold within the consented limits to improve water quality and quantity outcomes and to achieve the best environmental outcomes while allowing processing of gold and disposal of tailings.

This system is currently operating in the following configuration:

Frasers Underground in the base of Frasers Pit is operational and is being actively dewatered. Water levels in Golden Point Pit and Frasers Pit are being actively managed. Water from pit dewatering is either utilised in the processing plant or for dust suppression.

Tailings from the process plant are stored in the Top Tipperary Tailings Storage Facility (**TTTSF**).

The Mixed Tailings Impoundment (**MTI**) is inactive, SP10 and SP11 are inactive (no current discharge of tailings but classified as resting impoundments as they are not closed), are becoming dewatered and seepage drain discharges are declining. Seepage from the TSFs is collected by the tailings impoundments drainage systems and returned to the gold processing plant or to the impoundment. Makeup water is pumped from the Taieri River. Surface water run-off and groundwater seepage collecting in the Northern Gully and Maori Tommy Gully silt ponds is returned to the process water system. Approximately 95% of the water used in the processing plant is recycled

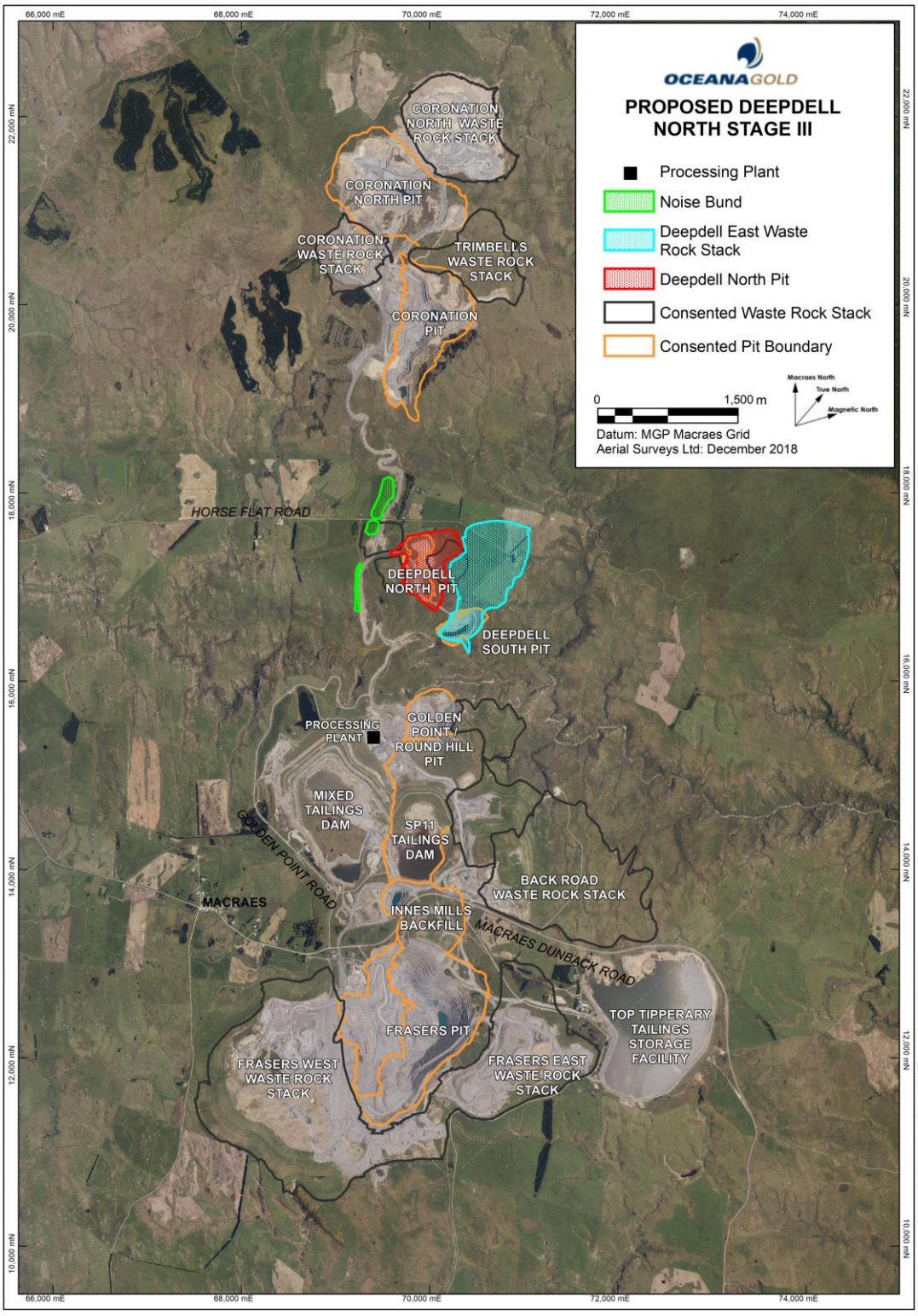


Figure 7: Overview of existing activities at the Macraes Gold Project and the proposal components.

2.5 SOCIO-ECONOMIC CONTEXT

The Macraes Gold Project is the largest and most successful gold mining project in New Zealand's modern history and is a significant employer in the context of the Waitaki District, Dunedin City District and the Otago Region. The Copeland (2019) report, attached as **Appendix Q,** provides further details on the importance of the Macraes Gold Project in the district and regional economic and socio-economic contexts. Since 1990, the Macraes Gold Project has been an important employer, source of royalties and a generator of economic activity in North Otago.

2.6 TAKATA WHENUA VALUES

An assessment of the cultural values attributed to the wider Macraes area is provided in the Cultural Impact Assessment (**CIA**) report prepared by Aukaha for the Coronation North Project on behalf of Te Rūnanga o Moeraki, Kāti Huirapa Rūnaka ki Puketeraki and Te Rūnanga o Ōtākou (Ngā Rūnanga). A takata whenua archaeological assessment of the Deepdell North locality, albeit with a different WRS location (Horse Flat WRS), was carried out in 2018 and reported on in Allingham (2018). This report provides information on the takata whenua cultural values in the general area and can be provided if requested.

While the CIA for Coronation North does not specifically describe the cultural values that apply to the immediate Deepdell North Stage III Project area, relevant information from that assessment is provided below where this information refers to the wider Macraes area.

2.6.1 Cultural Association with the Deepdell Creek and Waihemo (Shag) River Catchments

All catchments along the East Coast, regardless of their size, were part of the seasonal trails and behaviours associated with mahinga kai, and hapū and whānau bonding.

Most of the river mouths have, over the span of hundreds of years, supported human populations. Water plays a significant role in takata whenua spiritual beliefs and cultural traditions. The loss and degradation of this resource through drainage, pollution and damming is a significant issue for Kāi Tahu ki Otago and is considered to have resulted in material and cultural deprivation.

2.6.2 Resource Use in the Area

In addition to the mineral resources that were found in the upper Northern Branch Waikouaiti River and Waihemo (Shag) River catchments, the area known today as Macraes Flat contained many natural resources that were valued by Māori. Streams and ponds contained raupō and tuna (eels), and supported waterfowl that would be harvested during the seasonal moult (flappers). Forested gullies housed a range of birds and provided

timber. Open tussock grassland originally supported weka, quail and formerly moa. Also naturally occurring are taramea (spear grass), tikumu (mountain daisy), harakeke (flax) and probably tī kōuka (cabbage tree).

2.6.3 Ara Tawhito (Travel Routes)

The trails and resource gathering places of Kāi Tahu were widespread throughout Otago. Seasonal travel and places of encampment ensured the depth of association and traditions were continuously renewed and transferred to succeeding generations.

The Macraes Flat area was part of a major trail network running north-south and east-west, linking the Waihemo Valley directly with the lower Taieri wetlands bordering Maukaatua. The area, as discussed, contained natural resources that would have been targeted by Māori occupying more permanent settlements nearby, or on seasonal mahika kai gathering expeditions.

An early undated Topographical Plan of the Dunback District shows a Road from Macraes to Shag Valley which almost certainly follows an old Māori track, which was often the case as stated on some early Otago survey plans. This track heads east from the upper catchment of Tipperary Creek following the present-day line of the Macraes-Dunback Road to Waynes in the Waihemo Valley.

2.6.4 Cultural Sites in the Area

As mentioned above, an archaeological survey of an earlier version of the Deepdell North Stage III Project with a different WRS location (Horse Flat WRS) was undertaken in March 2018.

No archaeological sites of Maori origin were found in the area of the earlier proposed Deepdell North Stage III Project area, although the area includes schist outcrops with shelter qualities that may contain archaeological deposits. These shelters are relatively small and exposed, making it unlikely that anything other than stone, ash, or charcoal of an archaeological nature would survive into modern time given the low amount of natural deposition of protective cover affecting the wider survey area.

Further afield an orthoquartzite quarry (NZAA reference I43/68) and non-extant remains of a small settlement dating from the moa-hunter period (NZAA reference I43/96) are located within 8km south of the Macraes township towards Nenthorn. Many other sites including urupā, orthoquartzite quarries, rock-shelters, artefact (taoka) finds and umu occur in the same area within 10km of Macraes Flat.

These sites are evidence of the traditional use and importance of this area to tākata whenua. Many place names along the East Coast originate from the waka Araiteuru. The

names of the waves which wrecked the waka, plus the names of the many passengers of the waka are represented in the names of the reefs, hills, and mountains of East Otago.

Te Wai a te Atua is the name of a stream in the Nenthorn district, which may refer to 3 O'Clock Stream. Aside from the significant name, the site was a food gathering place where eel, weka and later pigs were taken by Māori. Finally, there are a variety of sites of interest to iwi lining the Waihemo Valley, and parts of the upper catchment of the Waikouaiti River.

2.7 HERITAGE

The wider Macraes district consists of a complex and extensive heritage landscape. There are a variety of historic sites, representing farming, alluvial mining, and quartz mining operations. Since the early 1990s, a vast number of archaeological and heritage assessments and inventory work has been undertaken.

Origin Consultants have completed a detailed assessment of the heritage values which apply to the specific areas that will be affected by the proposed Deepdell North Stage III Project. Origin (2019) is included as **Appendix H**.

No heritage item included in the New Zealand Heritage List/Rārangi Kōrero is contained within the area affected by the project, nor is any heritage item identified in the Waitaki District Plan.

However, the Origin (2019) assessment identifies that various mining and farming related heritage items are in the general area of interest, including:

- The historic Bellfield Homestead (I42/219).[12]
- The remnants of two historic water races (I42/205, I42/220)[13]
- A 20th century hard rock mining site (Deepdell/Evans workings) (I42/15).[14]
- A heritage covenanted area protecting the Evans workings (associated with I42/15).[15]

The Bellfield Homestead (see Figure 8), was constructed around 1888 by Alexander McLellan and is a representative example of the type of pastoral holdings created after the dissolution of the much larger early runs. While the early runs often had extensive holdings due to their size, the latter, smaller scale runs were usually run by one family, with little

[12] This feature is outside of the proposal footprint.

[13] These features are outside of the proposal footprint.

[14] This feature is partially inside the proposal footprint but is not classified as a heritage site under the Heritage New Zealand Pouhere Taonga Act 2014 due to dating from the 20th Century.

[15] See Figure 9 for the heritage covenant boundary.

additional help. The condition of many of the buildings within the Bellfield Homestead complex are poor or in a state of collapse. The buildings are no longer occupied or used, and as such have fallen into disrepair. The homestead building has also had significant alterations to its original 19th century form, and as a result the archaeological values of the building have been significantly diminished. The surviving buildings of Bellfield, while extensively altered during its operation as a farm during the 20th Century, including demolition of the original stable and woolshed, still provide a clear record of the size and form that these pastoral homesteads adopted. Correspondence with a farmer who used to own Bellfield has identified that several of the buildings, while added to, are the original 19th Century buildings of the homestead. Additionally, there are possible subsurface remains associated with 19th Century auxiliary buildings (stable and woolshed), which were demolished in the 20th Century.

The two water races connected to early alluvial mine workings on Horse Flat. The water-race above Horse Flat Road (I42/205) has been truncated by the earlier creation of the Coronation Pit access road and possible slumping in the gully to the north of the homestead area. The race originates from the Highlay Creek catchment outside the survey area and continues through to the southwest beyond the haul road. The other race (I42/220) survives in only a short segment, protected from being filled in by its proximity to the Bellfield complex. The condition of other alluvial features in the Horse Flat area has previously been the focus of archaeological surveys, which have noted that alluvial workings along the flat have been badly damaged by stock and by ploughing. The survey undertaken by the Origin Report confirmed this, with no evidence of mining visible anywhere on the flat within the assessment area. The surviving portion of the Horse Flat water races are therefore one of the few remaining traces of alluvial mining practices in the immediate area.

The hard-rock mining features date to the early 20th Century, and therefore are not required to be addressed under the provisions of an archaeological authority. However, the wider Deepdell mining site is protected under a heritage covenant with Heritage New Zealand Pouhere Taonga (**HNZPT**) as illustrated in Figure 9 below.

Figure 8: Bellfield Homestead, circa 1990s, showing additions to the villa (circa 1950s) and woolshed.

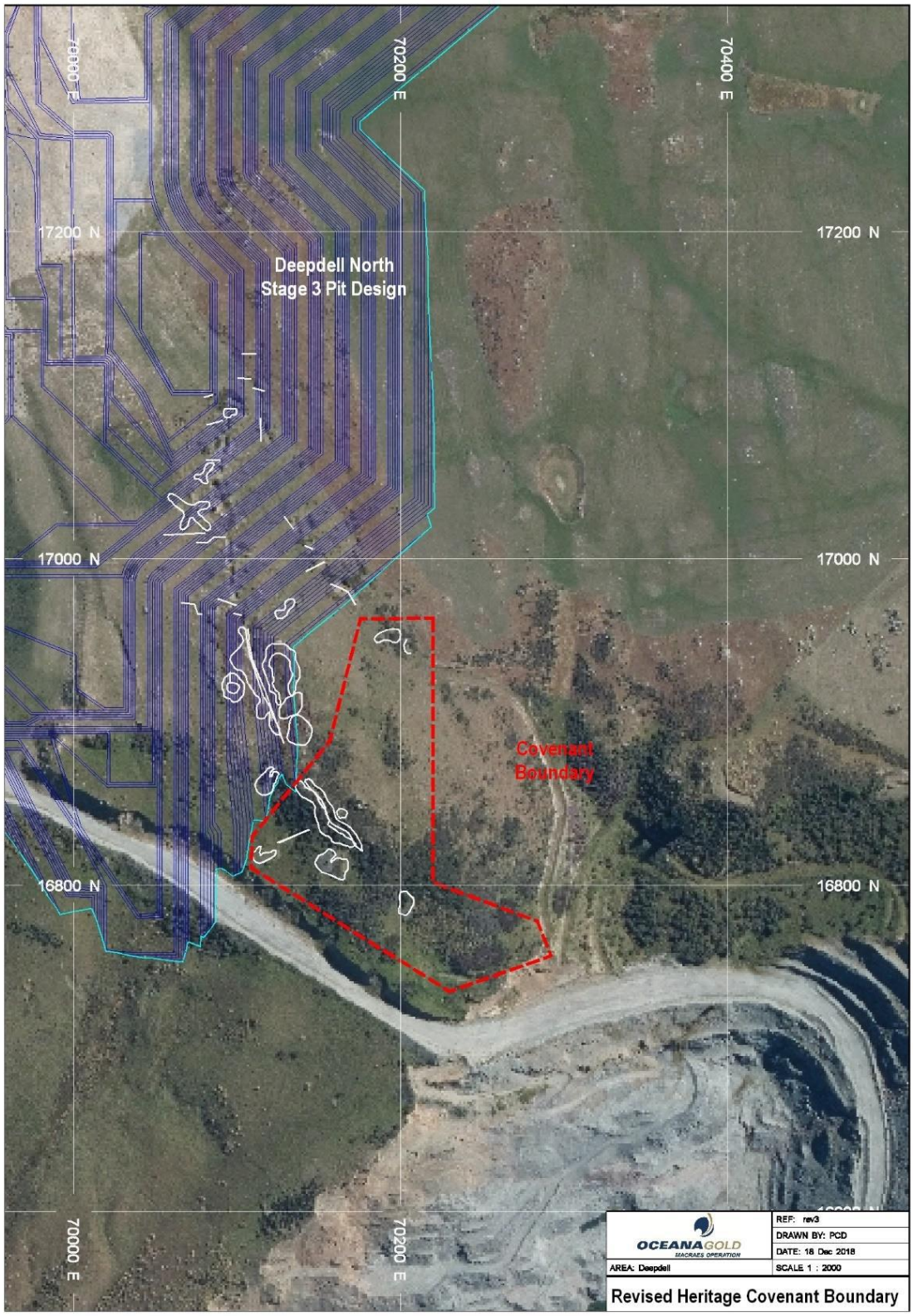


Figure 9: **The Evans/Deepdell Workings covenant and the Deepdell North Stage III Pit.**

2.8 LANDSCAPE

A description of the landscape values attributed to the Project area is provided in the Opus (2019) Visual Landscape Assessment). It describes the broad Macraes landscape, the Macraes Operation landscape and the more specific Deepdell North Stage III Project landscape. This assessment is attached as **Appendix M** to this AEE.

An overview of that assessment is provided in the sections below.

2.8.1 Landscape Context

Macraes sits within a rural upland landscape of fluvially dissected rolling hills of moderate relief and with characteristic broad ridge crests; being the coastal extent of Central Otago's basin and range topography (see Figure 3).

Prominent regional landscape features include the Nenthorn Valley, Taieri Ridge, Taieri Valley and the Rock and Pillar Range, which lie to the south and west, the Shag (Waihemo) Valley and Kakanui Mountains (including the Horse Range) to the north, and the coastal hills and extinct volcanic cones of Palmerston and Waikouaiti to the east and southeast.

Pastoral farming is the dominant land use in the area, followed by gold mining; the latter has a history in this area that dates back to the 19th Century. Macraes is 'off the beaten track' and on the eastern edge of the schist country and the broader historic goldfields of Central Otago. The presence of the relatively large-scale Macraes Operation is a noticeable and culturally interesting element in the current landscape. The Macraes Operation is the modern 'face' of open pit gold mining and its presence and effect relative to landscape change is now a major feature contributing to the local landscape character.

The long-term, focal and cultural landscape feature of Macraes Flat is the Macraes village with its hotel, school, churches, cemeteries and small clusters of houses with various outbuildings and shelterbelts. The village sits in splendid isolation within 'the flat' and various local roads lead to even more isolated farms and homesteads. Scattered and isolated habitation is a feature of the open, rolling, landscape on the edge of basin and range topography that expands through to the upper Taieri and Maniototo.

2.8.2 The Deepdell North Project Landscape

The landscape of the Deepdell North Project Area is steep to rolling country, rising steeply from the north side of Deepdell Creek to a relatively flat plateau on either side of Horse Flat Road and then rising steeply again to the Taieri Ridge.

The obvious current mining components of the Macraes Operation in the immediate vicinity of the Deepdell North Stage III Project area are the current Coronation haul road, existing Deepdell WRS that was completed in 2003, and the existing, mined Deepdell

South Pit. The Golden Point Road section of the haul road was built to access the Deepdell South Pit and the associated waste rock stack, and the haul road from Horse Flat Road up to the Coronation and Coronation North Pits has been in place since construction began on that in July 2014.

The existing Deepdell WRS 'sits' on the plateau or terrace above Deepdell Creek and a residual section of haul road runs from this WRS down and across to the Deepdell South Pit, which has been excavated into the terrace face just upstream from the Golden Point Historic Reserve.

The proposal site is located on a minor catchment boundary between Deepdell Creek and one of Deepdell Creek's tributaries, Highlay Creek. The eastern extent of the plateau and upper slopes within the Deepdell North Stage III Project area, drain east to Highlay Creek, which has upper tributaries (three small gully systems) within the face of the Taieri Ridge. Much of the plateau within the Deepdell North Stage III Project area drains via a minor unnamed tributary to Highlay Creek that has an ephemeral flow parallel to the south side of Horse Flat Road. The southern extent of the Project Area drains directly to Deepdell Creek immediately upstream of the Golden Point Historic Reserve. These tributaries are ephemeral and have been impacted by farming practices.

In terms of natural character and visual amenity value, the Taieri Ridge forms a distinct skyline and a visual backdrop to the Deepdell North Stage III Project area to the north, and the incised Deepdell Creek demarcates the southern extent of the Project Area. The block-faulted skyline ridge with frequent outcrops of schist is distinctive and its various incised gullies that drain to Deepdell Creek give the ridge a rugged character. The visual amenity of the Taieri Ridge is further defined by its predominant vegetation cover of tussock grassland, which has been maintained by extensive pastoral farming practices, its elevation and its isolation.

The plateau section within the Deepdell North Stage III Project area is distinctive in the wider landscape due to its cultivated and grazed paddocks with higher production pastures; many of which are cut for hay and intermittently 'disced' or ploughed. This more intensively farmed landscape also contains numerous conifer shelterbelts, as well as several farm dwellings and barns. The slopes of Deepdell Creek are again, more rugged with areas of scrubby native vegetation and tussock.

2.9 ROAD NETWORK

The road network of the surrounding environment is outlined in the attached Tim Kelly Transport Planning (2019) report at **Appendix P.** The private OceanaGold Macraes haul road runs broadly northwest to southeast through the subject area, connecting the

Coronation and Coronation North mining pits in the northwest, with the gold processing plant in the southeast. The single lane, metalled and public Horse Flat Road (which is classified as a local road) runs southwest to northeast through the subject area and on the eastern side of the Haul Road is formed for approximately 1.4km before reducing abruptly to an unformed paper road which in parts follows a farm track. Horse Flat Road connects at its western end with the sealed Macraes–Hyde Road approximately 5.3km from its intersection with the haul road. The Horse Flat Road intersection with the haul road is manned and controlled with haul road traffic being stopped to enable private vehicles to cross the haul road and to access or exit the eastern formed section of Horse Flat Road, which is approximately 1.4km long. Private vehicles can also access the Golden Point Historic Reserve via the haul road from Golden Point Road or from Horse Flat Road. This is by requesting that haul road traffic is stopped at the manned haul road crossings in order to safely use the haul road.

2.10 NOISE

The existing noise environment and expected noise emanating from the activities of the proposal is described in the Acoustic Engineering Solutions (2019) report attached as **Appendix F.**

The noise effects from existing and consented mining activities form part of the existing environment for the resource consent applications for the Deepdell North Stage III Project. Due to its location, the noise of most relevance to the Deepdell North Stage III Project is from existing haul truck traffic passing the western edge of the proposal area between the existing Coronation and Coronation North Mine Operations and the Macraes Gold Project processing plant. The consents for these activities allow the trucks to produce noise affecting the surrounding environment, but require the following limits to be met at any point within Macraes Village, and at the notional boundary of any dwelling not owned by OceanaGold:

- On any day between 7am and 9pm (daytime): 50 dB L_{Aeq}; and
- On any day between 9pm and 7am the following day (night-time): 40 dB L_{Aeq}; and/or 70 dB L_{Amax}

Noise monitoring has also been undertaken at the C & M Howard dwelling to determine the actual noise effects experienced at the closest habitable building for the Coronation and Coronation North trucks using the haul road. It showed on nights when hauling to the processing plant occurs, noise levels of up to 37 dB $LA_{eq\ (15\ min)}$ occur at the notional boundary of this residence. As such, the existing environment is affected by mining noise to the above degree. The other noise at the site would be mainly intermittent farm vehicles and typical rural noise such as livestock.

2.11 METEOROLOGY AND CLIMATE

OceanaGold measures meteorological variables at a climate station located on Golden Point Road approximately 5.5km south of the existing Coronation Operation.

Figure 10 contains the windrose for the years 2012-2018 inclusive. Winds blow predominantly from the south-westerly and north-westerly quarters. The strongest winds also come from these quarters. Winds from the north-easterly quarter tend to be lighter and less frequent and winds from the south-easterly quarter are rare.

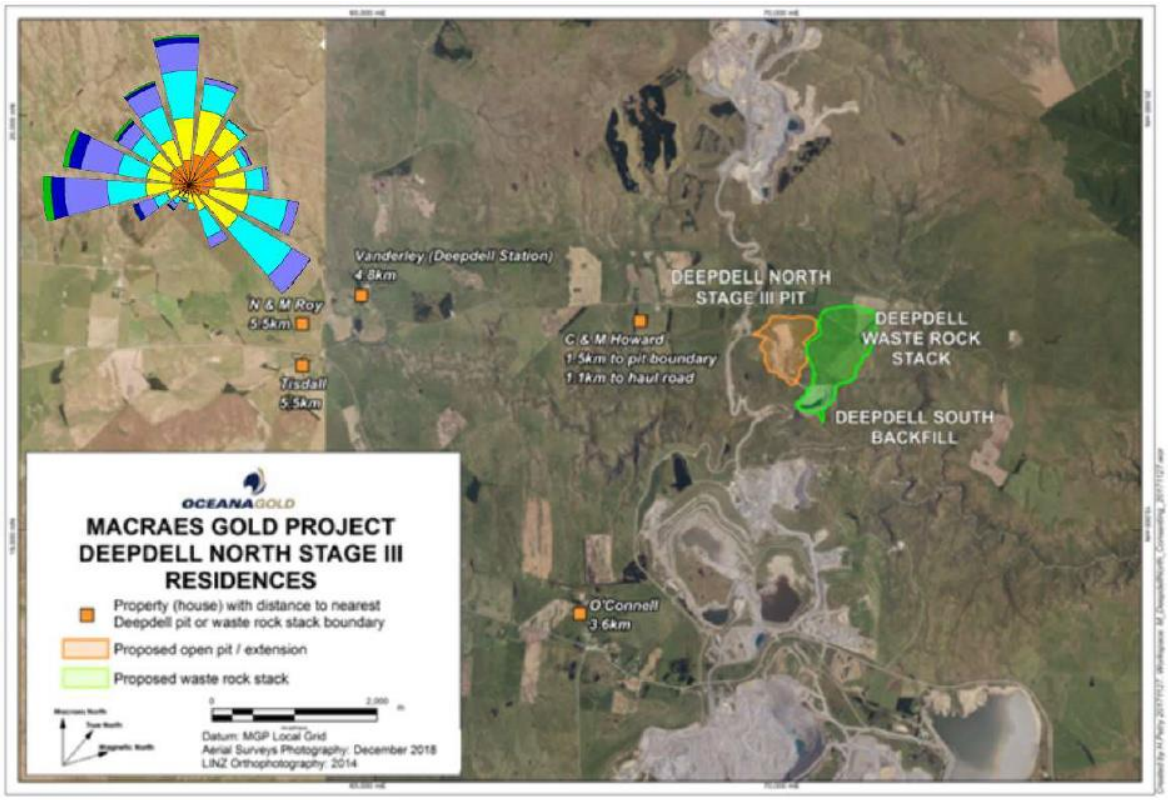


Figure 10: Windrose of hourly average wind speed and direction measured at Golden Point Road for 2012-2018 (inclusive) oriented to Macraes north. and location of the proposed Deepdell North Stage III Project relative to sensitive receptors.

The average wind speed measured between 2012 and 2018 (inclusive) was 3.3 m/s and calm conditions occurred for 3.0% of the time. Winds exceeding 5 m/s, which is the critical wind speed for the pick-up of dust from unconsolidated surfaces, occurred for 20.1% of the time. Figure 11 shows the frequency and occurrence of various wind speed classes measured between 2012 and 2018 (inclusive).

The average annual rainfall measured by OceanaGold, at the Golden Point climate station between 2012 and 2018 (inclusive), was 550 mm.

The relatively high frequency of winds exceeding 5 m/s, and the relatively low rainfall make the area susceptible to the generation of fugitive dust.

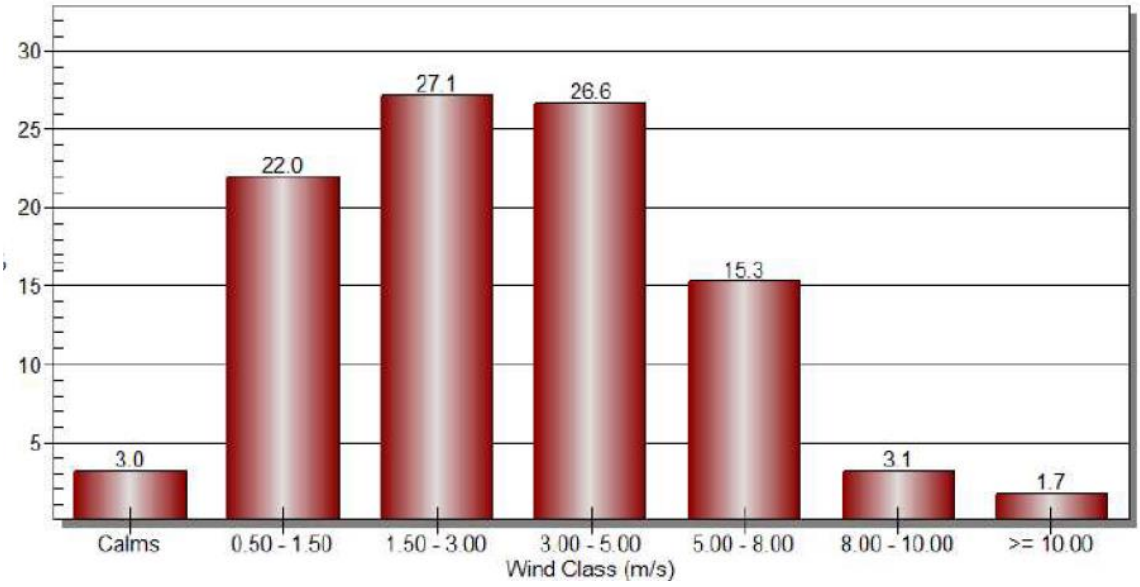


Figure 11: Frequency distribution of hourly average wind speeds measured at Golden Point Road weather station from 2012 - 2018 (inclusive).

2.12 AIR QUALITY

OceanaGold has been monitoring deposited dust and Total Suspended Particulate (**TSP**) concentrations in the vicinity of the Macraes Operation since 1989. The dust fall measured at these sites (see Table 4) should be indicative of background deposited dust concentrations in the rural area around the Deepdell North Stage III Project.

Table 4: Summary of background insoluble deposited dust values and TSP concentrations for 2016 - 2018.

	2018[16]	2017[17]	2018[18]	2018[16]	2017[17]	2016[4]
Minimum	0.1	0.2	0.2	1.6	0.0	0.0

[16] Beca Ltd "Macraes Mine – Summary of Ambient Air Monitoring Results for 2018" prepared for OGNZL (New Zealand) Limited, April 2019.

[17] Beca Ltd "Macraes Mine – Summary of Ambient Air Monitoring Results for 2017" prepared for OGNZL (New Zealand) Limited, April 2018.

[18] Beca Ltd "Macraes Mine – Summary of Ambient Air Monitoring Results for 2016" prepared for OGLNZ (New Zealand) Limited, 2017.

Average	1.0	0.9	0.4	12.3	10.1	8.3
Maximum	3.6	2.3	0.7	100	156.1	191.3

2.13 GEOLOGY

The basement rock in Central and East Otago is comprised of Otago schist. The Otago schist is primarily composed of psammitic and pelitic grey schist derived from metamorphism of mesozoic age sandstone and mudstone. In the area of Macraes Flat, the rocks have been metamorphosed to green schist metamorphic facies, giving a strongly foliated fabric of dark grey micaceous and light grey quartz-rich laminations.

From previous geotechnical investigations for the Macraes Operation it is apparent that the prominent geological structure includes a well-developed schistosity with two dominant fault sets. West of the footwall fault, that defines the footwall of the Hyde–Macraes Shear Zone (**HMSZ**). The schistosity is folded and has a varying trend over the project area revealing a series of anticlines and synclines. Foliation dips either to the northwest, north, west or southwest. East of the footwall fault (hanging wall) the schistosity has more of an easterly trend. At Coronation the footwall fault position is inferred as a subtle feature on the landscape. The Deepdell East WRS and Deepdell South Backfill WRS are located to the south of the proposed Coronation North Pit and overlie both the footwall fault and the hanging wall shear.

The major set of faults has an eastern trend. They exhibit miocene (recent tectonic) deformations and are related to formation of the Alpine Fault. This deformation has faulted and folded the surface within Central and East Otago to produce the present-day basin and range topography.

The second set of faults has a northern trend, and the most significant of these is the Hyde–Macraes Shear Zone.

The Hyde–Macraes Shear Zone comprises a mineralised shear zone which has been mapped for at least 25km by OceanaGold geologists. The HMSZ represents the principal gold bearing ore body utilised by OceanaGold and generally strikes north and dips at about 15° to the east. Tectonic displacement associated with the HMSZ is inferred to be in the order of hundreds of metres, with this movement initiating some 120 to 150 million years ago. The ore-schist zone of the HMSZ consists of predominantly pelite and semipelite, but includes blocks of psammite, typically well foliated and containing mineralised quartz veins.

2.14 SURFACE WATER AND AQUATIC ECOLOGY

2.14.1 Overview

The main surface water bodies in the vicinity of the Deepdell North Stage III Project are shown in Figure 12. The proposed Deepdell East WRS is situated on a catchment boundary between an unnamed tributary of Highlay Creek (Highlay Creek being a tributary of Deepdell Creek) and another unnamed tributary of Deepdell Creek. Runoff and seepage from Deepdell East WRS will flow mainly into Highlay Creek, which has a catchment of approximately 770ha and drains generally higher and steeper areas. The Deepdell East WRS catchment is split, with 50.5ha of a total area of 70.7ha currently reporting to Highlay Creek and the balance of 20.2ha reporting to Deepdell Creek.[19]

The Deepdell North Stage III Pit and Deepdell South Backfill footprints also lie within two catchments, the Deepdell Creek catchment and the Camp Creek Catchment (itself a tributary of Deepdell Creek). Surface water from these sites would flow directly into Deepdell Creek via the existing Deepdell North and the Deepdell South Silt Ponds and clear water (rainfall runoff) from uphill of the project will flow into Camp Creek via a clear water diversion and an existing modified stream channel (itself a tributary of Camp Creek). As shown in Figure 12, there are a number of surface water quality monitoring sites upstream of (DC01/DC02), adjacent to (DC03/DC05/DC06) and downstream of the Macraes Operation (DC07/DC08). The Deepdell Creek flows ultimately into the Shag/Waihemo River, which drains a primarily agriculture and forestry land use catchment. The Deepdell Creek runs dry some summers due to a lack of rainfall, whereas the Shag/Waihemo River is not known to run dry and has a larger catchment of 319km^2. Highlay Creek is known to have periods of no visible flow in summer. The surface water quality compliance levels in the relevant water courses for existing consents are being achieved.

[19] The WRS and associated erosion and sediment control drainage system will change this with WRS water being split between Deepdell and Highlay Creeks differently.

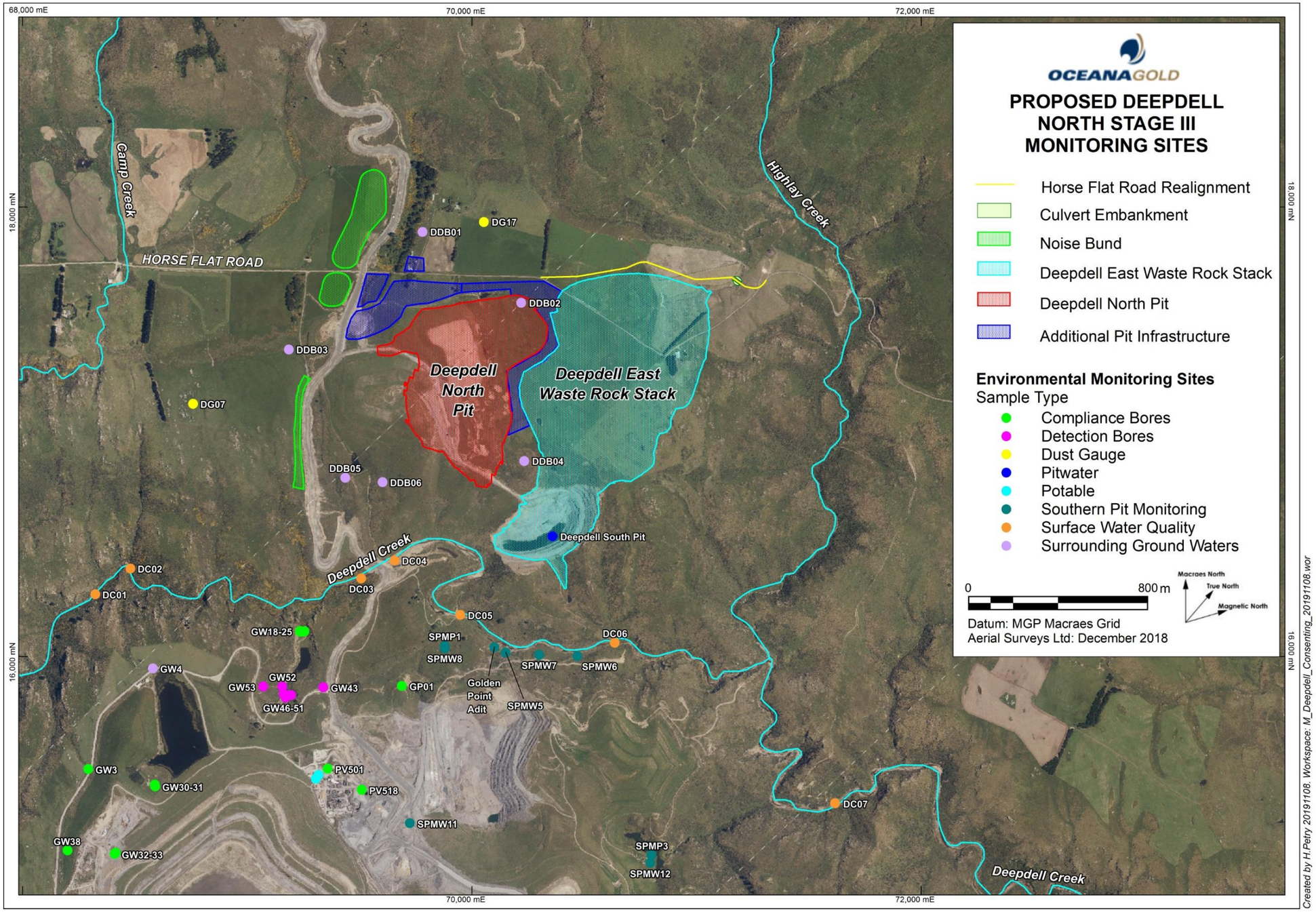


Figure 12: **Key surface waters and monitoring points in the vicinity of the Deepdell North Stage III Project area.**

2.14.2 Highlay Creek

Highlay Creek is a third order tributary of Deepdell Creek. Its headwaters are in the vicinity of Highlay Hill, starting at elevations up to approximately 750m above sea level. The catchment is approximately 770ha and drains steep slopes with several small tributaries that join upstream of Horse Flat Road. Below Horse Flat Road the creek flows in a south-easterly direction through a 2km long gorge before a confluence with Deepdell Creek.

The area of catchment within the Project footprint consists largely of gently sloping land, with shallow ephemeral gully systems, and straightened watercourses that may have once had a natural channel or have been man-made to divert surface flows. The gullies and watercourse drain to small tributaries of Highlay Creek located outside of the Project footprint. The watercourses may have ephemeral flow or at least carry very little surface flow in drier months of the year.

Surrounding land is a mixture of open pasture and matagouri with tussock grasses and native shrubs surrounding the watercourses (see Ahika 2019, **Appendix D**). Cattle, deer and sheep graze much of the area and the creek is not fenced off from livestock.

In general, the quality of habitat in Highlay Creek is superior to that in its tributary that would be directly affected by the Deepdell East WRS. This affected tributary is pugged by livestock and has no easily defined bed due to the livestock damage and bank-to-bank rooted terrestrial vegetation. As such, the directly affected Highlay Creek tributaries have very little aquatic ecology values.

Figure 13: **Top: Heavily pugged upper reaches of a gully that drains part of the proposed Deepdell East WRS. Bottom: Lower reaches of the same gully system upstream of the confluence with the main stem of Highlay Creek. (Source: Ryder 2019).**

2.14.2.1 Water Quality

Regular water quality monitoring of Highlay Creek has only commenced more recently. Spot readings collected during previous surveys in summer found reasonably low water temperatures (for summer), good dissolved oxygen levels (all readings above 9 mg/L) suitable for sensitive fish species, conductivity levels increase gradually with distance down the catchment, but are relatively low and indicative of low nutrient and heavy metal enrichment (see Table 5).

Table 5: Water quality in Highlay Creek (February 2011).

Site	pH	Temperature (°C)	Dissolved oxygen (mg/L)	Dissolved oxygen (%)	Conductivity (µS/cm)
Highlay Creek - upper reaches	8.11	13.7	10.42	100.3	53.2
Highlay Creek tributary	7.83	17.0	9.05	93.2	65.8
Highlay Creek - middle reaches	8.54	15.8	9.83	98.8	65.7

2.14.2.2 Aquatic Biota

Various periphyton and algal communities have been observed in Highlay Creek and its tributaries. Algal communities present in the creek are commonly found throughout New Zealand in a range of conditions, with the filamentous algae typically found in open, unshaded situations. Not surprisingly, algal abundance appears to be higher in open areas where sunlight can reach the creek bed, providing more suitable conditions for growth.

The macroinvertebrate communities are relatively healthy throughout Highlay Creek, with communities dominated by sensitive mayfly species and Potamopyrgus snails. Invertebrate communities are of poorer quality in the tributary which leads up to the Horse Flat WRS area, and it contains taxa typically found in slower flowing, wetland type habitat. Crayfish (*Paranephrops zealandicus*) have been observed throughout the Highlay Creek catchment, having been recorded at all survey sites.

Figure 14: Crayfish and crayfish eggs from Highlay Creek.

2.14.2.3 Fish Communities

Flathead galaxids have been observed throughout the Highlay Creek catchment, including its upper reaches. However, no fish were observed in a 2018 survey of the headwater tributaries. This is likely to be due to the fact that these tributaries are steep and carry very little water under summer low flow conditions. Further, observations by Ryder (2019) are that the ephemeral tributaries of Highlay Creek directly under the Deepdell East WRS are not thought to be capable of supporting fish due to the bank-to-bank rooted terrestrial grass vegetation, high levels of livestock pugging and lack of flow.

2.14.3 The Camp Creek Catchment

Camp Creek is a major tributary stream of Deepdell Creek and its headwaters rise in the Sister Peaks area on the true left of Deepdell Creek at approximately 737m above sea level. The Camp Creek catchment drains steep country like Highlay Creek and as a result, is likely to have similar water quality. Similar to Highlay Creek, Camp Creek is an intermittently flowing water course.

2.14.3.1 Aquatic biota

The aquatic ecology of Camp Creek is similar to that found elsewhere in the Macraes area. The quality of benthic macroinvertebrate communities is variable, but generally healthy throughout, with some degradation in community health in the tributaries.

2.14.3.2 Fish communities

Flathead galaxias are present throughout Camp Creek with higher abundance in the lower and middle reaches. Longfin eel are also present in the lower and middle reaches of Camp Creek, however eels have not been found further upstream.

Previous studies recorded brown trout, koura and galaxiids as being present within the tributary which is now beneath the haul road, however no fish or crayfish were captured in recent surveys in the tributary below Horse Flat Road.

Deepdell Creek in the vicinity of the project is contained within a confined channel that is surrounded by relatively steep-sided land throughout most of its length (refer to Figure 15). Riparian vegetation is dominated by pasture grasses, broom and matagouri, with occasional tussocks and *Carex sp*. sedges along the edges. Shading is common due to the steep topography and overhanging riparian vegetation. Stock and pig disturbance is evident in places.

In summer, flows can become very low and stop completely, however even during low flows, the creek is punctuated with deep, very slow-moving sections. Small riffle and run sections are also present. In riffle and run sections the substrate is dominated by cobbles with gravels and occasional boulders. Softer sediment is present in the slow-moving glides and pools. These habitats are also home to significant macrophyte cover, particularly in the warmer months and following stable flow periods where algae growth can be significant.

2.14.3.3 Flows

Flow in Deepdell Creek has been monitored by OceanaGold since 1985. The average monthly flows from this record are set out in Figure 16. The greatest flows occur through winter while the lowest flows are around the summer months of January and February. Most drainages intercepting the Deepdell North Stage III Project area in the Deepdell catchment are ephemeral or intermittent, with flows stopping during dry summers.

Figure 15: Aerial view of Deepdell Creek looking downstream, with the Deepdell South Pit in the upper left corner.

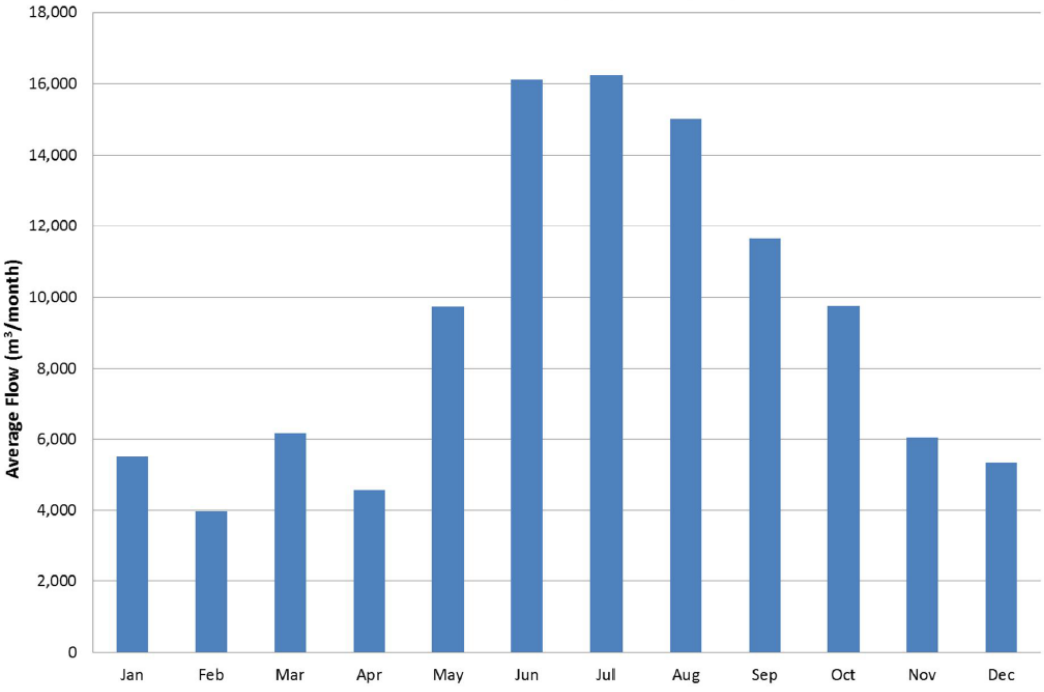


Figure 16: Average recorded monthly flows in Deepdell Creek.

2.14.3.4 Water Quality

OceanaGold has conducted regular water quality monitoring in Deepdell Creek since 2000. The water quality monitoring data for a later part of this period is summarised in Table 6. As outlined in Section 2.4.5, OceanaGold holds various resource consents which allow the discharge of water from mine related activities to Deepdell Creek (or its tributaries), and these existing activities and consents would remain in place over the life of the Deepdell North Stage III Project. Those resource consents[20] require OceanaGold to manage those activities to achieve various instream water quality limits at monitoring site DC08 and other sites (see Figure 12). The existing consent limits at those relevant Deepdell Creek and downstream water quality sites are being met. The consent limits for DC08 are also set out in Table 6 below.

Table 6: Summary of DC08 water quality monitoring data (20012 - 2019) (95th percentiles).

Arsenic	0.011 g/m^3	0.15
Cyanide	0.0046 g/m^3	0.1
Copper	0.0010 g/m^3	0.009
Iron	0.076 g/m^3	1.0
Lead	0.0001 g/m^3	0.0025
Zinc	0.0011 g/m^3	0.12
Sulphate	161 g/m^3	1000
pH (pH units)	7.8	6.0-9.5
Sodium	17.3 g/m^3	
Potassium	1.9 g/m^3	
Calcium	46.6 g/m^3	

[20] 2006.303.V2, 2006.304.V2, 2006.305.V4, RM10.351.33, RM10.351.34, 2006.306.V2, 2006.307.V2, 2006.308.V3, RM10.351.29.V1, RM10.351.31.V1, RM12.378.05, RM12.378.03, RM12.378.04, RM10.351.06.V1, RM10.351.04.V2, RM10.351.05.V2, 2010.159.V1, 2003.640.V2, 2005.341.V2, 2010.158.V1 and 2010.155.V1.

[21] Copper, Lead and Zinc standards are related to hardness and assume a hardness of 100g/m^3 $CaCO_3$.
- Copper (g/m^3) = (0.96exp$^{0.8545[ln(hardness)]}$ – 1.702) / 1000,
- Lead (g/m^3) = (1.46203 – [ln(hardness)(0.145712)]exp$^{1.273[ln(hardness)]}$ -4.705) / 1000 and
- Zinc (g/m^3) = (0.986exp$^{0.8473[ln(hardness)]}$ + 0.884) / 1000.

Magnesium	27.9 g/m^3
Bicarbonate (g/m^3 as $CaCO_3$)	1.06 g/m^3

Deepdell Creek also has a relatively high conductivity (average of 504 µS/cm), total Ammoniacal Nitrogen levels (average of 0.01mg/L) and, although no recent phosphorus monitoring data is available, past monitoring suggests that phosphorous is below detection levels. There is a clear correlation between low flow in Deepdell Creek and its elevated sulphate levels (see Figure 17). This is attributed to seepage being the predominant contributor to flow in Deepdell Creek when there is low rainfall and surface flow.

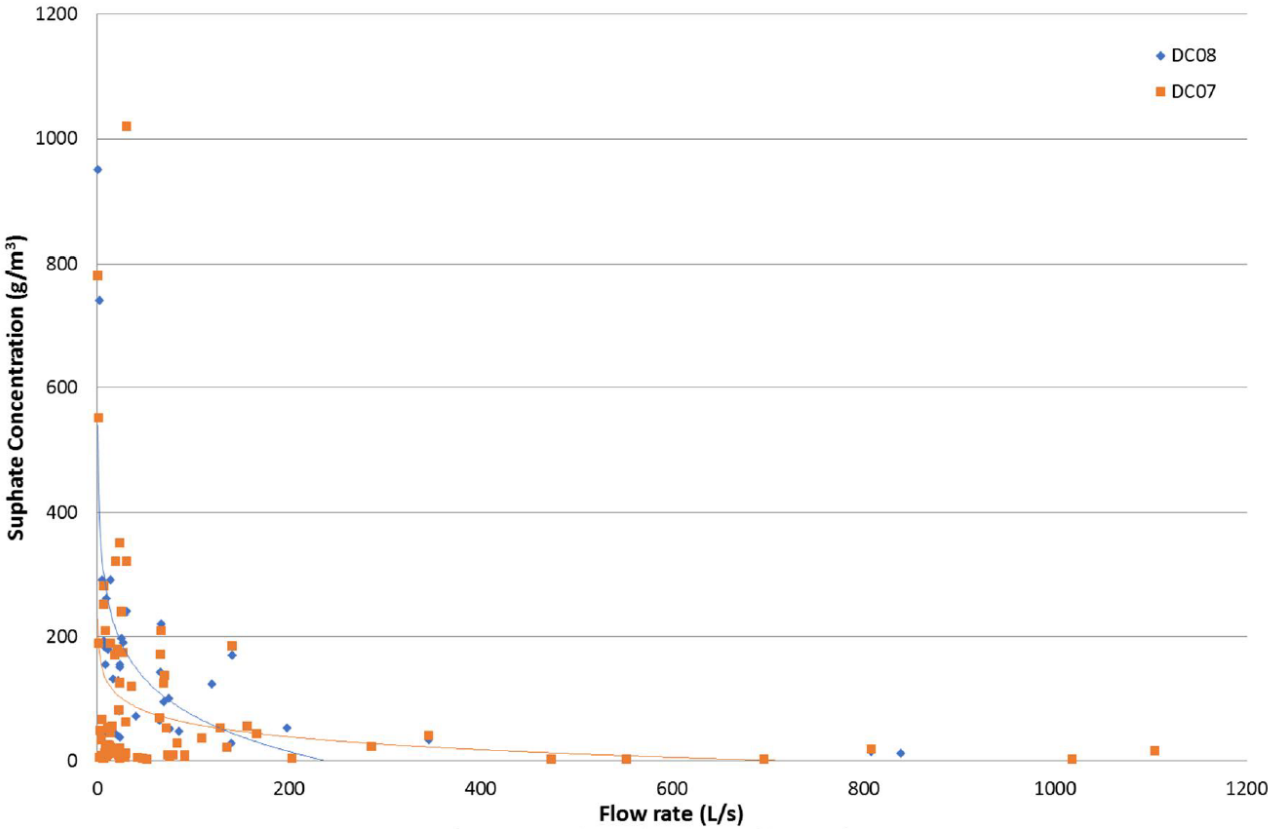


Figure 17: Sulphate versus flow in Deepdell Creek at DC08 and DC07.

2.14.3.5 Aquatic Biota

The most recently completed analysis of Deepdell Creek monitoring data (2019) found the invertebrate community composition at monitoring sites DC03, DC05 and DC07 to be dominated by Potamopyrgus antipodarum snails, chironomid larva and various Trichoptera, with lessor contributions from small crustaceans, mayflies and worms. Benthic invertebrate health index scores are typically indicative of 'poor' to 'fair' water quality. This ranking reflects the dominance of taxa (e.g., snails) that are relatively insensitive to poor water quality and habitat conditions. Koura have also been observed at these sites.

2.14.3.6 Fish Communities

Taieri flathead galaxiids are by far the dominant fish in Deepdell Creek, and site DC07, located downstream of the Highlay Creek confluence, typically supports a large population (see Figure 18).

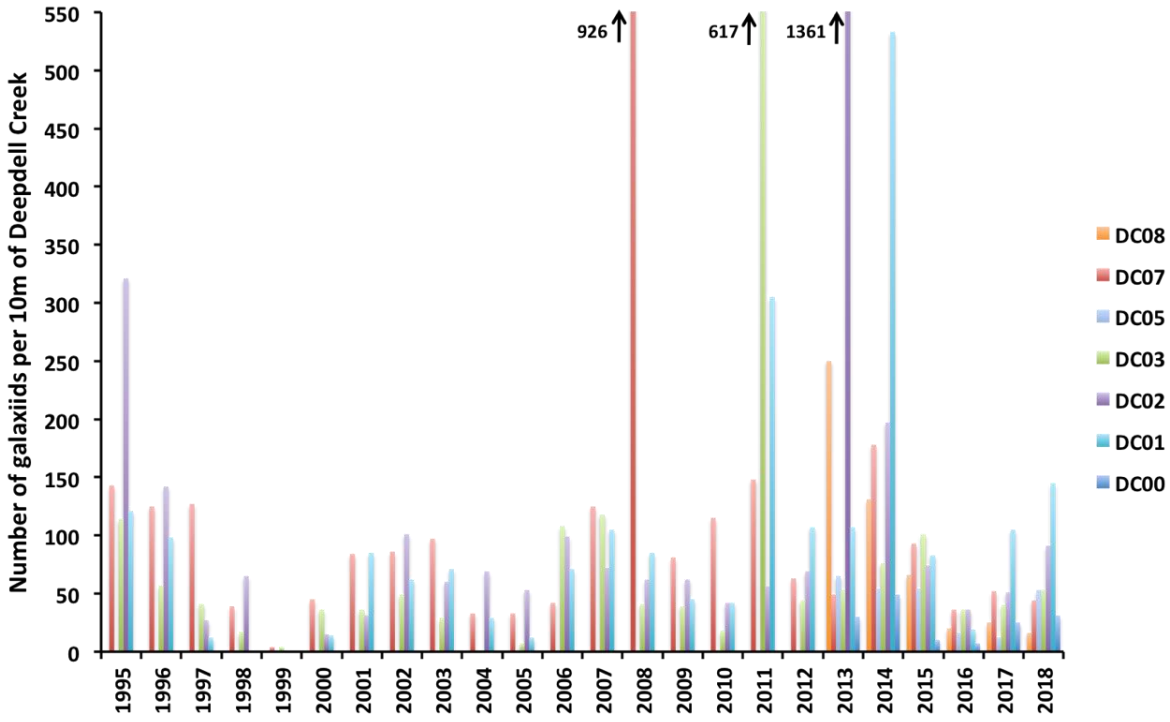


Figure 18: Number of flathead galaxiids (per 10m reach) found in summer surveys of Deepdell Creek at DC07 (1995 to 2018).

Deepdell Creek is identified in the Regional Plan: Water for Otago, as being significant habitat for Taieri flathead galaxiid.

2.15 GROUNDWATER

OceanaGold has commissioned a detailed study of the groundwater environment of the subject site and the effects of the proposal (GHD 2020) and this is attached as **Appendix T.** Eastern Otago is underlain principally by Mesozoic schist. The schist, being a crystalline metamorphic rock, has effectively no primary or intergranular porosity or permeability, except where weathered and/or fractured.

A previous evaluation of the Deepdell Creek catchment groundwater recharge rates estimated regional groundwater recharge rate to be approximately 32/mm/year. This estimated recharge rate was calibrated reasonably accurately with stream flow in Deepdell Creek at Golden Point Weir and was generally consistent with other assessments for other catchments in similar terrain and climate conditions.

Groundwater levels in the vicinity of the proposed Deepdell North Stage III Pit have been monitored monthly in observation bores DDB01 – 06 since 2001. The location of relevant groundwater monitoring points is shown in Figure 12 and the average recorded depths are listed in Table 7. The monitoring data shows that the existing groundwater is relatively close to the surface on the northern upslope side of the pit, and deeper on the southern, downslope side.

Table 7: Existing groundwater levels in the Deepdell North Stage III Project area.

Bore cap level (mRL)	495	480	462	506	436	429
Average water level (mRL)	488	477	461	470	392	402
Average depth to water level (mRL).	6.04	7.17	0.54	33.59	37.31	25.28

2.16 TERRESTRIAL ECOLOGY

2.16.1 General Setting

The Deepdell North Stage III project is situated on the northern end of the Taieri Ridge in the Macraes Ecological District (Macraes ED), being one of two Ecological Districts that make up the Lammerlaw Ecological Region of Otago.

OceanaGold has commissioned a detailed study of the terrestrial ecology of the subject site (Ahika 2019) and this is attached as **Appendix D**. Past vegetation cover of the Macraes ED is thought to have been comprised of montane short tussock land grading into

subalpine tall tussock land, with areas of mixed hardwood and podocarp forest, kanuka forest and *Coprosma*-flax scrub. In Otago, much of the original vegetation cover has been dramatically altered as a result of anthropogenic factors and this massive vegetation change has also occurred at Macraes. Since European settlement in the 1850's, areas have been burnt (sometimes repeatedly) and exotic grasslands induced by ploughing, oversowing, and applying fertiliser. The present vegetation of the Macraes ED is of a highly modified nature, with approximately 75% of the district dominated by exotic vegetation types (mainly improved pastureland) and the remainder of the vegetation types being indigenous and comprised of varying density narrow-leaved tussock, copper tussock-based wetlands and grey shrubland interspersed with remnants of original forest cover and scattered ephemeral wetlands. The remaining native vegetation communities currently present within the Macraes area are botanically diverse and are comprised of 568 indigenous (including 15 Data Deficient, 47 At Risk and 24 Threatened species) and 208 exotic species. The remaining vegetation communities are likely to be derived from the original vegetation communities that existed before human colonisation of the region, but many are likely to be considerably reduced in extent and species diversity. Invasion by exotic shrub and tree species, particularly gorse and broom, is an increasing problem in the area.

Of the fauna, fifty-four species of birds have been recorded in the area, of which 34 are indigenous and twenty are introduced. The area's indigenous avifauna are likely being predated by exotic mammals, though the impact of this predation pressure on population dynamics is not known. They are also being impacted by changes to their habitats, however the nature of these changes and their impacts on the species is again not known. The area is noted for its high diversity of seven lizard species and the invertebrate communities are diverse (for a region at moderate altitude) and contains some species that are rare or of biogeographic interest. The lizard species are being similarly impacted as birds by exotic mammals and habitat change, though the severity of predation is somewhat moderated by the abundance of rocky habitats offering safer retreat sites. This is thought to be at least part of the reason why Central Otago retains a high density and diversity of lizard species.

2.16.2 Flora of the Project Area

Seven vegetation communities are present within the Deepdell North Stage III Project area (see Table 8 and Figure 19).

Table 8: Area of each vegetation community in the Deepdell North Stage III Project area.

Vegetation Community	Pit	WRS	Buffer	Total
Exotic vegetation communities				
Cultivated Pasture	29.16	24.93	26.39	80.49
Shelterbelts & Exotic Trees	0.0	0.53	0.08	0.61
Semi-natural vegetation communities				
Ephemeral Wetland	0.0	0.30	0.02	0.31
Low producing grassland	8.76	39.47	24.82	73.04
Seepage	0.0	0.07	0.0	0.07
Shallow Ephemeral Drainage System	0.50	1.91	1.79	4.20
Shrublands	0.08	3.65	7.36	11.09
Total (ha)	**38.49**	**70.85**	**60.46**	**169.81**

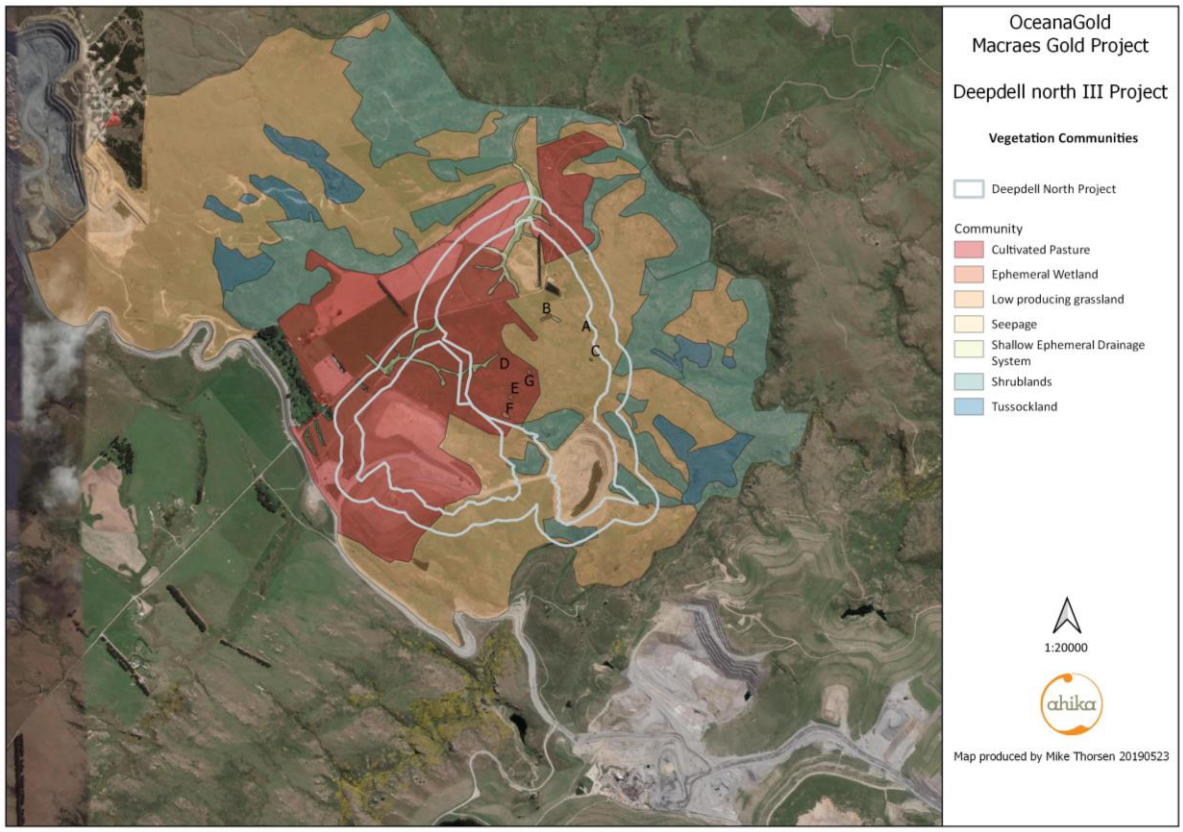


Figure 19: Vegetation communities in the Deepdell North Stage III Project area.

Ahika (2019) have also identified the following thirteen plant species within the project impact area (**PIA**) that are currently classified as At Risk in that they are

either Declining (ten species) or Naturally Uncommon (three species). Recorded locations of these species are also illustrated in Figure 20.

1. ***Anthosachne falcis (dwarf wheatgrass, Poaceae)*** *This dryland grass was recorded as scattered plants inhabiting shrubland in the Pit and mainly in the WRS zones.*
2. ***Carmichaelia crassicaulis Hook.f. subsp. crassicaulis (coral broom, Fabaceae).*** *Three plants of this thick-stemmed broom were recorded at one site in the Pit (one grazed plant) and at one site in the WRS (2 heavily grazed plants). A group of 15 heavily grazed plants and a single nearby plant are present in the Buffer area.*
3. ***Carmichaelia petriei Petrie (desert broom, Fabaceae).*** *This leafless broom was recorded at several sites in both the Pit and WRS zones where several plants are present. Carmichaelia petriei is a new addition to the threatened plant list and is classified as Declining.*
4. ***Discaria toumatou Petrie (matagouri, Rhamnaceae).*** *Matagouri was recorded at multiple sites and in considerable numbers in the Pit and WRS zones. Matagouri is a new addition to the threatened plant list and is classified as Declining.*
5. ***Leptinella pusilla Hook.f. (a button daisy, Asteraceae).*** *This creeping button daisy was recorded at one site in the WRS where one patch is present on the margin of ephemeral wetland C. Leptinella pusilla is a new addition to the threatened plant list and is classified as Declining.*
6. ***Lobelia ionantha Heenan (a wetland herb, Campanulaceae).*** *This creeping wetland herb was recorded at one site in the ephemeral wetland G in the WRS where several patches totalling an estimated 0.56m^2 are present. Lobelia ioantha is currently classified as Declining.*
7. ***Rytidosperma buchananii (Hook.f.) Connor & Edgar (a dryland bristlegrass, Poaceae).*** *This grass was recorded at one site in the WRS where one plant is present on a rock stack in the existing WRS. Rytidosperma buchananii is a new addition to the threatened plant list and is classified as Declining.*
8. ***Carex subtilis K.A.Ford (elegant hookgrass, Cyperaceae).*** *This small sedge was recorded at one site in the WRS zone. Carex subtilis (previously Uncinia elegans) is currently classified as Naturally Uncommon.*
9. ***Juncus distegus Edgar (Two-storey rush, Juncaceae).*** *This rush was recorded in various numbers bordering the ephemeral wetlands and is the dominant larger plant species in the seepage wetland in the WRS where there are patches covering an estimated 369 m^2 with an additional scattered 56 individuals. Juncus distegus is a new addition to the threatened plant list and is currently classified as Naturally Uncommon.*

10. ***Juncus pusillus Buchenau (dwarf rush, Juncaceae).*** *This tiny rush was recorded as two 5 x 5 cm patches in ephemeral wetland A. Juncus pusillus is currently classified as Naturally Uncommon.*

11. ***Carex resectans Cheeseman (desert sedge, Cyperaceae).*** *This small creeping sedge was recorded as three patches totalling 40 x 40 cm in ephemeral wetland G. Carex resectans is distributed in the east of the North and South Islands and is a species rarely recorded within the Macraes E.D. where it has been recorded at one other site.*

12. ***Melicope simplex A.Cunn. (poataniwha, Rutaceae).*** *This shrub was recorded as 11 individuals in one group of rock outcrops in the WRS. Rare within the Macraes E.D. where it has been recorded at four other sites.*

13. ***Myrsine divaricata A.Cunn. (weeping matipo/mapou, Primulaceae).*** *This shrub was recorded as 2 individuals in one group of rock outcrops in the WRS. Rare within the Macraes E.D. where it has been recorded at five other sites. At Macraes it inhabits shrublands around rock outcrops and is thought to be a relict species from previous woody vegetation.*

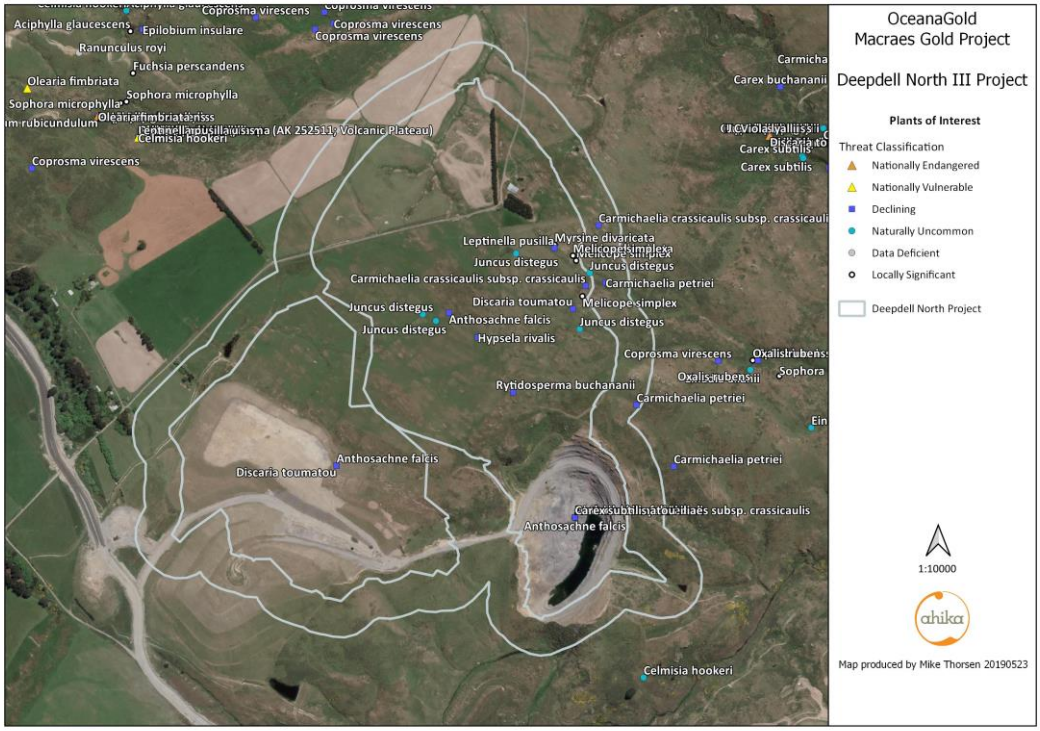


Figure 20: Locations of threatened, at risk and other plant specifies of interest within the Deepdell North Stage III Project area.

Ahika (2019) have ascribed value to the flora and vegetation communities in the vicinity of the Deepdell North Stage III Project using the assessment methodology set out in

Ecological Impact Assessment (EcIA) EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems March 2015 which is published by the Environmental Institute of Australia and New Zealand Inc.[22]

Although the indigenous plant communities are of moderate representation, minor ecosystem service importance, and moderate diversity and moderate integrity, Ahika (2019) have conservatively attributed the area with high ecological importance because there are remnants of rare vegetation communities present, the ephemeral wetlands and seepage vegetation community are a national priority for protection and both types of wetlands are classified as a Naturally Uncommon ecosystem. An example of the ephemeral wetlands at site is illustrated in Figure 21. Further, there are three Threatened Level IV land environments that are overlain by some natural vegetation communities.

There are no RAMSAR sites in the vicinity of the Project Area, and no wetlands that are identified as regionally significant in Schedule 9 of the Otago Regional Plan - Water for Otago or located over 800m above sea level.

Figure 21 Ephemeral wetland F near Deepdell North III pit on Horse Flat at NZTM 1398013 4975714 (within the WRS footprint). Photo taken 16 January 2018.

[22] Available at: https://www.eianz.org/document/item/2827

2.16.3 Birds

Ahika (2019) recorded 20 bird species in the Deepdell North Stage III Project area, nine of which are indigenous. Several birds were not able to be identified, including one sighting of what may have been a flock of three brown creeper in shrubland on the margin of the WRS. The breakdown of indigenous and exotic species is shown in Table 9.

Table 9: Bird species identified by Ahika (2019) in the Deepdell North Stage III Project Area.

Indigenous Species	Exotic Species
Grey teal	Blackbird
Black-backed gull	Skylark
Pipit	Goldfinch
Harrier hawk	Starling
Grey warbler	Yellowhammer
Paradise shelduck	Chaffinch
Welcome swallow	Redpoll
Kereru	House sparrow
Spur-winged plover	Magpie
	Mallard
	Song thrush

With respect to the indigenous species, Ahika (2019) notes:

- A single pair of pipit was observed on the existing, recently revegetated Deepdell WRS and they are assumed to be breeding there.
- One harrier hawk was seen on most visits to the site. It is assumed that they regularly use the area for hunting and feeding but are unlikely to be breeding there.
- A pair of grey warbler was seen in the WRS zone near the existing Deepdell Pit. It is assumed that there are likely to be other birds present and they are breeding in some of the more intact shrubland areas.
- Six paradise shelduck were observed in the WRS zone.
- A flock of six grey teal were observed on the farm pond in the Deepdell North Stage III pit zone and it is assumed they are using this site for feeding, though they may be nesting in the willows outside of the Project Area.

- A group of welcome swallows were also observed feeding over this pond and may be nesting in nearby buildings or rock overhangs. Welcome swallows are probably migrant into the area for breeding over the summer months.
- Spur-winged plover were vocally conspicuous in the Deepdell North Stage III Pit area. It is estimated that several pairs were present, and it is likely that they breed there.
- A colony of black-backed gulls was breeding adjacent to the existing Deepdell South pit lake: 45 adults and 15 juveniles were present on the 7 April visit and they are foraging in the surrounding farmland.
- A single kereru was seen flying 150m overhead, however, it is not thought that this species is using this area.
- No falcons have been seen or heard, though it is known from further afield in this area. It is possible the species uses this area occasionally for hunting.

Overall, the Ahika (2019) assessment of the ecological importance of the birds within the Deepdell North Stage III Project area is moderate – low on the basis of the presence of one At Risk species (Pipit), the avifauna's small role in ecosystem function, and the low species diversity and abundance.

2.16.4 Reptiles and Amphibians

Ahika (2019) recorded four reptile species (three of which are classified as At Risk) in the Deepdell North Stage III Project area, namely:

- The McCann's skink *O. maccanni* (clade 4 genotype), which is present in low to moderate numbers throughout the shrubland vegetation community and is absent from the majority of the exotic grassland. It is more common in rocky areas with good cover.
- The southern grass skink *Oligosoma polychroma* (clade 5 form), which is present infrequently in areas with denser vegetation or rock piles.
- The cryptic skink *Oligosoma inconspicuum*, which is rare in this area due to a shortage of suitable habitat. It was sighted in one area of rocks of the existing waste rock stack beside the road. This is anomalous habitat for this species as they are more typically an inhabitant of gully bottoms in the Macraes area. The possibility exists that this was a misidentification of a subadult skink of another species (both McCann's and southern grass skinks are known to occupy this habitat type at Macraes).
- The korero gecko Woodworthia "Otago/Southland large" was noted in one location in the Pit zone, though it is likely to also be present on other areas of the PIA, particularly the rocky outcrops in the WRS zone. Only 1-5 individuals are likely to be present where it occurs in the PIA and the total population within the PIA is estimated

at 30 individuals based on encounter rate and quantity of habitat present. It is likely to be common at only a few sites, but small groups or individuals are possibly present in some of the rock outcrops.

Other species of reptile that are known to have inhabited the surrounding area in the past include:

- Grand skink Oligosoma grande;
- Otago skink Oligosoma otagense; and
- Green skinks Oligosoma chloronoton. [NB: No confirmed previous sightings]

Ahika (2019) consider it highly unlikely these species are present in the Project Area.

Ahika (2019) have assessed the ecological importance of the lizard populations within the Deepdell North Stage III Project area as being moderate on the basis of the presence of three At Risk species, the presence of genetically distinct lineages (that also occur at multiple sites outside the Project Area), the role the herpetofauna is likely to be playing in ecosystem function, and the low species diversity and abundance within the Project Area.

2.16.5 Invertebrates

Sixty-eight invertebrate species were recorded in the PIA, however the eastern portion of the WRS has not been specifically surveyed and the surveyed area includes the hillslopes of the Taieri Ridge. Some of the specimens collected are awaiting ID. The invertebrate community identified to date is mainly a mix of exotic and indigenous species from the surrounding pasture, shrublands, low producing grassland, gullies and rock outcrops.

The ecological importance of the invertebrate communities within the PIA is categorised as moderate.

3. PROJECT DESCRIPTION

3.1 INTRODUCTION

This Chapter of the AEE describes the activities to be undertaken as part of the Deepdell North Stage III Project in the following Sections:

Section 3.2 Describes the main project components.

Section 3.3 Describes the realignment of Horse Flat Road.

Section 3.4 Describes the site establishment methods.

Section 3.5 Describes the proposed mining methods.

Section 3.6 Describes the proposed erosion and sediment control measures.

Section 3.7 Describes waste rock and sulphate management measures.

Section 3.8 Describes the proposed water management measures.

Section 3.9 Describes the storage and use of hazardous substances.

Section 3.10 Describes the existing and consented Macraes Gold project facilities that will be used for the Deepdell North Stage III Project.

Section 3.11 Describes the proposed project schedule.

Section 3.12 Describes the proposed workforce.

Section 3.13 Describes the proposed rehabilitation and closure concept for the Deepdell North Stage III Project.

Section 3.14 Describes the off-setting.

3.2 PROJECT COMPONENTS

The Deepdell North Stage III Project includes the following key components:

- The Deepdell North Stage III Pit;
- The Deepdell East Waste Rock Stack and access road;
- The Deepdell South Backfill Waste Rock Stack;
- Noise bunds and rehabilitation material stockpiles;
- Temporary site facilities; and

- Realignment of a ~900m section of Horse Flat Road.

Each is described below.

3.2.1 The Deepdell North Stage III Pit

The Deepdell North Stage III Pit is illustrated on Figure 2 and key pit components are set out in Table 10. Detailed design parameters for the Deepdell North Stage III Pit are provided in the report prepared by PSM (2019) which is attached as **Appendix J**.

The Deepdell North Stage III Pit area has already been partly mined as part of previous Deepdell mining activities (see Section 2.4.1). The Deepdell North Stage III Pit will extend the existing (Stage II) pit area further to the east, and the pit floor will be deepened from 438mRL down to 372mRL.

Table 10: Deepdell North Stage III Pit design parameters.

Parameter	Deepdell North Stage III Pit
Footprint	38ha (18.7ha of previously mined area and 19.6ha of new disturbance).
Total depth	Approximately 150m. (Base Approximately 370mRL / Top approximately 520mRL).
Excavated Material	Total Movement 57Mt comprising: Ore: 3.5Mt / Backfill Waste: 9.4Mt / in-situ oxide waste: 2.4Mt / in-situ fresh waste: 41.5Mt.
Access	No new access roads. Access via existing Deepdell haul road. 30m wide haul roads to be constructed within the pit footprint.

3.2.2 Waste Rock Disposal

A single waste rock stack (WRS) will be used for the Deepdell North Stage III Project (see Figure 2). The Deepdell East WRS will include a backfilling component at its southern end where it will partially infill the existing Deepdell South Pit and will extend north onto the relatively flat but undulating land between the crest of the slopes leading up from Deepdell Creek and Horse Flat Road. The majority of the capacity of the 59.5Mt WRS is to be stored outside of the Deepdell South Pit backfill area and on the relatively flat and cultivated land of Horse Flat.

Detailed design parameters and cross sections for the Deepdell East WRS are provided in the WRS design report (Engineering Geology 2019) attached as **Appendix J** and a summary of the key components for the WRS is provided in Table 11 below.

Table 11: Waste rock stack project components.

Parameter	Deepdell East WRS
Footprint	70.6ha (13.2ha of which has been previously disturbed by mining activities in the Deepdell South Pit).
Total depth stacked	155m.
Storage Capacity	59.5Mt
Access	Access to Deepdell South Pit back filling via existing Deepdell South haul road. Access will then transfer to a short external road between the Deepdell North Stage III pit and the Deepdell East WRS (refer to figure 22 below),

3.2.3 Noise Bunds / Rehabilitation Material Stockpile Areas

Stripped topsoil and oxidised schist from 'opening-up' the pit and WRS sites will be stored for rehabilitation.

This material will be used to construct new noise bunds on the western side of the Coronation Haul Road where it passes the Deepdell North Stage III area and in an area immediately to the west of the Pit (see Figure 2). The bunds will be up to 5m high.

This material will be re-spread over the project area as sequential areas of the WRS are completed.

Once WRS surfaces are ready for rehabilitation any subsequently stripped topsoil and oxidised schist will be placed directly on the rehabilitation surface.

3.2.4 Temporary Site Facilities

As has occurred for other Macraes Gold Project activities, a suite of temporary buildings and infrastructure will be established at the Deepdell North Stage III Project Area to provide sanitary services and crib room facilities. These will be similar to temporary buildings used elsewhere at the Macraes Gold Project (e.g. container-style buildings, approximately 10m x 6m). Park up areas would also be established in this location.

Sewage (wastewater) will be managed via either portable toilet facilities or by self-contained sewage tank systems, which will be removed after mining ceases[23].

These temporary facilities would be located immediately west of the Deepdell North Stage III Pit in the area marked "Pit infrastructure" on Figure 2. This area has been used to house

[23] No wastewater discharges are proposed.

these facilities during previous Deepdell mining activities. Relevant land use consents are being sought for the above activities from Waitaki District Council.

3.3 REALIGNMENT OF HORSE FLAT ROAD

An approximately 900m section of Horse Flat Road is required to be realigned in order to reroute local traffic using the existing no exit road around the northern extent of the proposed Deepdell East WRS. The road will be constructed and opened to the public prior to the closure of the existing Horse Flat Road in order to ensure public access is maintained and will be subject to Waitaki District Council requirements and approvals.

The Horse Flat Road realignment will be constructed to a similar standard as the section to be removed. The new road reserve will be a minimum of 15m wide, and the formed carriageway will be a minimum of 5m wide. The road shall be formed with a minimum 150mm sub-base and a base course of 100mm AP40 with a wearing course of AP20. The road shall be marked and delineated to a public road standard.

The road will cross the unnamed intermittent tributary of Highlay Creek on a 9m high embankment which will have 2H:1V batters and drainage of stream flow in the water course shall be maintained through an approximately 51m long culvert (approximately 900mm in diameter) through the earth embankment.

3.4 SITE ESTABLISHMENT

The Deepdell North Stage III Project will commence with the removal and relocation of farm fencing, the establishment of light and heavy vehicle access to key project areas, the installation of crib rooms and vehicle park-up areas and on-site diesel tank(s). Erosion and sediment controls will also be established at this time (Erosion and sediment controls are outlined in more detail in Section 3.6 below).

Stripping and stockpiling of topsoil from the footprint of each project component will then take place, with the stripped areas kept to the minimum necessary in order to mine the Pit and deposit waste.

3.5 MINING METHODS

In accordance with other open pit mining at the Macraes Gold Project mining of the Deepdell North Stage III Pit will use standard drilling and blasting methods with a diesel-powered mobile fleet of equipment.

The blasting programme and methods that will operate at Deepdell North Stage III Pit will be similar in nature to that which already operate at the Coronation North Project and to those used at Deepdell previously. Typical and expected blast design parameters are set

out in Table 12. Ore will be blasted in 7.5m high benches[24] and excavated in three, nominally 2.5m high flitches[25]. Waste rock will be blasted in 15m high benches and excavated in four 3.5m high flitches.

Table 12: Typical blast design parameters for the Deepdell North Stage III Pit.

Parameter	Ore	Waste
Diameter (mm)	102	229
Explosives weight/hole (kg)	50	450
Maximum Instantaneous Charge (kg)	200	1350

While mining activities will be undertaken 24 hours a day / 7 days per week, in accordance with current practice at the Macraes Gold Project, blasting will be restricted to within the following hours at Deepdell North Stage III:

- Monday – Friday 9am – 530pm
- Saturdays, Sundays and public holidays 10am – 4.30 pm[26]

Hydraulic excavators will remove and load topsoil and brown, oxidised waste rock onto dump trucks for direct use or stockpiling for rehabilitation purposes. Waste rock will be removed by the same methodology and backfilled into the Deepdell South Pit first followed by the Deepdell East Waste Rock Stack. Hydraulic excavators will load mined material onto a fleet of dump trucks, which will transport the ore to the run of mine (ROM) stock-piles located at the Macraes Gold Project processing facility or low grade stockpiles for later re-handling (see yellow route on Figure 22). Waste rock will be hauled to the nearby Deepdell South Backfill WRS or Deepdell East WRS for final deposition (see green routes on Figure 22). A fleet of support equipment such as bulldozers, graders and water carts (trucks) will assist the main mining fleet.

[24] A bench is the mining terminology used to describe a narrow strip of land cut into the side of an open mining pit, normally through blasting.

[25] A flitch is the mining terminology used to describe a pass by mining equipment to remove rock material in an open mining pit.

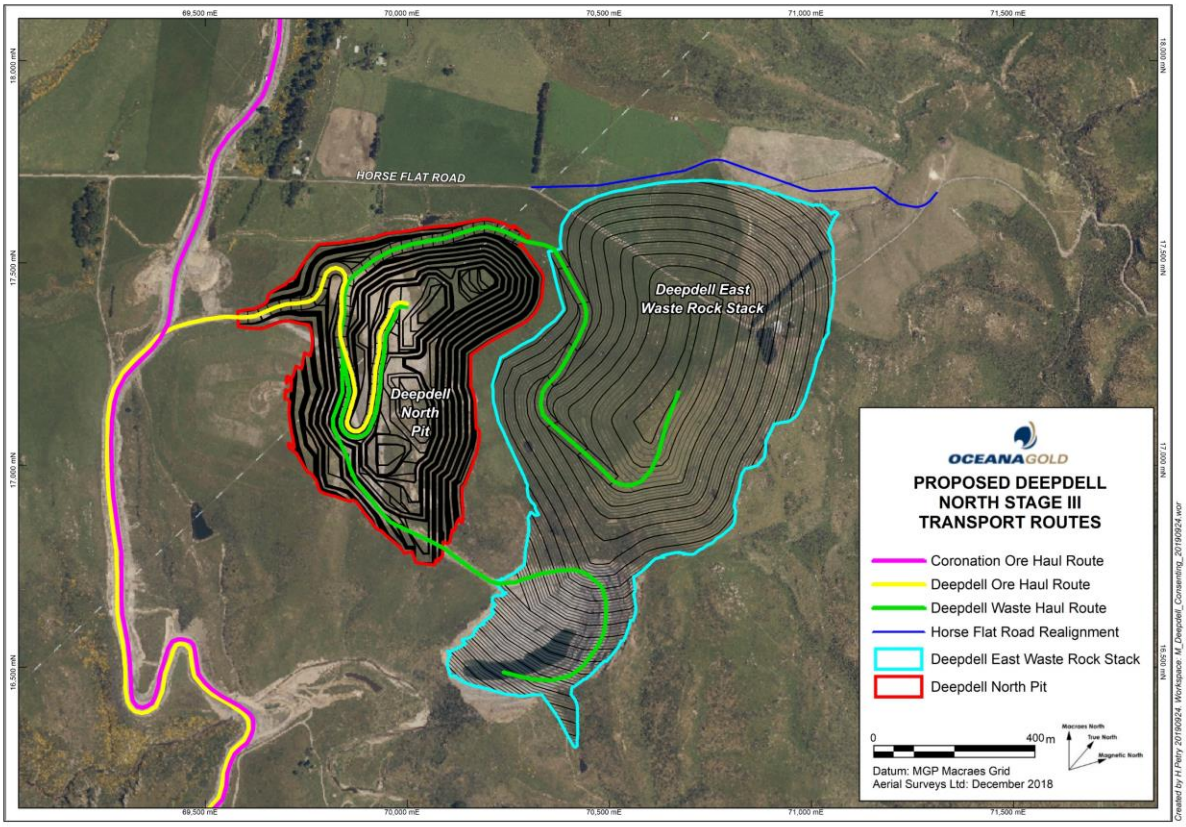


Figure 22: Location of haulage routes for Deepdell North Stage III Pit ore and waste rock material

3.6 EROSION AND SEDIMENT CONTROL

Erosion and sediment control throughout the life of the proposed Deepdell North Stage III Project will follow the existing proven practices utilised elsewhere at the Macraes Gold Project. These practices have been developed and refined through the 29 years that the site has operated and have worked well to date with no known issues identified.

Detailed descriptions of the proposed erosion and sediment control measures for key project components are contained in the Erosion and Sediment Control design report (EGL 2019) which is attached as **Appendix R** and an overview is provided in **Figure 24** below.

A detailed Erosion and Sediment Control Plan will be prepared prior to the commencement of construction. It will set out the detailed erosion and sediment control measures to be used. The Erosion and Sediment Control Plan will follow the Environment Canterbury's 2007 Erosion and Sediment Control Guidelines, except that site-specific

design criteria will be adopted for sizing new silt ponds for Deepdell East WRS that are based on experience at the site.[27]

The erosion and sediment control measures described in Engineering Geology (2019) for the Deepdell North Stage III Project include:

- *Use of clean water diversion drains and bunds to direct rainfall runoff from undisturbed areas away from disturbed areas (see Figure 23);*
- *Use of diversion drains to direct runoff from disturbed areas to silt ponds (see Figure 23);*
- *Use of permanent and temporary silt ponds to allow settlement of suspended solids associated with runoff from disturbed areas (see Figure 23);*
- *Progressive stripping of WRS and Pit footprints only as required;*
- *Not stripping steep gullies underneath WRS's, except in the base of gullies at the toe location of the WRS's, so as to leave a buffer area that acts to intercept sediment from areas stripped above;*
- *Progressive rehabilitation of the WRS, backfills and embankments consisting of 0.3m of oxidised rock and 0.2m of topsoil, and grassing to minimise bare areas (see Figure 24);*
- *Management of surface water on the surface of the WRSs including preventing runoff from discharging over the outside shoulder, allow surface runoff to soak into the waste rock near the outside of the WRS (which acts to filter out fines) and end-tipping to create coarser rock in gullies which act as underdrains (see Figure 24);*
- *Adoption of appropriate sediment control practice (e.g. silt fences, decanting bunds) in accordance with the Auckland Regional Council Technical Publication No 2 'Erosion and Sediment Control Guidelines for Earthworks';*
- *Monitoring of discharge quality as required by consent conditions; and*
- *Regular inspections of silt ponds and diversion drains to check condition and undertake maintenance if required.*

[27] The Environment Canterbury Guidelines are for a suggested upper catchment limit of 10 hectares whereas the actual disturbed catchments on site could be up to twice this and greater when the rehabilitated WRS are included. Specific design criteria are therefore required to treat the potential increased runoff and detention of stormwater runoff.

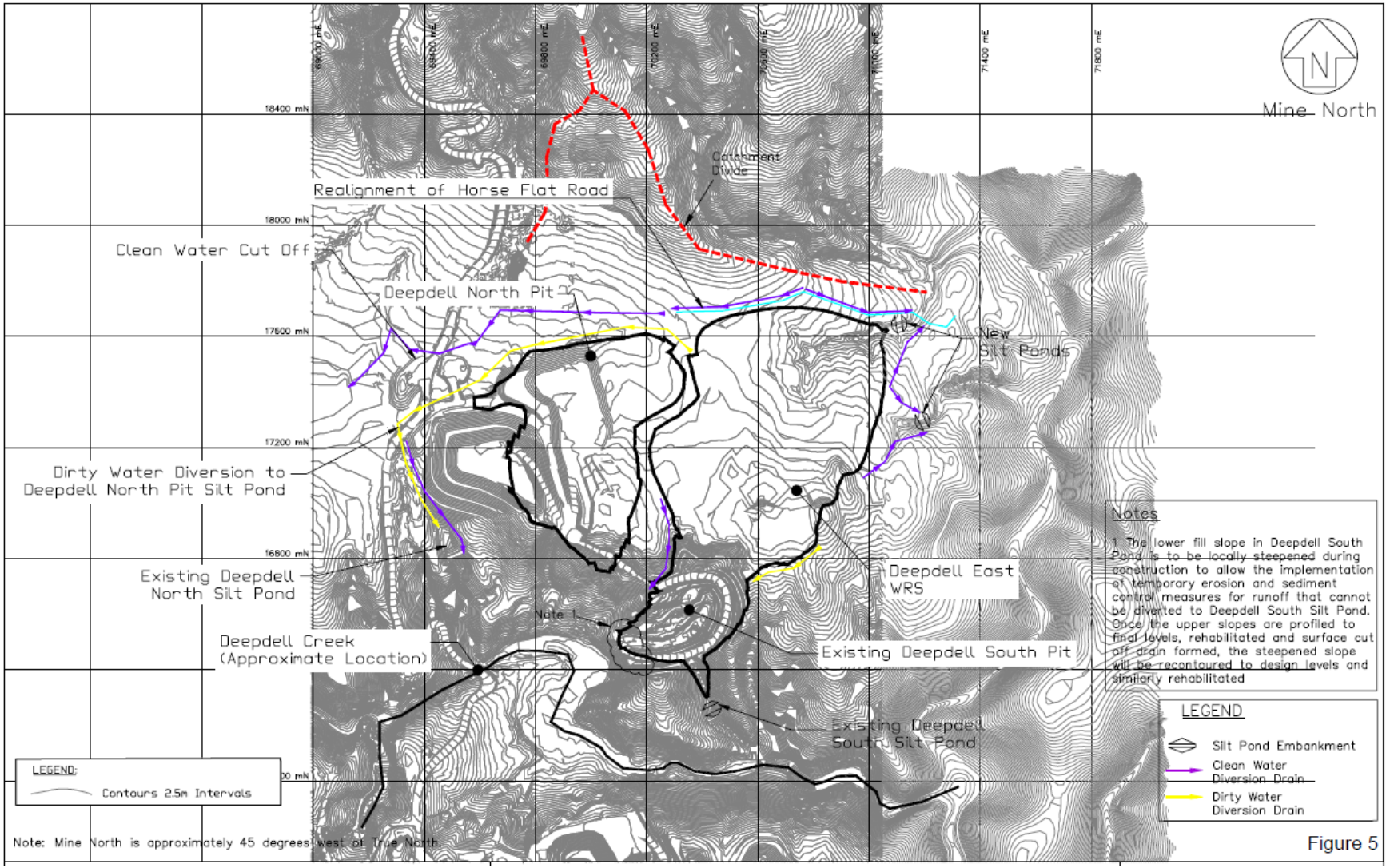


Figure 23: Deepdell North Stage III Waste Rock Stack and Pit erosion and sediment control features.

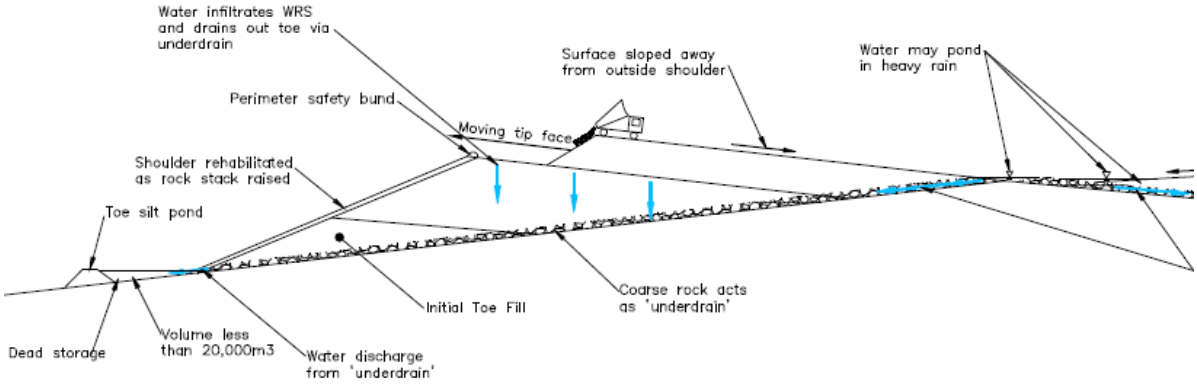


Figure 24: Waste rock stack schematic of erosion and sediment control features during construction.[28]

3.7 WASTE ROCK AND SULPHATE MANAGEMENT

The waste rock stack will be constructed so as to minimise the concentration of sulphate in the WRS seepage. The following strategies, which were developed as part of Coronation North WRS construction, will be implemented:

- Analysis of samples from exploration to identify concentrations of sulphur in the waste rock and build a sulphur model;
- Construct the WRS with the waste rock containing the higher concentrations at the centre of the stack and the lower concentrations on the outside of the stack;
- Limit particle size separation of waste rock by paddock dumping on each lift of the WRS and dozing outer faces of the dump as soon as practicable in order to limit the advection of oxygen into the WRS; and
- Placement of brown rock and topsoil on the outer faces of the WRS to further limit advection of oxygen into the WRS.[29]

3.8 WATER MANAGEMENT

3.8.1 Overview

The proposed water management during and post operational mining at the Deepdell North Stage III Project is set out below. More detail is found in GHD (2019) located at **Appendix E** and the basic principles including where water will be directed are set out in

[28] The rehabilitated WRS will have a smooth outer face and no benching.

[29] This is based on methodology trials and further information can be provided on request.

section 3.6 above and the erosion and sediment control design report attached at **Appendix R.**

3.8.2 Operational Mining

Runoff water from the operational WRS will be directed to sediment retention (silt) ponds as outlined in the erosion and sediment control report (attached as **Appendix R**). Some of this water in the ponds will be utilised for dust control on site during drier periods so these ponds will have an increased capacity for receiving rainfall events.

Rainfall runoff water and ground water infiltration within the operational pit will be dewatered through pumping and discharged to the drainage system that runs to the Deepdell North Silt Pond for treatment

3.8.3 Post Mining

The WRS will be rehabilitated so runoff will be primarily rainfall and any seepage from the WRS that enters surface flows. These waters will flow through silt ponds for treatment prior to being discharged to receiving surface waters or utilised for dust suppression on site. The water quality in the receiving surface and ground waters will continue to be monitored in order to maintain water quality and ensure compliance.

The proposed pit will not be dewatered once mining is complete and will become a sink for rainfall run off from parts of the WRS with some discharges from the pit to ground water. The pit is not modelled to overflow until the year 2120 (GHD 2019).

3.9 HAZARDOUS SUBSTANCES

Diesel exceeding 3,000 litres in volume, as well as explosives in quantities exceeding 2.5 kilograms will be transported to the Deepdell North Stage III Project Area.

Diesel will be stored in above ground, 60,000 litre double-skinned temporary storage tanks which will be removed from site after mining operations cease. The diesel will be transported from Macraes Gold Project bulk storage tanks via a mobile fuel truck along the haul road route. The mobile fuel truck is a BP fuel tanker with a maximum capacity of approximately 30,000 litres. The diesel will be used in mobile generators and mining equipment at the site.

Chemical and explosive use (including blasting accessories such as detonators, primers, detonating cord and surface delays), and the handling of explosives and the method of firing will be in accordance with standard practices for those activities at the Macraes Operation.

Key management measures used at the Macraes Operation site will also be employed at the Deepdell North Stage III Project include:

- *Explosives will not be stored at site and will be brought to site for blasting use on days this occurs.*
- *People using hazardous substances will be certified under the Health and Safety at Work (Hazardous Substances) Regulations 2017*
- *Relevant location certificates and stationary containment certificates for hazardous substances for the site under the above Act will be in place.*
- *Material safety data sheets will be held on an electronic database.*
- *Bunding will be used for all bulk hazardous substance storage. The majority of bunds will have sump pumps fitted to recover any spillages.*
- *Spill kits, fire extinguishers and other safety equipment will be available, and signage will be in place.*
- *A trained emergency response team will be in place in case of accidents and fires, and*
- *The location of hazardous substance storage will be located well away from neighbouring residences and will be located to avoid the nearest watercourses.*

There have been no major spillage events at the Macraes Operation, and OceanaGold operates:

- *A Risk Management Plan for each identified hazard at site to address any health and safety risks to personnel.*
- *A Health and Safety management system (Hazardous Substances), 30 April 2018, for the Macraes site which is updated annually, and*
- *An Emergency Management Control Plan for various contingencies*

Copies of the above documents can be provided to Waitaki District Council upon request.

3.10 USE OF EXISTING AND CONSENTED MINE FACILITIES

The Deepdell North Stage III Project will make use of the following existing and consented Macraes Gold Project facilities:

- **The Processing Plant and tailings storage facilities** - Ore from the Deepdell North Stage III Pit will be processed at the Macraes Operation processing plant. Ore processing has been undertaken at the same processing facility since inception in 1990. The processing plant capacity has been increased over the years from an original capacity of 1.5 million tonnes per annum to its current processing rate of 6 million tonnes per annum.

- **Existing haul roads** - Ore from the Deepdell North Stage III Pit will be hauled to the Processing Plant using the existing Deepdell Haul Road.

3.11 PROJECT SCHEDULE

The project is expected to take 2 years to complete from first overburden mining to mining of ore finishing. Rehabilitation activities will continue after this time so the Deepdell North Stage III project is expected to take approximately 3 years including rehabilitation.

3.12 WORKFORCE

The existing workforce at the Macraes Operation will be retained during the Deepdell North III Project which will likely add one year to the overall Macraes Operation life. The proposal will require a full standard mining crew in order to carry out the activities and this will consist of machinery and numbers similar to that used at the Coronation North Site:

Drills:

- *Sandvik D45KS rotary drill used for waste rock*
- *Montabert CPA top hammer drill mounted on Hitachi ZX330 carrier used for ore-containing rock*

Excavators:

- *2 x Hitachi EX3600-6*
- *1 x Hitachi EX2500-6*

Trucks:

- *12 x Cat 789C haul trucks*

Support:

- *3 x Cat D10T track dozers (1 at waste rock stack, 2 in pit)*
- *2 x Cat 16H graders*
- *1 x Cat 844H wheel dozer*
- *1 x Cat 785C watercart + 1 x Cat 773F watercart*

3.13 REHABILITATION AND CLOSURE

Rehabilitation is an integral part of all mining operations at the Macraes Operation and a key issue considered in all mine planning.

The approach to rehabilitation taken for the Deepdell North Stage III Project will be largely in accordance with the progressive rehabilitation confirmed in the existing Coronation North Project. This includes:

- Careful design and construction of the backfill and waste rock stack to integrate with the existing landform character of the area;
- Keeping the surface area disturbed at any one time to a minimum while remaining compatible with day to day operations;
- Rehabilitating the site to a safe and stable condition as soon as practical;
- Parts of the WRS around the base have been identified for early rehabilitation to decrease runoff;
- Removal and restoration of the haul roads used during construction of the Project;
- Containing and treating all contaminants on site in such a manner that they do not pose a long-term safety or environmental hazard and
- Achieving a suitable sustainable post-mining land use.

The Deepdell North Phase III Project area will be rehabilitated with use of exotic pasture seed that is compatible with existing vegetation patterns on the site, and to return the ground to agricultural pasture. The success that OceanaGold has had in doing this and ongoing development of techniques for rehabilitation of mined areas to grazing pasture is outlined in the Macraes Rehabilitation report attached as **Appendix N** (Landcare 2019). Past practice at the Macraes Operation has been to sow pasture plant species (e.g. browntop, rye). There is some opportunity to rehabilitate the WRS margin and some other surfaces to provide habitat for lizards with larger aggregate and boulders and this is explained further in the Deepdell North Impact Management Plan (Ahika 2019) attached as **Appendix D**.[30]

OceanaGold is not proposing to plant any exotic species on site that are listed under the Waitaki District Council Rural Scenic Zone Rule 4.4.7 and will ensure that rehabilitation carried out for this project adheres to the Waitaki District Council critical zone standards for avoiding shading of public roads with vegetation between 1000hrs and 1400hrs on the shortest day of the year.

At closure, the proposed Deepdell North Stage III Pit will not be backfilled (except for the small exception below) but left to become a pit lake. Surface and ground water flow from the waste rock stack will be allowed to flow into the pit void to create the lake. The resultant lake is not expected to overflow till the year 2120 based on the water models outlined in the GHD (2019) report attached as **Appendix E.** A section of the proposed pit will have pit walls composed of WRS materials so this section will be partially pushed down

[30] See page 31 of 56 (section 9.2) of the terrestrial ecology impact management plan.

(backfilled) into the pit to increase stability of the final design though a lower angle of repose.[31]

3.14 OFF-SETTING

Mostly, the Deepdell North III project is assessed as having low to very low effect on most of the terrestrial ecological features present. Exceptions to this are a moderate impact on the plant communities together (mainly a result of the presence of the LENZ, rare species, and the Nationally Critical ephemeral wetland) and a high impact (locally) on the seven Historically Uncommon Nationally Critical ephemeral wetlands. In order to address effects on these features to at least a no-net-loss state, OceanaGold will as part of an overall mitigation and management package, implement an ecological offsetting programme at at least two sites which are to be confirmed. These offsets may be located at Redbank Station, and another site in the south of the Ecological District which is yet to be confirmed. The proposed Redbank Station site is shown on Figure 25 below:

Figure 25: Location of Redbank Station Proposed Improved Condition Offset Site

A covenant of at least 126ha will be established under the Conservation Act which contains biodiversity that is of similar character to that being lost, but of better quality and with other inherent ecological values. Sensitive parts of this covenanted area will be fenced to exclude

[31] This aspect is referred to in the LVIA report and in the project description as 'pit shaping'.

stock and limits will be placed on the type of stocking that can occur in the covenanted area and on any activities that could result in damage to the soils or to vegetation of high ecological importance. Subject to confirmation, this land will be managed using the income from a fund held by OceanaGold until cessation of mining when the fund will be ceded to another appropriate authority.

Offsetting the impact resulting in the loss of 0.3ha of ephemeral wetlands will be an 'improved-condition' offset with the improvement work informed by a research project investigating ephemeral wetland form, function and threats. This offset will involve using weed control to produce a 25% improvement in indigenous vegetation cover at ephemeral wetlands at 5-7 sites totalling at least 2ha and an improvement in indigenous plant diversity to at least 11 indigenous plant species which are characteristic of Macraes ephemeral wetlands within a 10-year timeframe.

4. RESOURCE CONSENTS REQUIRED

4.1 WAITAKI DISTRICT COUNCIL

Table 133 below identifies the activities associated with the Deepdell North Stage III Project that require resource consent.

Table 13: Deepdell North Stage III Project consent requirements (WDC).

Activity	Rules	Overall Activity Status
A land use consent for Mining Activities associated with the Deepdell North Stage III Project including (but not limited to): (i) Extraction of minerals and overburden by mechanical means from the Deepdell North Stage III Pit. (iii) Deposition of waste rock produced by the Deepdell North Stage III Pit at the Deepdell South Pit Backfill WRS. (iv) Deposition of waste rock produced by the Deepdell North Stage III Pit at the Deepdell East WRS. (v) The construction, use and maintenance of haul roads from the Coronation Haul Road to the Deepdell North Stage III Pit and from the Deepdell North Stage III Pit to the Deepdell East WRS, pit backfilling at Deepdell South Pit and to the Processing Plant. (vi) The transport, treatment and processing of minerals extracted from the Deepdell North Stage III Pit.	Rural Scenic Zone Rule 4.3.3(4) – Discretionary Activity.[32] Macraes Mining Project Mineral Zone Rule 6.3.3(3) – Non-complying Activity. Utilities Rule 15.1.3(6) – Discretionary Activity. Hazardous Substance Rule 16.1.2 – Discretionary Activity. Temporary Building Rule 10.1.1.2 – Discretionary Activity. NES 2011 – Discretionary Activity	Non-complying

[32] While the mining is a discretionary activity in the Rural Scenic Zone pursuant to Rule 4.3.3(4), it is also subject to section 1.8.4 of the Waitaki District Plan where it does not meet critical zone standards and is a non-complying activity as a result.

(vii) The construction, operation and maintenance of diversion drains, silt ponds and silt control facilities necessary for controlling runoff from the Deepdell North Stage III Project mining operation.

(viii) The removal of structures and the rehabilitation of the Deepdell North Stage III Project Area, including formation of a Pit Lake in the Deepdell North Stage III Pit.

(ix) Storage and use of hazardous substances.

(x) The construction and use of temporary buildings.

(xi) Disturbance of soil within a HAIL site.

4.1.1 District Plan Activity Definition of Mining Activity

The District Plan includes the following definition of mining activity:

> ***Mining Activity*** *means the use of land and buildings for the primary purpose of the extraction, winning, quarrying, excavation, taking and associated processing of minerals and any ancillary activity related to mining but does not include prospecting and exploration.*

This encompasses all the activities proposed as part of the Deepdell North Stage III Project, including:

- Extraction of minerals and overburden by mechanical means from the Deepdell North Stage III Pit.
- Deposition of waste rock produced by the Deepdell North Stage III Pit at the Deepdell South Backfill WRS.
- Deposition of waste rock produced by the Deepdell North Stage III Pit at the Deepdell East WRS.
- The removal of structures and the rehabilitation of the Deepdell North Stage III Project Area, including formation of a Pit Lake in the Deepdell North Stage III Pit.
- The construction and use of temporary buildings.
- The construction and use of a haul road from the Coronation Haul Road to the Deepdell East WRS.

- The transport, treatment and processing of minerals extracted from the Deepdell North Stage III Pit.
- The construction, operation and maintenance of diversion drains, silt ponds and silt control facilities necessary for controlling runoff from the Deepdell North Stage III Project mining operation.
- Storage and use of diesel and use of explosives.
- Removal and placement of topsoil at site into stockpile areas.
- Construction of noise attenuation bunds on the western side of Golden Point Road.
- Realignment, construction, use and maintenance of an approximately 900m section of Horse Flat Road.

4.1.2 Chapter 4 Rural Zones

Mining Activities (as per the above definition) are listed in Rule 4.3.3 as being a **Discretionary Activity** and are not explicitly required by that rule to meet critical zone standards.

However, the proposed Mining Activity overall will not meet Rural Zone Critical Zone Standard 4.5.1 (Noise) because night-time noise levels at the notional boundary of the C & M Howard residence in the Rural General Zone are predicted to exceed 40dBA on occasion (due to hauling).

Following the direction in Section 1.8.4 of the Waitaki District Plan, the proposed Mining Activities located in the Rural Scenic Zone are therefore a **Non-complying Activity**.

4.1.3 Chapter 6 Macraes Mining Project Mineral Zone (MMPMZ)

Provided they comply with all of the Site Development Standards and Critical Zone Standards, Rule 6.3.1(7) provides for Mining Activities as a Permitted Activity in the MMPMZ, except for those activities listed in Rule 6.3.2(1).

Rule 6.3.2(1) states:

> ***6.3.2 Discretionary Activities***
>
> *The following activities shall be **Discretionary Activities**:*
>
> *1. The excavation and construction of pits, pit margins, waste rock stacks and embankments, tailings impoundments and any other dams, roads and tracks associated with mining*
>
> *The exercise of the Council's discretion being restricted to the following matters:*
>
> *a) Rehabilitation of disturbed ground and vegetation;*
> *b) Landscaping includes the siting and shaping of the pits, pit margins, waste rock stacks and embankments, tailings impoundments and any other dams, roads and tracks.*

c) *Long term structural stability, environmental integrity, and safety of the pits, pit margins, waste rock stacks and embankments, tailings impoundments and any other dams, roads and private tracks.*

d) *The modification or destruction of features of historic or archaeological value or any nature conservation value provided no conditions imposed be inconsistent with any heritage plan in existence.*

e) *Methods to avoid any discharge to water.*

f) *Effects on Grand and Otago Skinks.*

The excavation and construction of pits, pit margins, waste rock stacks and embankments, tailings impoundments and any other dams, roads and tracks associated with mining.

The proposed Mining Activities will not meet Critical Zone Standard 6.5.1 (noise) as the activities will be undertaken close to and on the Macraes Mineral Mining Project Zone / Rural Scenic Zone boundary, and the relevant noise standards for activities in the Macraes Mineral Mining Project Zone apply at the zone boundary (not at the boundary of habitable dwellings).[33] The proposal will exceed critical zone standards for noise at the zone boundary with the Rural Scenic Zone.

As per the direction in Section 1.8.4 of the Waitaki District Plan (see above in Section 4.1.2), the proposed Mining Activities are therefore a **Non-Complying Activity**.

4.1.4 Chapter 10 Temporary Buildings

In addition to being a "Mining Activity", the temporary buildings located on-site for the Deepdell North Stage III Project are also covered by the Temporary Building land use rules. The buildings will remain on-site for longer than 12 months, and therefore will not meet permitted Activity Rule 10.1.1.1(1) or (2), they are therefore a **Discretionary Activity** under Rule 10.1.1.2.

4.1.5 Chapter 11 Heritage

The archaeological sites that would be affected by the Deepdell North Stage III Project are not listed as Category A or B Heritage Sites in the Waitaki District Plan. Therefore, there are no heritage rules in Chapter 11 of the Waitaki District Plan which apply to the activity.

Additional approvals are assessed as not being required pursuant to the Heritage New Zealand Pouhere Taonga Act 2014 for works affecting historic sites as the sites within the footprint are already destroyed through previous activities or are not old enough to be covered by the requirements of the Heritage New Zealand Pouhere Taonga Act 2014.

[33] This also applies to Critical Zone Standard 6.5.2 (vibration).

4.1.6 Chapter 14 Subdivision, Development and Financial Contribution Rules

Under Rule 14.2.2(2), development for any mining activity when the value of the construction, erection or alternation is in excess of $200,000 is a **Controlled Activity**, with Council retaining control over the ability to impose conditions in respect of:

a) financial contributions to the provision of services and/or the provision of land, cash and/or facilities for open space and recreation; and/or

b) financial contributions to the provision of cash for the maintenance of open space and recreation areas; and/or

c) on sites located adjoining the bank of any river or the margin of any lake, to which Section 230(4) of the Act applies, financial contribution to the provision of esplanade reserves and strips and easements for access to waterbodies.

4.1.7 Chapter 15 Utilities

In addition to being a Mining Activity, the diversion drains and silt ponds[34] also meet the District Plan definition of Utility, which states:

Utility means:

a) lines and necessary incidental structures and equipment for the transmission and distribution of electricity;

b) pipes and necessary incidental structures and equipment for transmitting and distributing gas;

c) storage facilities, pipes and structures and equipment necessary for the supply, drainage and treatment of water or sewage;

d) water and irrigation races, drains, channels, pipes and necessary incidental structures and equipment;

e) structures, facilities, plant and equipment for the treatment of water;

f) structures, lines, facilities, plant, equipment and associated works for receiving, emitting and transmitting radiocommunications and telecommunications;

g) structures, facilities, plant, equipment and associated works for monitoring and observation of weather and natural hazards;

h) structures, facilities, plant, equipment and associated works for the protection of the community from natural hazards;

i) structures, facilities, plant and equipment necessary for navigation by water or air.

Utility does not include structures or facilities used for electricity generation, the manufacture and storage of gas

[34] The diversion drains and silt ponds meet the definition of Utility d) in that the diversion drains are for the purpose of conveying water and are therefore a drain or channel and the silt ponds are for the treatment of water.

As water management facilities are not listed as being either a permitted or restricted discretionary activity in the utility rules, they are a **Discretionary Activity** under Rule 15.1.3(6).

4.1.8 Chapter 16 Hazardous Substances

60,000L of diesel will be stored on-site. This exceeds the 3,000L permitted in the Macraes Mining Mineral Zone, and in turn is a **Discretionary Activity** under Rule 16.1.2. The use of explosives on site[35] for blasting as part of the mining methodology also meets Rule 16.1.2.

4.1.9 S127 Change to the Coronation, Coronation North and Coronation North Extension Conditions

OceanaGold also seeks changes to the condition 13.1 of Coronation, Coronation North and the Coronation North Extension land use consents from Waitaki District Council.

The Deepdell North Stage III Project may require the continued use of that part of haul road south of Horse Flat Road after the Coronation, Coronation North, Coronation North Extension pit excavations have ceased in order to allow the completion of excavations and rehabilitation, and without the amendment to the 13.1 conditions in these consents, would not allow the haul road to stay closed to open access to the public while that occurred. As a result, the proposed changes are underlined where added and ~~struck through where deleted~~:

> ***Coronation**: WDC Reference: 201.2013.360*
>
> *Existing consent condition:*
>
> *13.1 Within 6 months of pit excavations ceasing the consent holder shall reinstate for public use that part of Golden Point Road south of Horse Flat Road shown on "Coronation Project October 2013 WDC/DCC LUC Consents Map 1" annexed.*
>
> *Proposed consent condition:*
>
> *13.1 Within 6 months of all of Coronation, Coronation North, Coronation North Extension and Deepdell North Stage III pit excavations and rehabilitation ceasing, the consent holder shall reinstate for public use that part of Golden Point Road south of Horse Flat Road shown on "Coronation Project October 2013 WDC/DCC LUC Consents Map 1" annexed.*
>
> ***Coronation North:** WDC Reference: 201.2016.779 and 201.2013.360.1*

[35] Explosives are to be stored off-site at another authorised magazine location(s).

Existing consent condition:

13.1 Within 12 months of the Coronation North and Coronation Pits ceasing excavation the consent holder shall reinstate for public use that part of Golden Point Road south of Horse Flat Road shown on "Coronation Project 2013 WDC/DCC LUC Consents Map 1" annexed. At the same time the consent holder shall define and take steps to vest to the Council (and make lawfully available to the Council pending completion of vesting) the legal road.

Proposed consent condition:

13.1 Within 12 months of all the Coronation North, Coronation North Extension and Coronation, Deepdell North Stage III Pits ceasing excavation and rehabilitation the consent holder shall reinstate for public use that part of Golden Point Road south of Horse Flat Road shown on "Coronation Project 2013 WDC/DCC LUC Consents Map 1" annexed. At the same time the consent holder shall define and take steps to vest to the Council (and make lawfully available to the Council pending completion of vesting) the legal road.

Coronation North Extension: *WDC Reference: 201.2019.1241.*

Existing consent condition:

13.1 Within 12 months of the Coronation North ceasing excavation the consent holder shall reinstate for public use that part of Golden Point Road south of Horse Flat Road shown on "Coronation North Extension WDC/DCC LUC Consents Map 1" annexed.

Proposed consent condition:

13.1 Within 12 months of all the Coronation North, Coronation North Extension, Coronation and Deepdell Stage III Pits ceasing excavation and rehabilitation, the consent holder shall reinstate for public use that part of Golden Point Road south of Horse Flat Road shown on "Coronation North Extension WDC/DCC LUC Consents Map 1" annexed.

An application to change existing consent conditions is a discretionary activity pursuant to s.127 of the Act.

4.1.10 Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 – NES Soil

The proposed activity is located partially within an area of land that was subject to mining and waste rock stack construction as part of the previous Deepdell and Deepdell South Pits. As such, it is a Hazardous Activities and Industries List (**HAIL**) site and is considered to

be actually or potentially contaminated land. Therefore, this land is subject to the relevant rules and regulations of this legislation.

In accordance with s.31(1)(b)(iia) of the Resource Management Act 1991, territorial authorities are responsible for managing/regulating effects on human health resulting from activities carried out on land that is actually or potentially contaminated.

The disturbance at the site will exceed the permitted limits for soil disturbance specified in the permitted activity standards of the NES Soil and is therefore required to apply for a land use resource consent from the Waitaki District Council for the activity of disturbing and removing soil from within an area of land that has been the location of activities on the Hazardous Activities and Industries List. This is a **Discretionary Activity** pursuant to the NES Soil.

4.2 OTAGO REGIONAL COUNCIL

Table 14 identifies the activities associated with the Deepdell North Stage III Project that require resource consent and the relevant rules that apply.

Table 14: Regional Council Rules

Type	Activity	Rule and Activity Status	Overall Activity Status
Deepdell North Stage III Pit			Discretionary activity
Water permit	To take surface water and groundwater from the Deep Dell North Stage III Pit for the purpose of dewatering and for dust suppression.	Rule 12.1.4.2 (Water Plan) Restricted Discretionary and Rule 12.2.4.1 (Water Plan) Discretionary	
Discharge Permit	To discharge rainfall run off water and associated contaminants to land where it may enter ground water from the mined pit surface within the Deepdell North Stage III Pit for the purpose of constructing and operating an open pit mine.	Rule 12.B.4.2 (Water Plan) Rule 6.6.1(1) (Waste Plan) – Discretionary	
Landuse Consent	To disturb, deposit onto or into and reclaim an approximately 480 metre length of the bed of an unnamed intermittent, modified tributary of Camp Creek for the purpose of establishing a drainage network and stockpile.	Rule 13.5.3.1 (Water Plan) (Discretionary)	
Deepdell North Stage III Pit Lake			
Water permit	To dam water in Deepdell North Stage III Pit for the	Rule 12.3.4.1 (Water Plan) - Discretionary	

	purpose of creating the Deepdell North Pit Lake.	
Water Permit	To take surface water for the purpose of creating the Deepdell North Pit Lake.[36]	Rule 12.1.4.2 (Water Plan) Restricted Discretionary
Deepdell East Waste Rock Stack and Deepdell South (Pit Backfill) Waste Rock Stacks		
Discharge Permit	To discharge waste rock to land where it (and resulting contaminants) may enter ground and surface water for the purposes of constructing and operating a waste rock stack and silt ponds.	Rule 12.B.4.2 (Water Plan) Rule 6.6.1(1) (Waste Plan) – Discretionary
Landuse Consent	To disturb, deposit onto or into and reclaim approximately 350 metres of the ephemeral bed and approximately 130 metres of the intermittent bed of an unnamed tributary of Highlay Creek for the purposes of constructing a waste rock stack and silt ponds.	Rule 13.5.3.1 (Water Plan) Discretionary
Landuse Consent	To place, operate and maintain a 51m long culvert and earth embankment structure into the bed of an unnamed tributary of Highlay Creek for the purposes of establishing a realignment of Horse Flat Road.	Rule 13.2.3.1 (Water Plan) Discretionary
Air		
Discharge Permit	To discharge contaminants from mining operations and post mining rehabilitation to air for the purpose of undertaking mining operations.	Rule 16.3.5.9. (Air Plan) Discretionary

4.2.1 Permitted activity

Diversion of rainfall run-off from surrounding land around the proposal through diversion drains and from the proposal area through dirty water drains and sediment retention (silt) ponds is assessed to meet permitted activity Rule 12.3.2.1 of the Regional Plan – Water for Otago.

[36] This is a post mining take of WRS runoff surface water from the dirty water drainage channel into the pit. This will not meet permitted activity rules for take due to the rate which may exceed 25,000 litres per day and/or 0.5 litres per second during rainfall events. No diversion consent is required due to meeting the requirements of the permitted rule for surface water diversions (Rule 12.3.2.1). No take of ground water is assessed as required for forming the pit lake as ground water is not being removed from its location and will enter the pit naturally.

4.3 BUNDLING OF CONSENT ACTIVITY STATUSES

This consent application demonstrates that a mining activity such as the Deepdell North Stage III proposal requires a variety of consents from both the Waitaki District Council and the Otago Regional Council.

In this case, the noise generating activities, namely transportation of ore on the haul road, waste rock transport to, and deposition onto, the WRS result in non-compliance. These respective non-compliances are due to the waste rock stack footprint crossing the zone boundary out of the into the rural scenic zone and as such, its construction and the hauling of waste rock will generate noise in excess of the critical zone standard for noise at the Mining Zone boundary with the Rural Scenic Zone. Further, the cumulative noise levels generated by the activity will exceed the Mining Zone boundary noise limits at the western periphery of the project.

These are a number of factors that should be considered when a decision maker decides whether the consents should be bundled or not. These are:

a) The nature of the proposal
b) The nature of the planning instruments
c) The connection between the various activities
d) The connection between the effects of the activities requiring consent

In regard to a), this is a large proposal with many components, which individually require consent and the composite nature of the proposal does not preclude bundling of the activities to a certain extent.

In regard to b), in this particular case the plans largely do not restrict matters which may be considered, and the activities are largely discretionary activities except where they are non-complying for the sole reason of noise non-compliance.

In regard to c), the various activities all rely on each other to enable the proposal to go ahead. Without hauling of ore or placement of waste rock there would not be any mining.

For d), this is the most important factor, due to the noise effects being limited to matters within the ambit of the territorial authority activities requiring consent alone. It can also be noted that the noise is not having any follow-on effects on some of the other territorial authority matters such as indigenous vegetation effects, traffic or landscape.

The assessment of d) suggests that the Waitaki District Council consents should be bundled as non-complying but also that the Otago Regional Council consents should be kept unbundled from the Waitaki District Council consents and therefore be consented as discretionary activities.

Considering the balance of the above, the opinion of OceanaGold is that unbundling of the Otago Regional Council consents so that they are considered as discretionary activities,

separate from the non-complying Waitaki District Council matters is appropriate in this case.

A key question for the decision maker in judgement on appropriate bundling in this situation is whether the noise-effect non-compliances have follow-on effects for the balance of the proposed project. If the evaluative judgement of the decision maker(s) is that they do not and the Otago Regional Council matters can be evaluated aptly as discretionary activities without overlap with the WDC consents or noise matters, then keeping the ORC consents (discretionary) unbundled from the WDC consents (non-complying) would be appropriate.

5. ASSESSMENT OF EFFECTS

5.1 INTRODUCTION

This chapter addresses the actual and potential effects of the Deepdell North Stage III Project.

A number of technical assessments have been prepared to inform this assessment. These technical assessments are referenced, as relevant, in Sections 5.2 – 5.17 below which address the effects of the following matters:

Section 5.2 Positive / socio-economic effects;

Section 5.3 Landscape and visual amenity

Section 5.4 Traffic, public access and roading

Section 5.5 Open space and recreation

Section 5.6 Geotechnical and stability issues

Section 5.7 Noise, Blasting and Vibration;

Section 5.8 Hazardous substances

Section 5.9 Contaminated land effects

Section 5.10 Terrestrial ecology

Section 5.11 Heritage

Section 5.12 Water

Section 5.13 Aquatic ecology

Section 5.14 Air quality

Section 5.15 Farming pasture

Section 5.16 Mana whenua cultural values; and

Section 5.17 Conclusion.

Within these sections, a number of measures to avoid, remedy or mitigate the actual and potential effects of the Deepdell North Stage III Project are identified, as are additional actions proposed by OceanaGold which are intended to further minimise or compensate for any residual potential adverse effects of the project. These measures are also summarised in Chapter 6 of this AEE and it is expected that they will form the basis of

resource consent conditions for the Deepdell North Stage III Project. This is reflected in the proffered resource consent conditions which are included in **Appendix S** of this AEE.

5.2 POSITIVE / SOCIO-ECONOMIC EFFECTS

An economic impact assessment for the Deepdell North Stage III Project is contained in the Copeland Brown (2019) report attached as **Appendix Q** of this AEE.

The positive economic effects of this proposal are that mining can continue to operate at the Macraes Gold Operation for at least another year and therefore, provide employment and income for individual employees, communities and businesses situated in Otago between Oamaru and Dunedin. The scale of employment provided at the mine and in providing services to the mine has been set out in the Copeland Brown (2019) report. This report also outlines the benefits that the mine operation offers, in the form of employment in the context for the Otago regional economy and the district economies of Waitaki and Dunedin City.

85 OceanaGold staff reside in the settlement of Palmerston, for instance. The continuation of the Macraes Gold Project by one additional year[37] as a result of the Deepdell North Stage III proposal will provide ongoing employment for those residents and delay the winding down of economic activity through loss of local income that would result from the closure of the Macraes Gold Operation.

The economic benefits created by the project for the extra year it extends the life of the Macraes Gold Operation are examined in Copeland Brown (2019) in a number of different ways. These estimations of indirect benefits including contractors and suppliers use the low range of established multipliers. The multipliers differ depending of the scale being examined below:

- The benefits to north-east Otago[38] of the additional mine project operation are estimated to be approximately 353 retained jobs, $34.7 million in retained wages and salaries and retained other expenditure of $29.9 million.[39]
- For the City of Dunedin and the surrounding suburbs, the benefits of the project for at least the year that it will extend mining at the Macraes Gold Operation will be 741 retained jobs, $74.3 million in retained wages and salaries and retained other expenditure of $67.9 million.

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[37] Mining will take 2 years but will provide ore for one year, so in conjunction with other projects, it results in two years of mine life.

[38] The 'North East Otago' used here includes, Waitaki District and the metropolitan Dunedin outliers of Warrington, Waitati and Waikouaiti.

[39] This is assuming a conservative district multiplier of 1.5 for employment, incomes and expenditure.

- The regional benefits for Otago are estimated to be 1,094 retained jobs, $109 million retained wages and salaries, and retained other expenditure of $97.8 million.[40]

The ongoing operation of the Macraes Gold Operation at its current level, and the benefits that it brings to the Waitaki (North East Otago) and Dunedin City Districts and the Otago Region, depends on the ongoing availability of ore to be mined and processed. As such, consent applications for mining of gold bearing ore by economically viable means such as Deepdell North Stage III are necessary to replace the consented sites that have been depleted. In terms of GDP for the Otago Region, the contribution of the Macraes Gold Operation is significant. In the year 2017, it was estimated to have contributed 0.88% ($84 million) of the region's total GDP. This is almost 1.5 times greater than the grape growing and wine industry, 90% of the logging and forestry industry, more than double the value of the wool industry and 5 times greater than the combined fishing and aquaculture industries. The royalties that the NZ Government receives from the Macraes Gold Operation are an estimated $3.1 million annually. The extension of the mine life through the Deepdell North Stage III Project will ensure that this continues.

Finally, the proposal presents efficiency benefits in that the extensive infrastructure required to process ore, service mining equipment and appropriately dispose of tailings is already in place at the Macraes Gold Operation. Extending the mine life by one extra year through the Deepdell North Stage III project enables the efficient ongoing use of that existing infrastructure and use of existing natural resources.

To conclude, ongoing mining at the Macraes Gold Operation, enabled for an extra year through the Deepdell North Stage III proposal, will provide significant socio-economic benefits to the communities of Otago and the wider region.

5.3 LANDSCAPE AND VISUAL AMENITY

An assessment of landscape and visual amenity matters associated with the Deepdell North Stage III Project is contained in the attached report (WSP-Opus 2019), located in **Appendix M**.

The activities associated with the Deepdell North Stage III project with the potential to impact on landscape and visual amenity are:

- The Deepdell North Stage III Pit
- The Deepdell East Waste Rock Stack[41]

[40] This is assuming a conservative regional multiplier of 2.0 for employment, incomes and expenditure. And includes provision of goods and services to the mine at a regional scale.

[41] A significant proportion of which will be backfilling within the existing Deepdell South Pit.

A high-level overview of the WSP-Opus (2019) assessment is provided below.

The fact that the Project will be visible and will change aspects of the character of the existing landscape does not necessarily mean that its effects will be adverse, inappropriate or unacceptable. Its visibility, the scale, nature and duration of the effect, the visual complexity and scale of the existing landscape, the visual sensitivity of the viewer and the size of the viewing audience influence the significance of the Project's effects. Visual sensitivity is a measure of how critically changes to a landscape will be regarded and depends upon a range of viewer and view characteristics.

The landscape assessment determines that once the final shaping and revegetation of the proposed Deepdell East WRS and associated Deepdell South Backfill are completed, the general shape, slopes and colour of the completed and revegetated landforms will be in sympathy with the natural slopes of the area.

The visual effects of the proposal have also been considered some a number of surrounding viewpoints. These locations are noted in Table 15 below:

Table 15: Visual impact assessment receptor site effects

Viewpoint	Proposal level of effects
View 0 - Sailors Cutting, Macraes Road	Nil
View 1 – Back Road Section, Macraes Road	Low
View 2 – 'Evacuation Point B', Golden Point Road	Negligible
View 3 – Golden Point Road Viewpoint	Moderate-Low
View 4 – Golden Point Historic Reserve	Moderate-Low
View 5 - Macraes Flat Old Cemetery	Nil
View 6 – Frasers Road to Nenthorn Road, Macraes Road	Low to Negligible
View 7 – Howard's Gateway, Horse Flat Road	Low
View 8 – East of Bellfield, Horse Flat Road	Moderate-High, Moderate-High to Moderate once rehabilitated.
View 9 – Roy's Gateway, Hyde-Macraes Road	Nil
View 10 – Hyde Hill east, Hyde-Macraes Road	Negligible to Nil

For the majority of viewpoints assessed the potential visual effect of the Project does not exceed what is considered to be a moderate effect. In the one instance where the effect is considered to be moderate-high (View 8), the particular viewpoint on Horse Flat Road is considered to be quite isolated on a small, local no-exit road that is infrequently used. It is also expected that once site rehabilitation has been completed at mine closure, the revegetation of the WRS has become well established and the adjacent pit has 'naturalised' and the pit lake 'filled-up', the effect will be moderate-high to moderate in the longer term.

There will be night light effects associated with the operation of the Deepdell North Stage III Project. However, compliance with existing night light conditions will adequately mitigate these effects. There are not expected to be any night light effects on the one private residence that is in proximity of the Deepdell North Stage III Project.

The landscape assessment has also considered cumulative impacts on the landscape arising from the Project. Cumulative landscape effects are considered to be those that affect the physical landscape such as earthworks for the haul road 'connection', site works, topsoil stripping, excavating the open cut pit, placement of noise bunding and longer-term brown rock stockpiles for subsequent use in rehabilitation and the progressive development of the backfill and elevated waste rock stacks. In terms of the overall cumulative landscape and visual effect of the Project, the assessment finds that the effect will be negligible to low from the majority of viewpoints considered. However, the effect will moderate-high from the one viewpoint on Horse Flat Road looking west to the existing Deepdell WRS and the proposed Deepdell East WRS. This effect will however become moderate with time as mining ceases and rehabilitation occurs.

Mitigation measures will be built into the Project from the outset. This includes:

- Careful design of the form of the WRS to integrate it with the existing landform character of the area;
- Progressive rehabilitation of the WRS;
- Shaping the upper pit walls of the open cut pit where they intercept previous WRS and backfilled areas to a naturalised, lower angle form that enables the establishment of vegetation cover and an accessible margin to the eventual (full) pit lake;
- Rehabilitation of the areas disturbed around the margins of the Project; and
- Removal and restoration of the haul roads during closure phase of the Project.

The assessment finds that these measures have been proven to be effective in mitigating the potential visual effects of the existing waste rock stacks, which are the most visible, elevated mining elements so far constructed as part of the Macraes Operation.

The Project is also an extension of previously consented activity and it will be seen in this landscape context as a continuation of the existing mining operation. Landscape and visual effects are therefore not considered to be significant in this wider context.

5.4 TRAFFIC, PUBLIC ACCESS AND ROADING

A roading and traffic assessment for the Deepdell North Stage III Project is contained in the attached report by Tim Kelly Transportation Planning Limited (2019) located at **Appendix P**. This report covers matters including ongoing public access (vehicular and pedestrian), movement of mine related vehicles and compliance with district transport standards.

The key findings of the report are as follows:

- The proposal will not increase vehicular traffic on external roads as the Deepdell North Stage III proposal will replace mining activity currently taking place at the Coronation Pit and will not result in an increase in staff or vehicle movements.
- The proposal will not adversely affect public access to the eastern end of Horse Flat Road or access to any properties in that vicinity as the road will be realigned and reformed around the northern edge of the proposed waste rock stack footprint, prior to the existing road being destroyed by the proposal.
- The proposal will allow for ongoing vehicle access from Horse Flat Road to Golden Point Historic Reserve by continuing the arrangement whereby private vehicle users register their intention to access the reserve at the manned Horse Flat Road/ Haul Road intersection/ crossing.
- The proposal will significantly increase the mine vehicle movements across the existing pedestrian access route from Horse Flat Road to the Golden Point Historic Reserve and operational mining is very close to this alignment. As such, a proposed new pedestrian access route is put forward as a replacement and this will avoid the operation mining area but will still need to cross a haul road. This crossing is proposed to be facilitated by a signed and fenced approach to a locked gate crossing with a call box and instructions. Minestar staff will be alerted and will send the open pit supervisor to the crossing, stop haul traffic and unlock the gates to escort the pedestrian(s) across the haul route and lock the gates again. These measures will be detailed in a traffic management plan (TMP) and will be appropriate to ensure the ability of any pedestrians to access Golden Point Reserve from Horse Flat Road, and to return safely to Horse flat Road after doing so.
- The proposal does not adversely affect public access between Horse Flat Road and Matheson Road.
- The proposal is mostly compliant with the relevant Waitaki District Plan provisions regarding transport and car parking. The relevant non-compliances are:

a. Rule 12.2.2 (d) stipulates a maximum non-residential crossing width of 9m and the haul road crossing will exceed this being approximately 25m wide to accommodate mining vehicles. The purpose of this rule is to accommodate the convenience and safety of pedestrians (of which there are unlikely to be any at this location) so there will be no adverse effect of this non-compliance.

b. Rule 12.2.2 (g) stipulates minimum sight distance requirements for crossings onto roads with certain speed limits while Rule 12.2.2 (h) stipulates sight distance requirements for sites generating over 60 vehicle movements per day. The Horse Flat Road requirement under Rule 12.2.2(g) is not met as 195m is required for the 100kph speed limit.

- The narrow gravel road environment of Horse Flat Road means that achievable speeds are considerably lower than 100kph. Further, gates on site entrance crossings and control of mining traffic through the TMP and radios limit the possibility of interactions between mining traffic and the public. As such, it is assessed that the adverse effects of these non-compliances are adequately minimised.
- The instances of non-compliance with the WDC rules are 'technical' in nature due to the speed-limiting physical characteristics of Horse Flat Road and the traffic management measures during site operation and will not be associated with any adverse effects in terms of the safe or efficient operation of the public road network in this area.
- A package of transportation measures is integrated as part of the proposal to maintain safety for the public and for mine staff. These measures will:

  a. maintain the ability of the public to access the Golden Point Historic Area by car from both Golden Point Road and Horse Flat Road;

  b. maintain the ability for the public to access the Golden Point Historic Area on foot from Horse Flat Road;

  c. ensure the mine operation is aware of the movement of any members of the public in this area and so ensuring their safety;

  d. ensure that the Council is aware of access arrangements through a continued requirement for the review and approval of Traffic Management Plans; and

  e. ensure compliance with the relevant requirements of the district plan.

Due to the above listed reasons, it is assessed that any adverse transportation or public access effects of the proposal will be appropriately managed and will not exceed a less-than-minor level.

5.4.1 Roading

The proposal involves realignment of approximately 900m of Horse Flat Road. The road will be constructed to an appropriate standard for a road of this type which is a single lane no-exit rural road with little traffic. The specifications for the road construction and the culvert/embankment crossing are outlined in section 3.3 of this document and detailed within the road and culvert technical report (EGL 2019) attached as **Appendix K**. The road realignment will not have any effects on road users exceeding those of the existing environment due to it being built to a similar or better standard for safe and efficient motor vehicle use. Proposed consent conditions including conditions surrounding the road construction specifications are outlined in **Appendix S.**

5.5 OPEN SPACE AND RECREATION

A development contribution for open space and recreation is not considered necessary for the Deepdell North Stage III Project because the project does not create any demand for additional open space or recreation within the district or have any effects on open space and recreation values. The same conclusion was reached for the larger Macraes Phase III project, and for the Coronation and Coronation North projects, and there is no reason to depart from that approach here.

5.6 GEOTECHNICAL AND STABILITY MATTERS

Assessments of geotechnical and stability effects associated with the Deepdell North Stage III Project are contained in:

- The PSM (2018) report which contains geotechnical assessments of the pit wall stability during three phases: During mining and two closure scenarios involving different lake levels (the same as PSM (2019). A copy of this report is provided in Appendix J of this AEE.
- The PSM (2019) report which contains the geotechnical stability assessment of the revised Deepdell North Stage III Pit with the final pit design and WRS designs and interactions between these two components, particularly how the WRS affects the pit walls. This is a supplementary report which should be read alongside PSM (2018). A copy of this report is provided in Appendix J of this AEE.
- The Engineering Geology Limited (2019) report. This contains detailed analysis of stability matters relating to the Deepdell East WRS and the Deepdell South Pit Backfill. A copy of this report is provided in Appendix J of this AEE.

The PSM (2019) report uses 3 scenarios, one during mining and two scenarios post mining when a pit lake has formed at two different levels (RL445m and RL475m).

The PSM (2019) report concludes that the pit walls will be stable and safe during operation and following rehabilitation with factors of safety (FOS) appropriate for a mining pit - both

while operational and post-closure. The report notes that where one of the modelled scenarios has a minimum FOS of 2% below 1.5, this difference is inconsequential. Results of the analyses show that a 1 in 2500-year earthquake would result in 100cm of permanent displacement but that slopes would remain stable.

Engineering Geology Limited (2019) sets out how the Deepdell East WRS and Deepdell South Pit Backfill will be designed in accordance with accepted engineering practices and will be sufficiently stable for the intended long-term pastoral farming use. Existing WRS at the Deepdell site have been designed to similar standards and their performance to date has been satisfactory with no apparent issues.

Based on the above, the pit and WRS design are assessed to be appropriately designed to meet expectations of safety and will also retain appropriate stability in the long term. As a result of the findings of the geotechnical reports referred to above, it is assessed that the geotechnical/ stability effects of the proposed pit and WRS are no more than minor

5.7 NOISE

The activity will produce noise from vehicle and machinery engine use, loading and unloading rock and the use of explosives. The expected noise emanating from the activities of the proposal is described in the Acoustic Engineering Solutions (2019) report attached as **Appendix F.** The key noise emissions from the project will be associated with the following activities:

- Pit – this area is where blasting and drilling will occur, and material will be excavated. This activity will commence with the removal of the waste fill on top, prior to excavating the pit.
- Waste Rock Stack – This area includes a previous open pit (Deepdell South), as well as an area of new disturbance. The waste rock (that contains insufficient gold for economic processing) will be transported from the Deepdell North open pit along the existing Deepdell South haul road to be deposited in this area.
- Haul roads – the waste rock will be loaded into haul trucks and will be taken on the haul road to the deposition area. The ore will travel on the haul road down to the existing processing plant, and stockpile areas area to the south.
- Noise bund – construction activities to install a 4-metre-high bund along portions of the haul road between Coronation North mine and the haul road which runs to the processing plant to the south.[42]

[42] Note that further noise bunds are also proposed on the northern and southern sides of Horse Flat Road, west of the haul road and that these are illustrated in figure 2 located in section 1 of this AEE.

These features are shown in Figure 26 below:

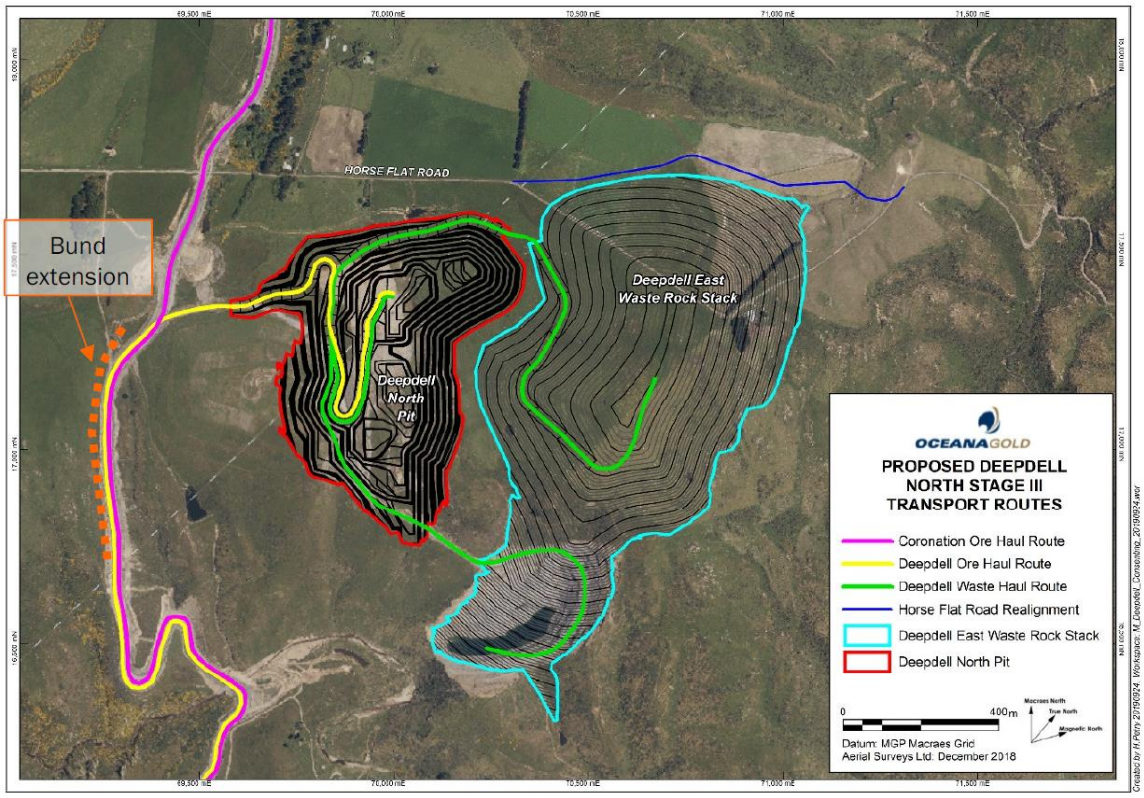

Figure 26: Noise generating activities

The potential noise effects emanating from these sources have been considered against the relevant acoustic criteria and standards that exist. The noise emissions have also been considered against previous noise assessments for the Macraes mine site and conditions of any relevant consents. The cumulative effects arising from existing mine operations and the proposed Deepdell North Stage III Project have also been assessed and are demonstrated to not increase the cumulative noise levels already received at relevant neighbouring dwellings.

5.7.1 Predicted Noise Levels

5.7.1.1 Drilling and Blasting

The expected noise levels from drilling operations at the notional boundary of neighbouring residential dwellings is presented in Table 16 below:

Table 16: Expected noise levels from drilling operations when received at notional boundary of neighbouring residential dwellings

Dwelling	Expected noise levels (dB LAeq)	
	Scenario 1	Scenario 2
C & M Howard	36	35
O'Connell	< 25	< 25
Vanderley	*< 25*	*< 25*
N & M Roy	< 25	< 25
Tisdall	< 25	< 25

This indicates that noise levels of less than 40 dB L_{Aeq} are expected at the notional boundary of all neighbouring properties. This is an acceptable outcome and adverse noise effects of drilling are predicted to be less than minor as a result from this activity.

Noise received at all neighbouring dwellings arising from blasting is anticipated to be less than 115 dB L_{peak}. This is considered acceptable; however, it is recommended that noise monitoring is undertaken to assess compliance and confirm predictions. A warning siren is also associated with the blasting activities on site. Noise levels arising from this source are expected to be less than 50 dB L_{AFmax} at 1500m from the Deepdell North Stage III site and at adjoining neighbouring properties. This will be audible on neighbouring sites, but it would not be at a level which causes startling or undue disturbance and will be the same order as other one-off noise events which occur regularly in a rural environment. The warning siren may also be considered as a mitigating factor overall, as it reduces the likelihood that the noise from the blast itself will cause surprise. The blasting will also be limited to 'daytime' hours as follows:

- Between 0900 to 1730 hours Monday to Friday
- Between 1000 to 1630 hours Saturday, Sunday and Public holidays

Good control of blasting noise can also be achieved via the implementation of a Noise, Air blast and Vibration Management Plan (NAVMP). This is consistent with how OceanaGold currently manage activities on the wider Macraes site. This plan will be amended to include management of noise and vibration emitting activities at the Deepdell North Stage III site.

5.7.1.2 Removal of Extracted Rock

For the majority of the time, the only potential noise source on-site will arise from the removal of extracted rock. This activity will consist of excavators loading the material into haul trucks and the haul trucks transporting the rock either to the waste rock stack, or to the processing plant. Expected noise levels arising at the notional boundaries of neighbouring residential dwellings from this general activity (based on a worst-case operational scenario) are as shown in Table 17 below.

Table 17: Expected noise levels from general operations when received at notional boundaries of neighbouring residential dwellings

Dwelling	Expected noise levels (dB LAeq)
C & M Howard	42
O'Connell	< 30
Vanderley	< *30*
N & M Roy	< 30
Tisdall	< 30

This analysis indicates that noise associated with this activity is expected to result in noise levels of less than 40 dB L_{Aeq} at the notional boundary of all properties, with the exception of the Howard residence. This is considered to result in a less than minor adverse effect on those residences. The expected general noise from hauling and other operations on site at the C & M (C & E) Howard residence is modelled to be 42 dB LAeq under worst case scenario conditions. Further, the assessment finds that the cumulative noise levels at the notional boundary of the C & M (C & E) Howard residence from both the Coronation North operation and the Deepdell North Stage III proposal is expected to reach 49 dB LAeq. This cumulative noise level is no higher than the current noise level experienced at the C & M (C & E) Howard property from existing consented operations and the resource consent conditions for the existing Coronation North Extension consent (WDC Reference: 201.2019.1241, DCC Reference: LUC-2019-42) granted 24th October 2019.

In order to ensure that the noise effects on the C and M (C & E) Howard residence are acceptable and consistent with the effects agreed to by the Howards as part of the Coronation North Extension consent application process, a replicated noise condition limiting noise at the notional boundary of the C & M Howard residence to 51dB LAeq or less is proffered in the proposed conditions attached as **Appendix S.** It is also noted that

OceanaGold has sought the affected party approval of C & E Howard and this is expected to be provided to Waitaki District Council shortly.

5.7.1.3 Blasting and Vibration

An assessment of the vibration effects that the Deepdell North Stage III Project will have is provided in TechNick (2019), a copy of which is provided in **Appendix G** to this AEE.

TechNick (2019) has not identified any environmental impacts of the proposed blasting program that are likely to cause adverse effects or discomfort to any specified neighbouring houses or sensitive sites. Issues concerning vibration, airblast and flyrock can be managed using best practice techniques to ensure that significant adverse effects do not arise.

TechNick (2019) also calculates the closest two residences to the blasting will experience predicted vibration levels of 3.8mm/s (the Howard residence located 1.5 km distant) and 1.0mm/s (the O'Connell residence located 3.6 km distant) respectively. These levels are below the AS / NZ Standard AS/NZ 2187.2 (2006) standards for human comfort and property damage.

Those residences are also calculated to receive levels below those the relevant AS/NZ 2187.2 standards.

TechNick (2019) notes that other consequences of blasting, such as flyrock and dust generation, will need to be managed, and that these potential hazards can be adequately addressed by continuing to apply the mitigation measures successfully used at Macraes Gold Operation over recent years. As noted above, an existing NAVMP will be amended to include specific consideration and management of any potential blast effects arising from this new site. There will also be limits on the times and days that blasting can occur within the site as recommended by AES (2019).

Conditions to this effect are included in **Appendix S.**

5.8 HAZARDOUS SUBSTANCES

Activities on site include the storage and use of hazardous substances including diesel fuel[43]. Mining explosives used on site for blasting and associated blasting caps and detonation cord will not be stored on site but will be brought to site from other authorised magazine(s), subject to the appropriate precautions and protocols.

[43] The amount of diesel will exceed permitted limits under the Waitaki District Plan.

The fuel will be stored in double skinned and self-bunded fuel tanks which will prevent and contain spills.

The storage and use of hazardous substances for the Deepdell Stage III Project will be undertaken in accordance with the existing management practices employed at the Macraes Gold Operation and the existing open pit mines operated by OceanaGold. Those existing practices comply with the relevant New Zealand Standards, Codes of Practice and the Health and Safety at Work (Hazardous Substances) Regulations 2017.

In accordance with current practice, a Hazardous Substance Principle Hazard Management Plan sets out the details of the substances used / stored, containment measures, risk management and emergency response approach will be maintained. The relevant pages of the site Health, Safety and Environment Compliance Standards are included as **Appendix I.**

As a result, it is considered that any effects on the surrounding environment or on human health due to the storage and use of hazardous substances associated with the Deepdell Stage III Project will be less than minor.

5.9 CONTAMINATED LAND EFFECTS

The Macraes Gold Operation site is technically considered to be a HAIL site due to previous and current consented activities including mining, mineral processing activities and the disposal of waste rock and tailings.[44]

Mining on site to date has demonstrated that the effects of extracting waste rock and ore from the ground (essentially large-scale earthworks) on the site is able to be controlled adequately using established on=site methodologies. The waste rock to be discharged to land for this proposal will be located partially within an existing mining pits (Deepdell South).

While this proposal will create additional land area that has been subject to HAIL activities, it will not create any adverse contaminated land effects that exceed a level considered to be minor.

The backfilled Deepdell South Pit and the area of the Deepdell East Waste Rock Stack site will have topsoil applied and will be rehabilitated into pasture to effectively remediate the site for grazing use. The Deepdell North Stage III Pit will become a pit lake in a similar fashion to the existing Deepdell South Pit. The proposed approaches to site rehabilitation

[44] Please note that a land use consent is being applied for from the WDC regarding the requirements of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

are established and widespread across the wider Macraes Gold Project site and are demonstrated to be effective in re-establishing topsoil and vegetation. The waste rock disposed of at site, while technically being classed as contaminated waste and being subject to faster natural oxidisation processes, has relevant contaminants at similar or the same levels as the surrounding bedrock. Further, it is encased within rehabilitation materials including oxidised 'brown rock' and respread topsoil. Therefore, contaminated land effects are assessed to be adequately accounted for through site rehabilitation, temporary and no more than minor.

5.10 TERRESTRIAL ECOLOGY

The impacts of the Project on terrestrial ecology values within and surrounding the site have been assessed in the report prepared by Ahika (2019). This is attached as **Appendix D**.

The report describes the Project Impact Area (**PIA**) for the Project as covering 169.9 ha[45].

The following have been identified as project activities which have the potential to result in an effect on the PIA's ecological features:

- Excavation of the pit – vegetation and invertebrate community loss, displacement of birds, potential mortality of reptiles;
- Deposition of rock material – stripping and covering vegetation and invertebrate communities, displacement of birds, potential mortality of reptiles;
- Sediment runoff (if unmanaged)
- Encroachment of weeds (if unmanaged)
- Potential displacement of indigenous animals through noise, vibration and lighting;
- Wind-blown dust accumulation affecting or covering plant species;
- Potential for accidental fire (if unmanaged);
- Changes to surrounding hydrological regimes may result in decreased surface and subsurface flow of water into some wetlands and water courses.

5.10.1 Impact on Vegetation Communities

The Deepdell North Stage III project will remove approximately 54.79 ha of indigenous vegetation comprising of low producing grassland, shrubland, seasonal gully drainages,

[45] This includes a large buffer area outside of the project footprint that is affected by light, noise and dust etcetera.

ephemeral wetlands and a seepage wetland inhabited by 71 indigenous plants (including 13 rare species), twenty bird species (nine indigenous and one rare species), four reptile species (three rare species) and a largely unknown invertebrate community. The project will also impact on 54.09 ha of cultivated pasture and shelterbelts. There may be some indirect effects on a further 88.71 ha of indigenous vegetation and 26.47 ha of cultivated pastures that occurs in the buffer area, but these effects are expected to be minimal if appropriate controls are employed. The indigenous vegetation communities are generally of low species diversity and most are characterised by high weed representation. The populations of the At Risk or Rare species are mostly small, except for the Declining Matagouri which is dominant in the shrubland vegetation community and frequent in the low producing grassland plant community. Matagouri dominated shrub land is common across the Macraes Ecological District and other areas of the South Island and there are questions about the current national conservation status of this species and how it was arrived at.

The total loss represents approximately 0.17% of the known vegetation communities that are within the Macraes Ecological District.

The indigenous vegetation communities trigger the significant criteria with regard to representativeness, rarity or distinctiveness as set out within proposed Otago Regional Policy Statement, and all communities but the seasonal gully drainage are classed as significant under representativeness or rarity criteria of the Waitaki District Plan.

Overall, the indigenous vegetation communities present within the PIA are assessed as being of high ecological importance, though the importance of each vegetation community varies between negligible for cultivated pasture and shelterbelts, moderate for the low producing grasslands and shrublands and high for the ephemeral wetlands and seepage wetland. Though the indigenous plant communities are of moderate to low representation and ecosystem service importance, and moderate diversity and moderate integrity, there are remnants of rare vegetation communities present, the ephemeral wetland vegetation communities and seepage wetlands are a national priority for protection, are Naturally Uncommon and classified as Threatened, there are three Threatened Level IV land environments that are overlain by some natural vegetation and it provides habitat for Threatened, At Risk, or rare plant and animal species.

5.10.2 Impact on Birds

The assessment finds that the effects of the project on birds will be the displacement of individuals from within the PIA, with a temporary increase in competition with neighbouring resident birds leading to the potential mortality of some individuals. Longer term there is likely to be avoidance of the area by harrier hawks and paradise shelduck. Disruption to

the black-backed gull colony is thought to be temporary as they are nesting seasonally in an artificial habitat, which will be re-created in the Deepdell North Stage III pit. The overall result of these effects is some disruption of local bird populations, most of which are common on a national scale, and the displacement of a pair of At Risk pipit which are inhabiting an artificial habitat in the form of rehabilitated Waste Rock Stack.

5.10.3 Impact on Reptiles

The assessment finds that there will be the loss of an estimated 185 reptile individuals from within the project area and some short-term disruption to reptile populations in the area immediately surrounding the project. As the populations within the PIA of these lizards are relatively small (for the area), it is assessed that the project will have a moderate effect on local lizard populations. As the lizard species concerned are widespread and often numerous, the project is considered to have a minor impact on lizard populations at a national scale.

5.10.4 Impact on Invertebrates

The mining activity and associated disturbance will likely result in the loss of invertebrate communities that currently reside within the project area. There may also be some disruption to species in the surrounding area. As most of the invertebrate species concerned are widespread and often numerous, the project is considered to have a minor impact on invertebrate communities.

5.10.5 Summary of Project Effects on Terrestrial Values

The Deepdell North Stage III project will remove approximately 54.79 ha of indigenous vegetation comprising of low producing grassland, shrubland, seasonal gully drainages, ephemeral wetlands and a seepage wetland.

The vegetation communities are habitat for 13 At Risk or Rare plant, bird or lizard or species and are underlain by 3 Threatened LENZ. The ephemeral wetland vegetation community is Historically Rare and Critically Endangered, and the seepage wetland is Historically Rare and Endangered. Both are priorities for protection. The indigenous vegetation communities are generally of low species diversity and most are characterised by high weed representation.

The following Table 18 provides an overview of the ecological features, their scale of importance and an assessment of the impact arising from the Project activities:

Table 18: Summary of project terrestrial ecology effects

Ecological Feature Class	Ecological Feature Type	Ecological Feature	Classification of Feature	Buffer	Pit	WRS	PIA	Unit of Measurement	Accuracy of measurement	Ecological Importance of Feature	Magnitude of Project Impact on Feature		Overall Project Effect	Assessment Confidence
											Local Scale	National Scale		
Bird	Community	Ecological function								Moderate	Moderate	Negligible	Very Low	Moderate-Low
Bird	Species	Pipit	Declining				2	individuals	Counted	Moderate	Low	Negligible	Very Low	Moderate-Low
Bird	Species	Black-backed gull					45	individuals	Counted	Low	Moderate	Negligible	Very Low	
Bird	Species	Grey teal					6	individuals	Counted	Low	Moderate	Negligible	Very Low	
Bird	Species	Grey warbler					10	individuals	Estimated	Low	Moderate	Negligible	Very Low	
Bird	Species	Harrier hawk					1	individuals	Counted	Low	Moderate	Negligible	Very Low	
Bird	Species	Paradise shelduck					6	individuals	Counted	Low	Moderate	Negligible	Very Low	
Bird	Species	Spur-winged plover					8	individuals	Estimated	Low	Moderate	Negligible	Very Low	
Bird	Species	Welcome swallow					5	individuals	Estimated	Low	Moderate	Negligible	Very Low	
Environment	LENZ	< 10% indigenous cover left	Cultivated Pasture	26.39	29.16	24.93	80.49	Hectares	Measured					
Environment	LENZ	< 10% indigenous cover left	Ephemeral Wetland	0.02		0.3	0.31	Hectares	Measured					
Environment	LENZ	< 10% indigenous cover left	Low producing grassland	13.24	7.8	29.11	50.15	Hectares	Measured					
Environment	LENZ	< 10% indigenous cover left	Seasonal gully drainage	1.79	0.5	1.91	4.2	Hectares	Measured					
Environment	LENZ	< 10% indigenous cover left	Seepage			0.07	0.07	Hectares	Measured					
Environment	LENZ	< 10% indigenous cover left	Shelterbelts & Exotic Trees	0.08		0.53	0.61	Hectares	Measured					
Environment	LENZ	< 10% indigenous cover left	Shrublands	3.17	0.08	2.79	6.04	Hectares	Measured					
Flora	Community	Ephemeral Wetland	Critically Endangered Historically Uncommon ecosystem type	0.02		0.3	0.31	Hectares	Measured	High	High	Medium	High	Low-Moderate

Flora	Community	Seepage	Endangered Historically Uncommon ecosystem type			0.07	0.07	Hectares	Measured	High	Moderate	Low	Low	Low-Moderate
Flora	Community	Cultivated Pasture		26.39	29.16	24.93	80.49	Hectares	Measured	Negligible	Low	Negligible	Very Low	
Flora	Community	Low producing grassland		24.82	8.76	39.47	73.04	Hectares	Measured	Moderate	Moderate	Low	Low	Moderate-Low
Flora	Community	Seasonal gully drainage		1.79	0.5	1.91	4.2	Hectares	Measured	Low	Moderate	Low	Very Low	Low
Flora	Community	Shelterbelts & Exotic Trees		0.08		0.53	0.61	Hectares	Measured	Negligible	Low	Negligible	Very Low	Moderate-High
Flora	Community	Shrublands		7.36	0.08	3.65	11.09	Hectares	Measured	Moderate	Low	Negligible	Very Low	Moderate
Flora	Community	Ecosystem services								Minor				
Flora	Community	Historically Rare or Threatened Ecosystems				2	2	Communities		See Ephemeral Wetland and Seepage Wetland Flora Communities				
Flora	Community	Integrity								Moderate				
Flora	Community	National Priorities for Protection				2	2	Communities		See Ephemeral Wetland and Seepage Wetland Flora Communities				
Flora	Community	Rarity								High	Moderate	Medium	Medium	
Flora	Community	Representativeness								Moderate	Moderate	Medium	Medium	
Flora	Community	Sites recommended for protection					0	Sites		Nil				
Flora	Community	Wetlands of National Importance or Ramsar sites					0	Sites		Nil				
Flora	Species	Carmichaelia crassicaulis Hook.f. subsp. crassicaulis	Declining	15		2	17	individuals	Counted	High	Very Low	Negligible	Very Low	Moderate
Flora	Species	Carmichaelia petriei Kirk	Declining	10		7	17	individuals	Counted	High	Low	Negligible	Very Low	Moderate
Flora	Species	Discaria toumatou Raoul	Declining	7.36	0.08	3.65	3.73	Hectares	Estimated	High	Negligible	Negligible	Very Low	Moderate-High
Flora	Species	Leptinella pusilla Hook.f.	Declining			1	1	m^2	Estimated	High	Low	Negligible	Very Low	Moderate-Low
Flora	Species	Lobelia ionantha Heenan	Declining			0.561	0.561	m^2	Estimated	High	Moderate	Low	Low	Moderate-Low
Flora	Species	Rytidosperma buchananii (Hook.f.) Connor & Edgar	Declining			1	1	individuals	Counted	Low	Very Low	Negligible	Very Low	Moderate-Low
Flora	Species	Carex resectans Cheeseman	Locally Uncommon			1.6	1.6	m^2	Estimated	Moderate	Moderate	Low	Low	Moderate-Low

Flora	Species	Melicope simplex A.Cunn.	Locally Uncommon			11	11	individuals	Counted	Moderate	Moderate	Negligible	Very Low	Moderate
Flora	Species	Myrsine divaricata A.Cunn.	Locally Uncommon			2	2	individuals	Counted	Moderate	Moderate	Negligible	Very Low	Moderate
Flora	Species	Anthosachne falcis (Connor) Barkworth & S.W.L.Jacobs	Naturally Uncommon				100	individuals	Estimated	High	Moderate	Low	Low	Moderate
Flora	Species	Carex subtilis K.A.Ford	Naturally Uncommon			1	1	individuals	Counted	Moderate	Moderate	Negligible	Very Low	Moderate
Flora	Species	Juncus distegus Edgar	Naturally Uncommon			369	369	m^2	Estimated	Moderate	Moderate	Low	Low	Moderate-Low
Flora	Species	Juncus distegus Edgar	Naturally Uncommon			56	56	individuals	Estimated	Moderate	Moderate	Low	Low	Moderate-Low
Flora	Species	Juncus pusillus Buchenau	Naturally Uncommon			1	1	m^2	Estimated	Moderate	Moderate	Low	Very Low	Moderate-Low
Flora	Species	Diversity								Moderate	Moderate	Medium	Medium	
Invertebrates	Community	Overall importance								Moderate	Moderate	Low	Low	Low
Reptiles	Community	Overall importance								Moderate	Moderate	Low	Low	Moderate
Reptiles	Species	*Oligosoma inconspicuum*	Declining		1			individuals	Counted	High	Moderate	Negligible	Very Low	Moderate-Low
Reptiles	Species	*Oligosoma polychroma* (clade 5 genotype)	Declining				5	individuals	Estimated	High	Moderate	Negligible	Very Low	Moderate-Low
Reptiles	Species	*Woodworthia* "Otago/Southland large"	Declining				30	individuals	Estimated	High	Moderate	Low	Low	Moderate
Reptiles	Species	*Oligosoma maccanni* (clade 4 genotype)					150	individuals	Estimated	Moderate	Moderate	Low	Low	

Overall it is assessed that the Deepdell North Stage III project will have low to very low effect on most of the terrestrial ecological features. Exceptions to this are an overall moderate impact on the plant communities together (mainly a result of the presence of the LENZ, rare species, and the Nationally Critical ephemeral wetland) and a high impact on the seven ephemeral wetlands as these will be lost within the Project's footprint. Ephemeral wetlands are known to present though out most of the Macraes Ecological District (see Figure 27 below) but numbers are not known and there are likely to be more present than the known 1,360 examples. The integrity of the ephemeral wetlands in the Macraes Ecological District is not known due to lack of data.

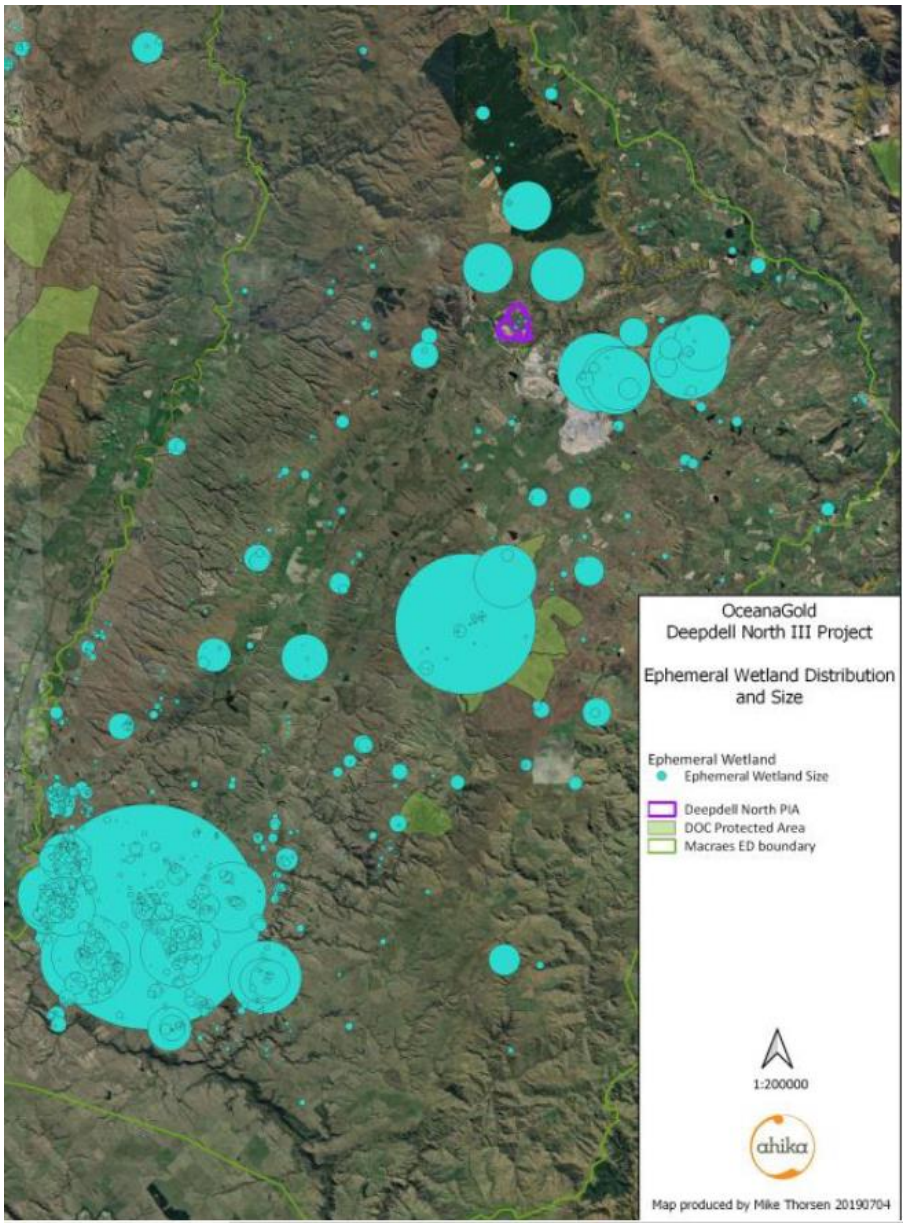

Figure 27: Ephemeral wetland distribution and size

These impacts will be addressed through the implementation of an Impact Management Plan (this is attached to the application within **Appendix D**) that details actions that follow a hierarchical approach to the management of adverse effects. This consists of avoiding effects through siting of the WRS and isolating important areas, remedying effects through creation of new lizard habitat and a new pit lake, mitigation of effects by employing standard site operating procedures for management sediment, fire, dust , light and noise effects and the rescue (transplanting) of two plant species.

Further, the proposal is to (mainly) offset impacts through funded actions at two offset locations, one will be for ephemeral wetlands and will be supported by a research program. The other will be in a high value mixed shrubland and tussock land area that has higher values than those lost as part of the Deepdell North Stage III project. This is discussed further in Chapter 6 of this report.

5.11 HERITAGE

The nature and significance of the historic heritage values in the vicinity of the Deepdell North Stage III Project and the project effects on those values have been assessed in the report prepared by Origin Consulting (Origin 2019), a copy of which is provided in **Appendix H** to this AEE.

No heritage items included in the New Zealand Heritage List/Rārangi Kōrero are contained within the area affected by the project, nor is any heritage item that is identified and protected in the Waitaki District Plan.

Origin (2019) also identifies that the Deepdell North Stage III Project will not impact on any existing features that require prior archaeological authority from Heritage New Zealand Pouhere Taonga (HNZPT).

Some recorded archaeological sites from previous mining are within the footprint of the proposal, but these are either already destroyed with appropriate authorisations or the features remaining do not require authorisation under the HNZPT Act 2014 due to being originated from the 20th Century. The main findings of the heritage assessment report are:

- *I42/15 (Deepdell and Evans Workings) are identified as early 20th century hard-rock mining sites and are therefore not considered an archaeological site under the HNZPT Act 2014.*
- *The Evan's Workings heritage covenant boundaries are adjacent to and outside of the proposed pit boundaries.*
- *The Golden Bell Mine (I42/13) and the Horse Flat Battery (I42/14) are within the footprint but have already been destroyed pursuant to Archaeological Authority and earlier Deepdell mining projects.*

Further, it is also avoiding impinging within the Evans workings heritage covenant. The unearthing of any artefacts of heritage or archaeological value will be managed by 'Accidental Discovery Protocol' currently in place. Based on existing values and the planned mitigation it can be concluded that the proposal will have negligible effects on heritage values. Conditions to this effect are proposed in **Appendix S**.

5.12 WATER

A detailed assessment of the effects of the proposal on water resources/values is included in the GHD (2019) assessment report attached as **Appendix E** and the ground water assessment report GHD (2020) attached as **Appendix T**.

The key purpose of the GHD (2019) assessment was to understand the cumulative effects on water quality as a result of the addition of the Deepdell North Stage III Project and its potential to cause non-compliance issues with existing downstream water quality resource consent conditions both during operation and post closure. To determine this, GHD developed a site water balance model which enabled OceanaGold to test the impact of future mine development on downstream water quality. This assessment also considered what effect the activity would have on nitrogen compounds loads in receiving downstream waterbodies.

The purpose of the GHD (2020) assessment was to provide:

- A description of the groundwater setting
- An assessment of effects on groundwater levels from the proposed activities
- An assessment of effects on groundwater quality
- To recommend appropriate monitoring

5.12.1 Relevant Resource Consent Conditions and Water Quality Management

The key surface water compliance points that are relevant to the Deepdell North Stage III project are Deepdell Creek at DC08 and the Shag (Waihemo) River Loop Road. The locations of these are shown in Figure 28.

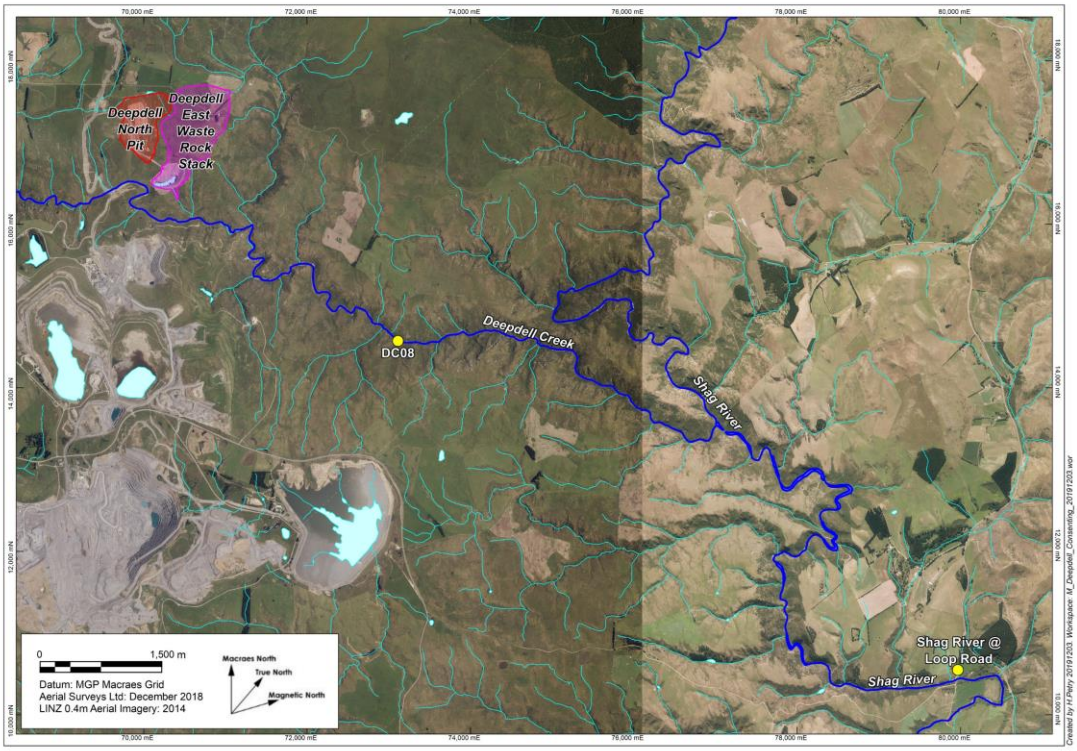

Figure 28: Key surface water compliance monitoring points

As explained in Section 2.14 of this AEE, currently the water quality compliance limits on OceanaGold's consents at these sites are being achieved, however studies have identified where potential breaches could occur.

Past studies and investigations associated with Macraes Phase III had identified a, possibility that sulphate concentrations may exceed receiving water consent limits seasonally, with risk increasing over time due to the delayed release associated with geochemical reactions of the waste rock material. Risk of other metals exceeding compliance values was also identified. However, the analysis in that regard was noted as conservative and an adaptive management regime was promoted to monitor and manage any risk to water quality. This has been utilised by OceanaGold for some time now and is used to guide its approach to on-site water management. Toxicity test work was carried out at Coronation North as a requirement of the relevant consents there and this resulted in the consented water quality limit for sulphate being raised from 400mg/l to 1000mg/l.

5.12.2 Nitrogen Compounds

It has been identified that the mining activities could contribute to downstream nitrogen loading in the receiving waterbodies. Potential on-site sources of nitrogen include:

- Ammonium nitrate explosives;

- Cyanide in tailings slurry;
- Chemicals and reagents used during ore processing – eg nitric acid;
- The weathering of fresh waste rock;
- The use of fertiliser for rehabilitation purposes;
- Nitrogen fixing in the soil from the spread of leguminous weeds along steep water course margins and subsequent leaching;
- Grazing animal waste in rehabilitated areas of the mine;
- Nitrogen in the mine site water supply and wastewater.

OceanaGold, in conjunction with GNS has conducted preliminary isotopic test work on nitrogen and this indicates that sources of nitrogen are from incomplete combustion of explosives and nitrogen found in the host rock. Ryder (2019) has completed a study on the ecological values of the Deepdell Creek and Shag River and has recommended that the NPS Freshwater Attribute B is an appropriate target for the Deepdell Creek and Shag River. Attribute B values are as follows:

- Nitrate-N g/m^3 (NO_3-N) – Annual median [>1.0 and ≤2.4] and Annual 95th percentile [>1.5 and ≤3.5]
- Ammoniacal-N g/m^3 (NH_4-N) – Annual median [>0.03 and ≤0.24] and Annual 95th percentile [>0.05 and ≤0.40]

For reference, measured values for Nitrate-N and Ammoniacal-N for the last 12 months are reproduced in the following graphs (Figures 29 and 30). The data indicates compliance with Attribute B values at both sites.

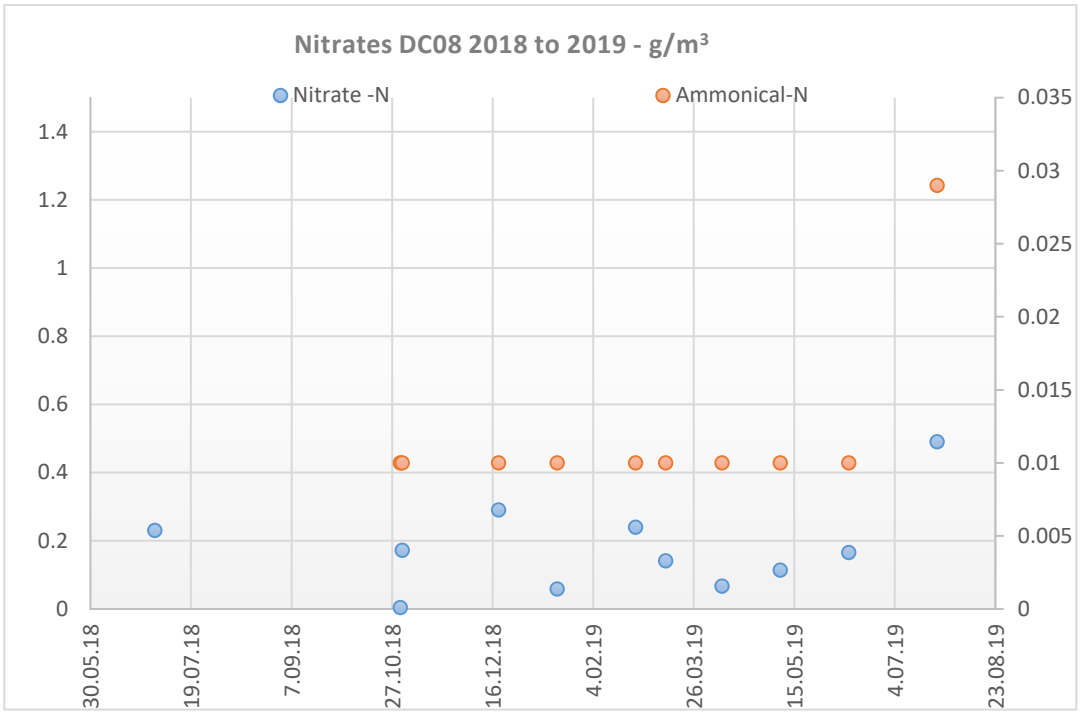

Figure 29: **Nitrate-N concentrations in Deepdell Creek at DC08 (2018-2019)**

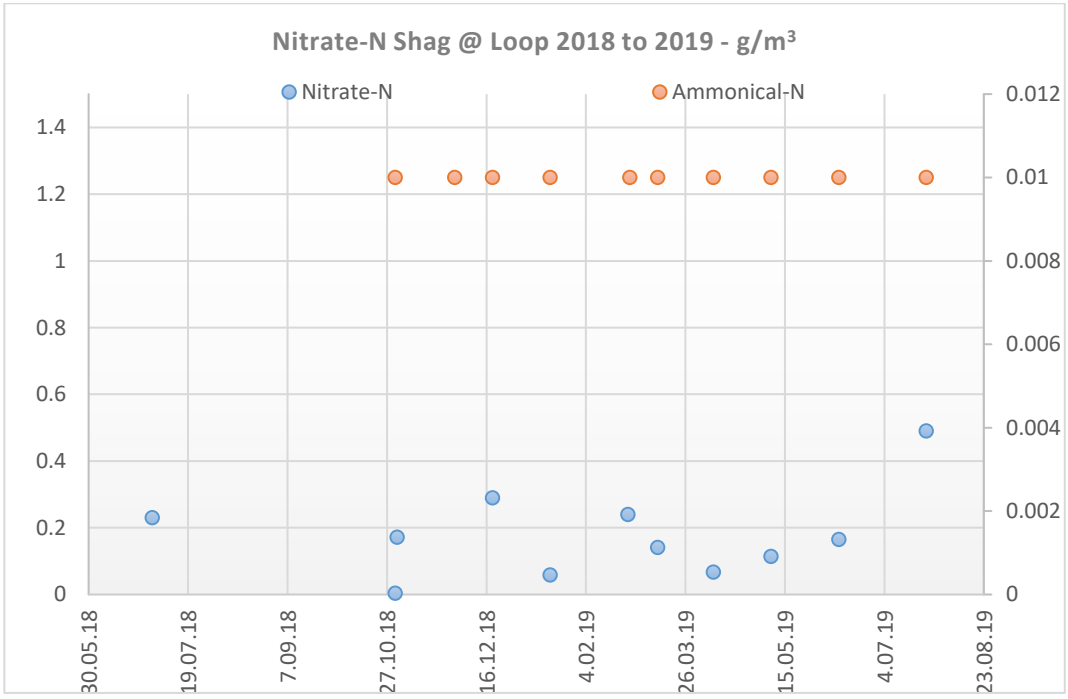

Figure 30: **Nitrate concentrations in the Shag River at Loop Road and McCormicks (2018-2019)[46]**

[46] The limit of detection of Ammoniacal N is 0.01g/m³

5.12.3 Sulphate

Sulphate has been identified as a contaminant of concern in the seepage discharges produced by WRS and mining at site. It is thought to originate in the weathering of minerals in the geology of the site. Monitoring shows that sulphate levels are still well below the compliance values at DC08 at Deepdell Creek and Loop Road in the Shag River for the last year (Figures 31 and 32).

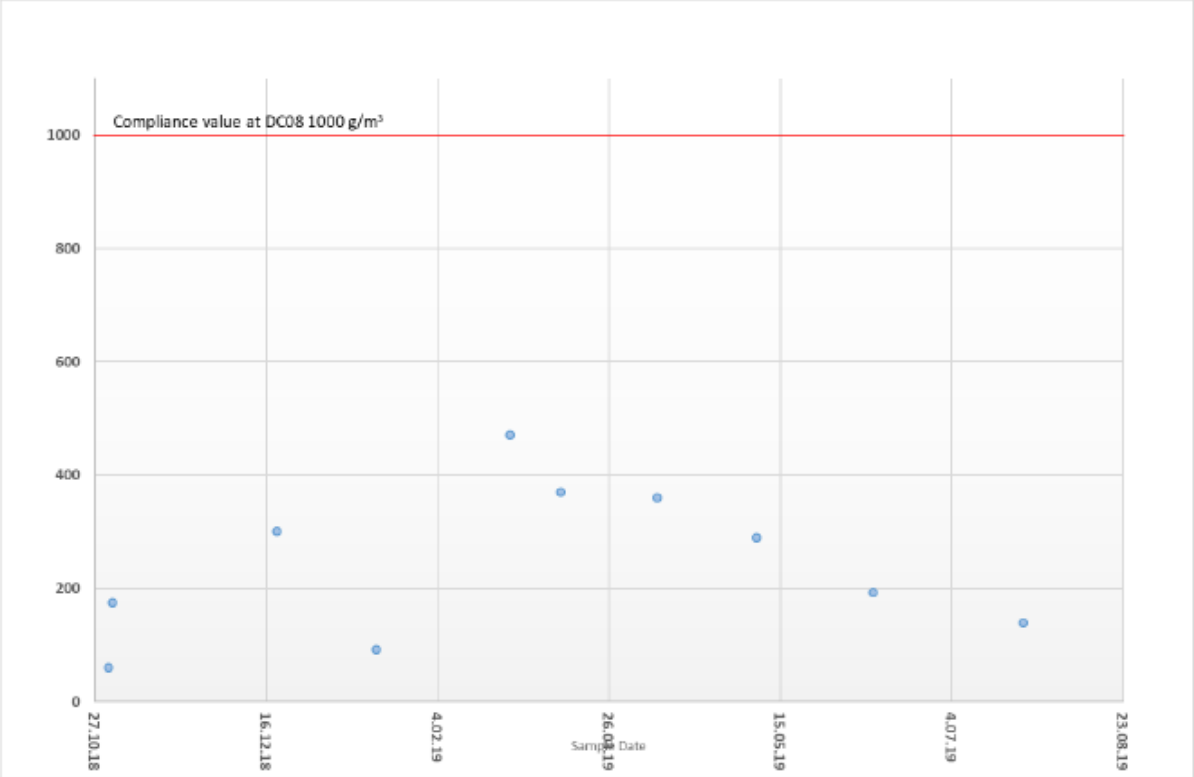

Figure 31: Sulphate monitoring values at DCO8

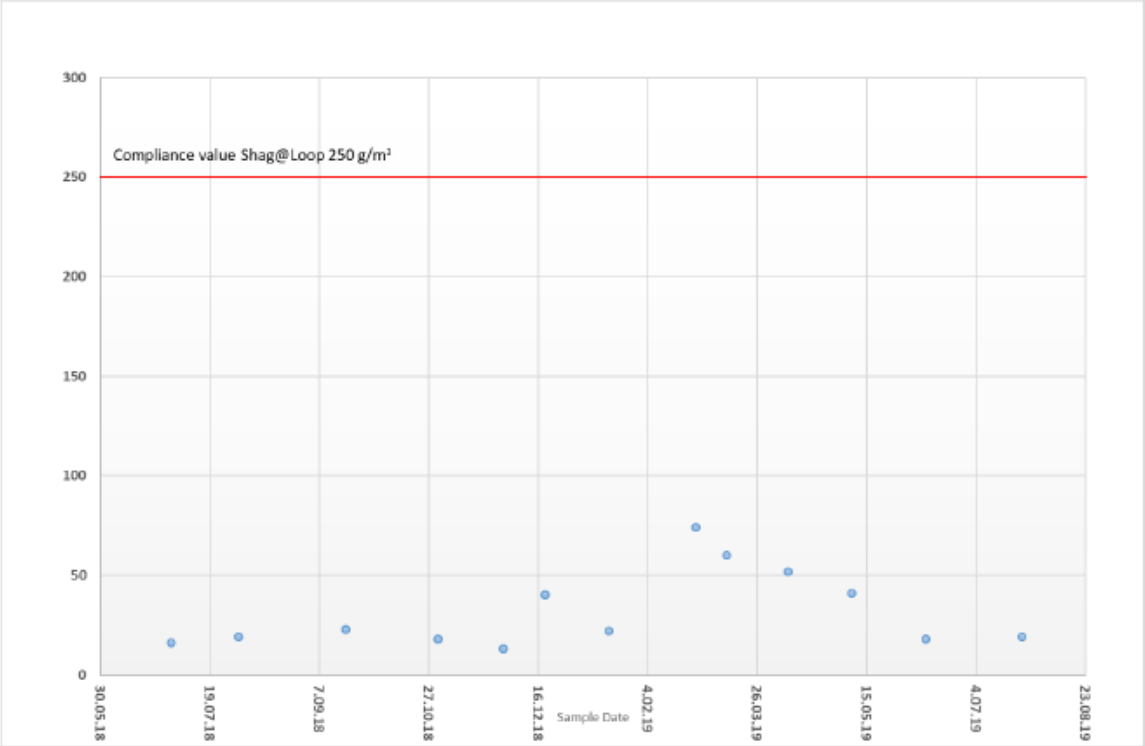

Figure 32: Sulphate monitoring values at Loop Road in the Shag (Waihemo) River

5.12.4 Adaptive management measures

OceanaGold adopt an adaptive management approach to water management and quality on-site. This is consistent with the current consents for the wider area and is effective in maintaining water quality.

Key features of this current adaptive management regime which are relevant to the Deepdell North Stage III are as follows:

- Ongoing monitoring to confirm model projections and assess effects. The development of the site wide Goldsim model (discussed in this report) is the most recent update to site water balance and water quality analysis and follows a number of other updates since 2011 that OceanaGold has commissioned.
- Ongoing pumping of Tailings Storage Facility (**TSF**) water as well as various collection systems across the mine that intercept water in ponds and drains for process re-use and to prevent release.
- Pumping of TSF and other water sources to Frasers Pit following cessation of mine operations for up to 20 years following closure of each facility to allow discharge flow rates to decrease to the point where other passive mitigation measures can be installed where deemed necessary.

- Construction of a freshwater dam on Camp Creek to provide a base flow to Deepdell Creek to manage and effectively mitigate sulphate concentrations in Deepdell Creek and in the Shag (Waihemo) River as far as the confluence with McCormicks Creek. The dam provides the opportunity also for seasonal or flow matched discharges of freshwater to effectively mitigate the sulphate concentrations in the Shag River.[47]
- Use of passive water treatment systems in targeted locations. There are two specific studies underway:
    - Investigation of options to use mine seepage water for irrigation (conducted by University of Otago)
    - A study of accelerated passive treatment of mine seepage water (conducted by CRL[48])

In addition to the above, OceanaGold has completed a number of studies on waste rock geochemistry, construction methodology and capping. This has resulted in a change to the waste rock stack construction in the Coronation North mine area to improve seepage water quality. For the Deepdell Waste Rock Stack, OceanaGold plans to adopt learnings from these studies in order to target and improve seepage water quality.

5.12.5 Water Balance Model

As noted above, a water balance model was developed by GHD (refer **Appendix E** attached) to assess how downstream water quality changes over the life of the Macraes mine. This model essentially updates models prepared previously by others (Golder, WGA) used to predict future water quality outcomes. A key purpose of the model is to assess how future changes, such as mine area extension and/or addition of a new WRS impacts downstream water quality; and what mitigations might be needed to stay within consent conditions. Figure 33 below illustrates the locations of the consented Back Road Waste Rock Stack and the Camp Creek Dam which are used in the scenario modelling.

[47] The dam is consented but has not yet been constructed.

[48] CRL Energy Ltd.

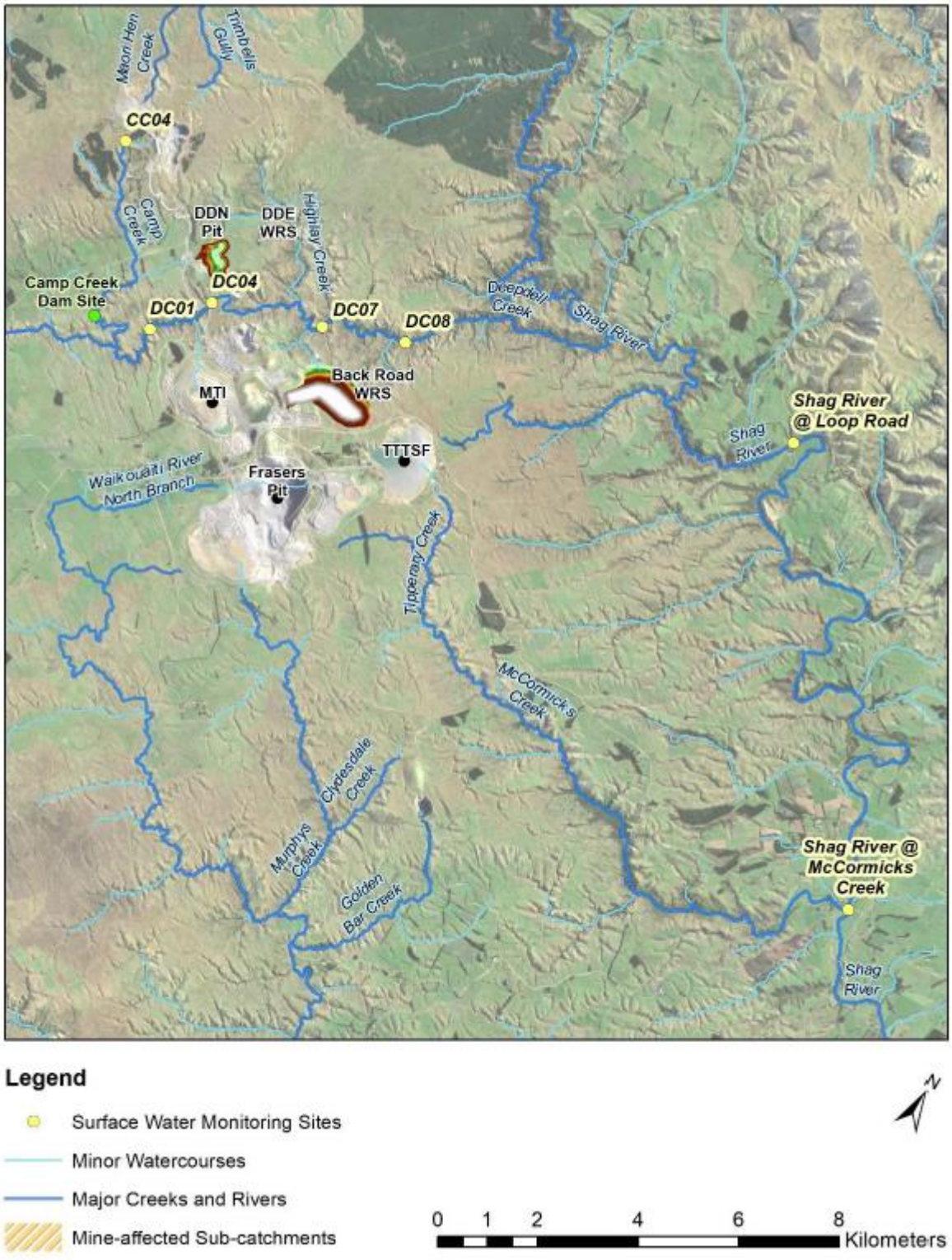

Figure 33: Location of features in the GHD report modelling scenarios

5.12.6 Surface Water Quality

The surface water quality parameters applied to the model are shown in Tables 19 and 20:

Table 19: Model surface water quality parameters

Parameter	Natural	Impacted	[1]Rehab Impact	Pit	Ponds	TSF
Ammonia	0.011	0.012	0.012	0.8	0.011	0.012
Arsenic	0.0018	0.04	0.02	0.2	0.0018	0.04
Copper	0.001	0.0012	0.001	0.02	0.001	0.0012
Hardness	65	1200	630	880	65	1200
Iron	0.05	0.032	0.14	0.9	0.24	0.032
Lead	0.00015	0.0002	0.00019	0.001	0.00015	0.00022
Nitrate	0.05	0.094	0.4	2.0	10.5	0.1
Sulphate	24	930	470	1400	1500	930
Zinc	0.001	0.001	0.001	0.0056	0.001	0.001

For the WRS's an "initial" and "final" value is applied to recognise that contaminant concentrations will change over time.

Table 20: Projected surface water quality for Deepdell East III WRS (g/m3)

Parameter	Initial Deepdell WRS	Final Deepdell WRS	Rehab Deepdell WRS
Ammonia	0.5	0.02	0.01
Arsenic	0.01	0.01	0.01
Copper	0.0018	0.0013	0.0011
Hardness	200	1030	220
Iron	0.08	0.1	0.08
Lead	0.00015	0.0003	0.00015
Nitrate	1.0	0.4	0.4
Sulphate	470	150	150
Zinc	0.001	0.001	0.0012

5.12.7 Waste Rock Stack – Seepage

Understanding how sulphate concentrations in WRS seepage change over time is key to predicting receiving water quality in the future. In low flow conditions, groundwater and

seepage make up receiving water flows; seepage is thus a key contributor to the overall water quality. OceanaGold commissioned a report (Babbage 2019) which examines the suitability of existing WRS as proxies for predicting waste rock stack seepage. This report is appended to GHD (2019) which is attached as **Appendix E**.

Historically WRS seepage water quality is expected to increase for some contaminants such as sulphate and nitrate, while others such as lead, iron and ammonia typically stabilise at reduced concentrations. However, results from Coronation North suggest that control strategies have reduced the rate at which sulphate is being generated.

The predicted concentrations of contaminants in seepage from the Deepdell East WRS is presented in the following table:

Table 21: Projected seepage water quality for Deepdell East III WRS (g/m^3)

Parameter	Initial Deepdell WRS	Final Deepdell WRS
Ammonia	0.5	0.02
Arsenic	0.01	0.01
Copper	0.0018	0.0013
Hardness	200	1030
Iron	0.23	0.1
Lead	0.001	0.0003
Nitrate	10.5	14
Sulphate	104	1500
Zinc	0.001	0.001

5.12.8 Water Balance Modelling – Summary of Key Impacts

In the 40-year period run through the model, it predicts that the following will occur with regard to downstream water quality and current consent condition requirements:

- At monitoring site DC08 sulphate values are predicted to increase from a median of 100 to 200 g/m^3 (seasonal variation). This is illustrated in Figure 34 below. This prediction aligns with a gradual increase in predicted sulphate concentrations in WRS seepage. While above current level values are predicted to remain consistently below the compliance limit. Arsenic and iron concentrations are predicted to sit well below compliance limits.
- At Loop Road the median results stay within compliance limits over the 40-year time period run in the model. There is potential to exceed the 95th percentile guidance

values for both arsenic and sulphate in the long term. This potential is identified from 2045 onwards and is of a low probability of occurrence. This is illustrated in Figure 35 below.

- Median nitrate levels at both DC08 and Loop Road sites are predicted to be well below the NPS Freshwater Attribute B range over the 40-year period.
- There may be some elevation in contaminant levels in Highlay Creek overtime, however not to the extent that these would be beyond compliance values applicable at DC08.

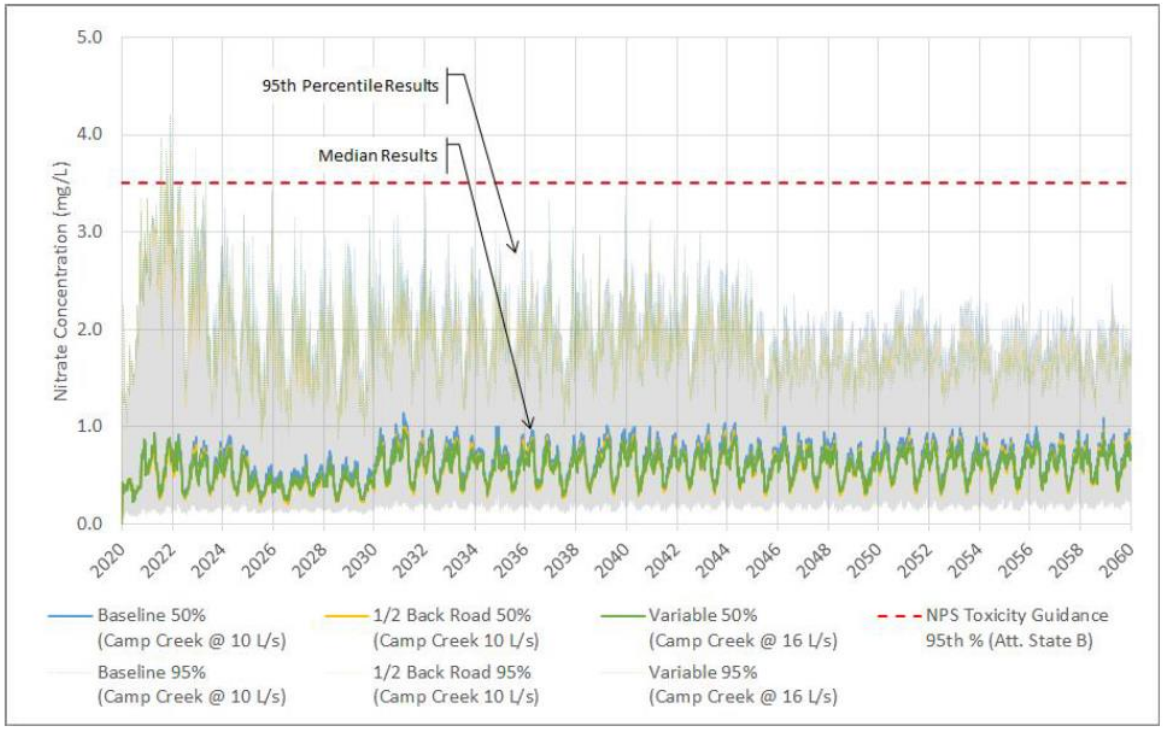

Figure 34: Predicted Nitrate N Concentrations over time at DC08

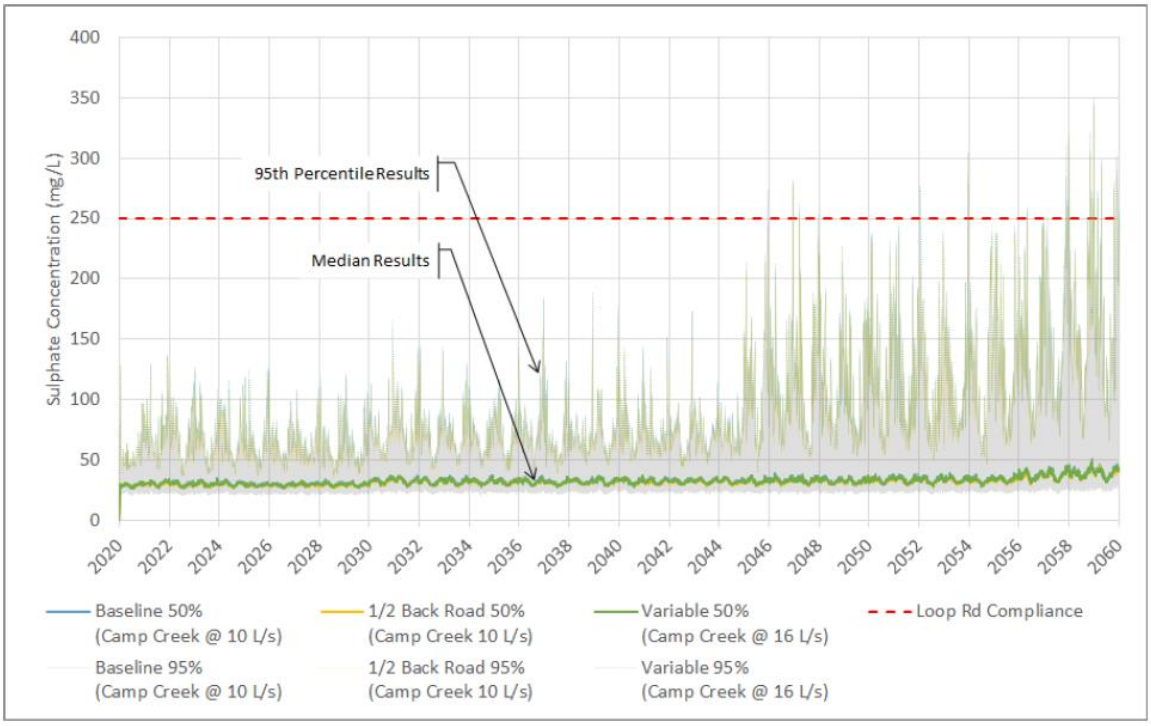

Figure 35: Predicted Sulphate concentrations over time at the Shag (Waihemo) River Loop Road

5.12.9 Water Quality Monitoring and Mitigation

OceanaGold has a well-established water quality monitoring regime for the Macraes mine site. The current level of monitoring is considered appropriate to continue with given the nature and scale of the operations. In addition, OceanaGold propose to continue sample collection of groundwater seepage from the toe of the Deepdell Waste Rock Stack, and over time will add a sample point at the toe of the Deepdell East Waste Rock Stack. This data will serve to confirm and validate the sulphate predictive equations that have been developed. Sample collection from current and future silt ponds (Highlay Silt ponds, Deepdell South and North silt ponds) will also provide reference water quality data to check results of the analysis and water quality modelling predictions over time.

Based on the model outputs, the current approach that OceanaGold is applying to water management is considered appropriate. This includes the following key features:

- Ongoing monitoring to confirm water balance modelling projections and to identify and track changes in downstream water quality.
- Ongoing refinement of waste rock stack construction to improve seepage water quality.

- Trialling of passive water treatment systems so that suitable methods for the site have been tested and can be implemented for the post closure period if deemed necessary.
- Construction of a freshwater dam on Camp Creek (already consented) to provide a base flow to Deepdell Creek to manage and effectively mitigate sulphate concentrations in Deepdell Creek and in the Shag (Waihemo) River as far as the confluence with McCormicks Creek.

Additional mitigation could include the introduction of localised treatment systems or delaying the diversion of flows from rehabilitated waste rock stacks. These are not considered necessary at this time and it is proposed that OceanaGold will monitor the surface water quality downstream and continue to adopt an adaptive management approach. Ongoing monitoring, further investigation and analysis will also be necessary to determine the various sources of nitrogen compounds in the receiving waterbodies, specifically so that the mining activity contribution can be separated out.

5.12.10 The Pit Lake

The pit lake in the completed Deepdell North Stage III pit will start to establish from the ingress of rainfall run-off and groundwater once mining and associated dewatering ceases. The establishment and operation of the pit lake has the potential to impact on surface water through groundwater flows from the lake being able to flow into ground water and into Deepdell Creek. The effects of the lake water quality on the wider receiving environment are assessed in GHD (2019) and are incorporated into model inputs, principally through ground water inflows, the report establishes that the pit lake will not overflow until approximately the year 2120, and also that the large time lag between completion of mining and the pit beginning to overflow allows ample time to sample the water in the pit lake and to establish appropriate treatment methodologies, if required.

5.12.11 Groundwater

The effects of the Project on Groundwater quality and quantity was examined in GHD (2020) attached as **Appendix T**. The GHD (2020) assessment is supplementary to the wider water effects model-based assessment contained in GHD (2019) and relies on the modelling carried out to produce GHD (2019), which included groundwater modelling components. GHD (2020) also utilises a conservative conceptual model and analytical equations to calculate likely effects of the proposed Deepdell North Stage III Pit dewatering and any other effects on ground water quality and quantity as a result of the proposal.

5.12.11.1 Effects of pit dewatering on groundwater levels and flows into surface water

Pit dewatering needs to occur during mining to prevent groundwater and surface water from collecting in the bottom of the pit and will include pumping water from the lowest point of the pit out to the erosion and sediment ponds. The GHD (2020) assessment finds that the effects of proposed pit dewatering on groundwater flows and surrounding hydrological networks (surface water bodies) such as Deepdell Creek are expected to be less than minor. This is concluded due to Deepdell Creek being outside of the estimated zone of groundwater drawdown impacts which are modelled to extend 580m from the centre of the proposed pit. Additionally, groundwater flow is found to form a very small component of flows in Deepdell Creek and these flows are dominated by surface water inputs, Finally, Deepdell Creek is at a lower elevation than the base of the proposed pit so dewatering would not reduce groundwater at that level and ground water flows to Deepdell Creek would be unaffected by the proposal.

The pit dewatering is also not anticipated to affect the smaller surface water bodies on the north side of Deepdell Creek. This is because it has been found that ground water levels are below the bed level of those surface water bodies and they are perched flows above and separate groundwater where they pass through the proposed area of drawdown.

5.12.11.2 Effects on ground water levels

As noted above groundwater drawdown could occur as a result of the pit dewatering that is proposed. However due to the behaviour of the rock as a limited conduit for ground water movement, any groundwater drawdown effects are likely to occur only within a constrained area limited to OceanaGold-owned land and as such does not affect ground water takes of any other user. The drawdown will likely be delayed after dewatering starts by approximately 1 – 1.5 years, a similar timeframe to earlier projects in the area. Post mining the drawdown will reverse, and groundwater will return to pre-dewatering levels within a few years.

5.12.11.3 Effects on ground water quality

The proposal has the potential to impact groundwater quality through:

- Infiltration of waste rock stack seepage into groundwater;
- Inflow of pit lake water into groundwater on the downhill side of the pit.

Waste rock stack seepage will enter the artificial surface drainage network primarily where it will enter and be treated within silt ponds before discharge to the wider surface water environment (Highlay and Deepdell Creeks).

The amount entering groundwater from the base of the waste rock stacks will only be a small proportion intercepted by rock fractures at the ground surface and as such, direct assessment of those effects directly on groundwater is not considered necessary. The

contribution of potential contaminants from the waste rock stacks have already been taken into account in the surface water modelling, given that surface water is the receiving environment for these discharges.

GHD (2020) finds that the impact of lake water inflow on groundwater quality is expected to be less than minor due to the lake water quality improving prior to it beginning to discharge to groundwater. The lake will receive groundwater for many years at a decreasing rate until it reaches equilibrium with surrounding groundwater and by that time, it is expected that water quality in the lake will not have any more than minor effects on surrounding ground water as water quality will have improved. When equilibrium is reached, there will be less forces causing flow of water between ground water and the lake and generally, pit lake water will migrate through ground water down the hill towards Deepdell Creek while inflow of groundwater to the lake continues on the uphill side of the pit. The effects on ground water quality will be less than minor due to pit lake water quality being adequately improved by the time the pit lake becomes a source of water to groundwater and also the relatively confined area of groundwater being subjected to flows originating from the lake.

The groundwater quality and quantity effects described above can be monitored effectively through continuing monthly monitoring of established groundwater bores DDB01-06. Any effects that become apparent during mining or after rehabilitation will be managed appropriately through the water quality management plan required by the consent conditions in **Appendix S**.

5.13 AQUATIC ECOLOGY

A detailed assessment documenting the effects of the proposal on aquatic ecology (Ryder 2019) is included at **Appendix O**. The values of the existing environment are outlined in Section 2.14 of this application.

5.13.1 Stream Habitat – Within the Project Footprint

The proposal will result in the loss of some shallow ephemeral drainage systems and small seepage habitat in the Highlay Creek catchment (approximately 350m) with loss of a small reach (approximately 130m) of likely intermittent creek bed at the downstream end of the Highlay Creek tributaries referred to above. The lengths affected are illustrated in the map in Figure 36. Inspections of some of these areas in September 2018 found them to be heavily modified and subject to considerable pugging from stock. It is unlikely that they carry surface flow during drier months of the year. Because they are small, very shallow surface water systems at best, and are ephemeral in nature, they do not support fish or typical stream invertebrate habitat and associated communities. Further, given that they lie within farmed land, and historically stock have had direct access to this habitat, they are also likely to be a source of nutrients, sediment and faecal pathogens to watercourses

located further downstream. Consequently, other than some very minor flow contribution, it is considered that these drainage networks provide little to support downstream stream communities of the Highlay Creek tributaries or Highlay Creek itself.

The existing watercourse adjacent to the haul road that drains into the Camp Creek catchment appears devoid of fish, and it is possible the watercourse flows intermittently, which would limit habitat potential even further. Although no fish or crayfish were captured in September, it is possible that crayfish may still be present in the system, given the habitat observed in September 2019. Crayfish were found in the general vicinity as part of Fish and Game surveys around 1987-1996. The Project development would remove an approximately 480m length of highly modified, intermittent Camp Creek tributary, which may also provide some crayfish habitat if surface water persists throughout the year. The length of watercourse affected is illustrated in Figure 36. A replacement drain would need to be constructed to divert clean water away from the site and under the haul road, and this could be constructed in a way that provides habitat for crayfish.

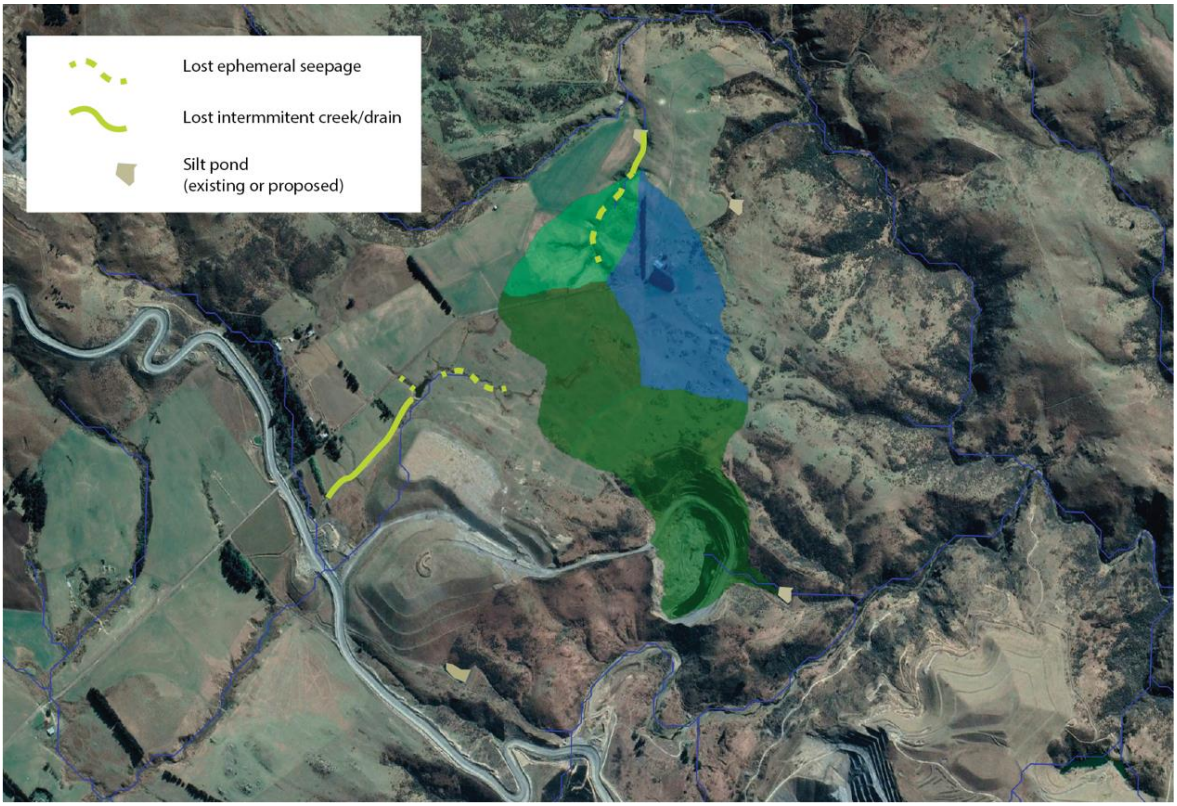

Figure 36: Location of water courses being directly affected by the proposal.

5.13.2 Stream Habitat – Outside the Project Footprint

Further downstream, where seepages join a small tributary of Highlay Creek, surface water in September 2019 was more obvious, although the presence of grass within the channel suggests it may flow intermittently.

Populations of Taieri flathead galaxiids are present throughout Highlay Creek catchment, but not in gullies that would be inundated by the proposed Deepdell East Waste Rock Stack. Galaxiid populations are present in the Highlay Creek tributary into which these gullies drain into, and in Highlay Creek itself.

Streams in Highlay Creek catchment that support fish and crayfish populations cannot be regarded as pristine. They are subject to physical disturbance through stock trampling and support nuisance algae growths. However, they obviously have characteristics that are favourable to these species. One of the likely key features responsible for robust crayfish and galaxiid populations in Highlay Creek catchment is the lack of predatory species, in particular brown trout.

Deepdell Creek is also a stronghold for flathead galaxiids, and a large population exists in the reach downstream of gullies draining the Deepdell South Pit and the Highlay Creek confluence.

5.13.3 Summary of Stream Habitat Effects

The proposal will result in the loss of approximately 150m of intermittent stream from the Highlay Creek Catchment as a result of the silt pond construction and the creation of a new road crossing. A further approximately 350m of ephemeral seepage will be lost from this catchment under the footprint of the WRS.

The pit excavation will result in the loss of approximately 200m of ephemeral seepage in the Camp Creek catchment and an approximately 480m length of a highly modified, intermittent Camp Creek tributary which will be diverted out of the Camp Creek catchment and used to convey WRS runoff from the existing pond to the existing Deepdell North Silt pond for treatment.

These effects are assessed to be minor due to the remedy and mitigation measures proposed which includes creating more freshwater crayfish habitat in the Camp Creek catchment in the new clean water diversion channel. Further, the loss of the ephemeral habitats will reduce nutrient inputs to the remainder of the catchment and the ephemeral seepage habitats do not contain any suitable habitat for aquatic fauna and have degraded, low values.

5.13.4 Sediment Mobilisation

Mining disturbs the land, removes vegetation and soil cover, and so increases the risk of fine sediment discharges to watercourses further down the catchment. Fine sediment is already present in tributaries of Highlay Creek, and also present in the mainstem of Highlay Creek and in slow runs and pools in Deepdell Creek. Excessive fine sediment cover is usually detrimental to stream communities, particularly if flow variability is insufficient to regularly flush excess material away. Specific erosion and sediment controls that are currently being adopted throughout the mine site will need to be similarly implemented to manage any potential adverse sedimentation effects.

There will be no more than minor physical disturbance to Deepdell Creek or Highlay Creek tributaries as a result of the project, except in order to install the road culvert and embankment across the intermittent and pugged section of the unnamed Highlay Creek below the proposed silt pond, and to adjust the drainage of water from the project in the bed of an intermittent and modified tributary of the Camp Creek catchment. Provided that the Project does not exacerbate low flows, sediment load and water quality, downstream crayfish and fish populations should be unaffected by these components of the Project. This is due to the very low flows in these water courses where the works will be carried out and the ability to avoid times when these reaches are flowing to carry out the works. Alternatively, there is the ability to install appropriate temporary bunds to isolate the works from any flow. As such, effects of sediment mobilisation will be no more than minor.

5.13.5 Water quality effects on aquatic ecology

Sulphate and Nitrate have been identified as two water quality parameters that have increased in downstream receiving environments which could be partially attributed to mining activities in the area.

5.13.6 Sulphate

As noted above, it has been reported that sulphate concentrations can exceed receiving water resource consent limits seasonally at the Macraes Gold Operation, with a risk of increasing over time due to the delayed release associated with geochemical reactions of waste rock material. In recent years, OceanaGold has initiated changes in its waste rock stack construction and management in order to better control sulphate in seepage. Sulphate leaches from waste rock stacks over time and recent consenting processes associated with the Macraes Gold Operation have considered the effects of sulphate on local surface water quality and ecology.

Monitoring has confirmed that elevated levels of sulphate have not resulted in changes to the typical fish population or size classes found in Deepdell Creek in late summer, with the

median population estimate in recent years slightly higher than that prior to sulphate levels increasing at DC07. There is also no evidence of any adverse toxicity effects on Taieri flathead galaxias as a result of elevated sulphate levels.

5.13.7 Nitrate

Nitrate nitrogen is a nutrient that is necessary for algae and macrophyte (plant) growth. In excessive concentrations in freshwater, it can result in nuisance growths of these plant forms, particularly if sufficient phosphorus is also available for growth (along with other factors such as sufficient temperature and water clarity for light penetration). At even higher concentrations, nitrate can be toxic to aquatic life to various degrees. As discussed in section 5.13, modelling has been undertaken to predict the potential changes in receiving water nitrate concentrations based on the project proceeding.

The 2014 National Policy Statement for Freshwater (updated 2017) contains attribute bands for nitrate toxicity. The three aquatic species identified in the catchment are freshwater crayfish (koura), longfin eel and the flathead galaxias, of which the latter species has a relatively narrow geographical distribution. It is noted however that the longfin eel is widely distributed throughout New Zealand and are very uncommon in the Deepdell Creek catchment. This catchment does not appear to be favourable to them and any protection afforded to them is likely to be met by that provided for other species, as described below.

The Taieri flathead galaxiids have not been tested specifically for sensitivity to nitrate. However, the waste rock stack seepage described above that focused on sulphate toxicity most likely contained elevated levels of nitrate also, given the seepage leachate was sourced from areas known to contain high nitrate.

A sulphate limit of 1,000 mg/L, which testing showed to have no effect on flathead galaxias eggs and larvae, is equivalent to a nitrate-N concentration of approximately 7-8 mg/L N. This range is below the NPS-FW National Bottom Line concentration.

Hickey (2013) described toxicity testing for another galaxias species (the inanga or *Galaxias maculatus*) and the ubiquitous, yet relatively sensitive *Deleatidium* mayfly, which is relatively common in Deepdell Creek and Highlay Creek. The chronic mayfly test was for a 20-day exposure and measured survival of the larvae. A no observed effect concentration (NOEC[49]) sensitivity value for *Deleatidium* was 20.3 mg/L NO_3-N in low hardness (soft) water (40 mg/L $CaCO_3$). A geometric mean value of 11.2 mg/L NO_3-N was

[49] The NOEC is the highest measured continuous concentration of an effluent or a toxicant that causes no observed effect on a test organism. NOEC is determined by a statistical test comparison with control concentrations.

calculated for inanga from the low and medium hardness water NOEC values and used by Hickey for guideline derivation.

Only one reference to nitrate toxicity testing using koura has been identified. That work was reported on by Hickey (2018). He found that the third most sensitive New Zealand native species to nitrate were juvenile koura, which were measured over a 60-day test on one occasion. The most sensitive thresholds[50] were growth at 2.2 and 2.3 mg/L NO_3-N for length and weight respectively, with a survival threshold of 17.4 mg/L NO_3-N (i.e., approximately 8x above the growth threshold).

Hickey (2018) found the most sensitive invertebrate species was the New Zealand snail (*Potamopyrgus antipodarum*), which is abundant in Deepdell Creek. Long-term (31-40 day) chronic tests were used and a range of endpoints measured. The most sensitive endpoint was for morbidity (averaged 1.9 mg/L NO_3-N), followed by growth (2.3 mg/L NO_3-N), and a reproduction endpoint of 8.6 mg/L NO_3-N. The survival threshold averaged 15.5 mg/L NO_3-N (i.e., approximately 8x the safety factor for the survival threshold above the morbidity threshold). The long-term 50% survival value averaged 56 mg/L NO_3-N (range 16.8 to 194 mg/L NO_3-N) (Hickey 2018).

Hickey (2018) also noted that a number of studies had identified water hardness as a factor affecting both acute and chronic nitrate toxicity in some species. For example, chronic toxicity studies with *Potamopyrgus antipodarum* showed a decrease in sensitivity as hardness increased for both survival and morbidity endpoints (Hickey 2016). Hardness is high in Macraes waste rock stack seepage (Table 21).

Given all of the above, for toxicity purposes, applying the NPS-FW band B would appear to provide ample protection for the aquatic community in the Deepdell Creek catchment.

The narrative description for the NPS-FW B Band is "*95% species protection level: Starts impacting occasionally on the 5% most sensitive species*". Hickey (2013) described this level of nitrate management as "*very good*" and for *"Environments which are subject to a range of disturbances from human activities, but with minor effects*".

It is noted that Deepdell Creek would not meet the Schedule 15 target concentrations for nitrate-nitrite nitrogen that are contained within the Otago Regional Plan: Water. The targets and limits specified in this schedule are to protect against nuisance plant growth as opposed to protection against toxicity. Ryder (2019) reports that a concentration target of under 0.075mg/L seems overly ambitious for this catchment given that current concentrations are almost an order of magnitude higher. Given a highly significant

[50] Measuring EC10 and LC10 values (the effect concentration or lethal concentration for a 10% effect).

reduction in typical nitrate concentrations in the creek are unlikely, it is recommended that focus on managing phosphorus losses to water be given greater attention in the catchment. Both nitrate and dissolved phosphorus are necessary to stimulate algae and plant growth. The pathway for phosphorus to reach surface waters is primarily via overland flow (and direct through stock access to water), whereas nitrate can reach surface waters via subsurface seepage and groundwater.

Ryder (2019) observes that this is not to say that management of waste rock stacks at Macraes will be not required to avoid adverse effects on freshwater ecology, but rather dual nutrient management be considered.

5.13.8 Other Potential Effects – On-Site Management

The presence of construction machinery in and around waterways always presents a risk of contaminants (e.g., diesel, lubricants) entering watercourses with the potential to harm aquatic life. These issues can be addressed by way of an appropriate on-site contaminant management plan. In line with on-site procedures, any contaminants stored on site should be kept away from watercourses and bunded. Refuelling of machinery should also take place away from watercourses. Such measures are routinely employed by OceanaGold at the Macraes mine and should be replicated for the Deepdell North Stage III Project.

Machinery and personnel involved in construction can also potentially transfer nuisance weeds/algae (e.g., *Didymosphenia geminata* - didymo) to local watercourses. Didymo has been recorded in the Shag River catchment but has not been recorded in the Taieri River catchment, and we have not found it during our more recent surveys. While didymo has not been recorded in the Taieri River catchment, and many watercourses within the mining area may not be suitable for didymo establishment, if didymo was to enter these streams it may be able to travel downstream to establish at more suitable locations in the lower Taieri River. The Macraes Gold Operations straddle the catchment boundary between the Shag (Waihemo) River and the Taieri River and operations interact with tributaries in both catchments. To address this, OceanaGold strictly complies with notices and guidelines issued by Biosecurity New Zealand regarding didymo management and preventing its spread and will continue this practice.

5.14 AIR QUALITY

An assessment of the potential effects of the Deepdell North Stage III Project on air quality in the surrounding environment is provided by Beca (2019), a copy of which is included as **Appendix L** to this AEE.

An overview of the Beca (2019) assessment is provided in the sections below, followed by an assessment of these effects in the context of the existing environment.

5.14.1 Emission Sources

Beca (2019) identify the following activities that are proposed at the Deepdell North Stage III project (and currently take place at the existing Macraes Gold Operation mine site), with a potential to generate discharges to air:

- Earthworks, including stripping of overburden and topsoil, mining, construction of roads and dam structures and the formation of the WRS and stockpiles;
- Blasting;
- Vehicle movements on unpaved surfaces;
- Loading and unloading of materials; and
- Wind-generated dust from dry, exposed, unpaved surfaces such as roads and stockpiles.

5.14.2 Summary of Current and Past Effects

Beca (2019) concludes that the results of ambient air quality monitoring and the complaints history for the site demonstrate that any increase above background concentrations of deposited dust, TSP, PM_{10} and silica at sites in the vicinity of the mining operation are small and well below the relevant National Environmental Standards for Air Quality (NESAQ) standards, regional air quality standards and guidelines and within the current resource consent limits.

The existing monitoring data also shows there is minimal risk of discharges to air from blasting resulting in ambient concentrations of contaminants that exceed the NESAQ and Ambient Air Quality Guidelines at locations where members of the public may be exposed.

Overall, Beca (2019) considers that past and current adverse effects resulting from the discharges to air from the Macraes Gold Operation are no more than minor.

5.14.3 Effects of the Deepdell North Stage III Project

The nature of the activities that will take place during the Deepdell North Stage III Project will be of the same type as the activities currently taking place at Coronation, Coronation North and elsewhere within the Macraes Gold Operation. In turn Beca (2019) consider the nature of the effects will also be similar or of a smaller scale and duration than existing activities, noting that:

- The results of site monitoring and audits, as well as the lack of recent complaints, demonstrate that measured dust levels resulting from existing mining activities are within the limits set by the current resource consents and the existing effects of the mine are no more than minor.

- OceanaGold intends to continue to use the dust mitigation techniques that have been used successfully to date at the Macraes Gold Operation.

Given the scale of the proposed additional mining activities associated with the Deepdell North Stage III project, relative to the scale of existing activities, any increase in the nature and scale of effects of dust emissions from the extension of the current activities is expected to be minimal. The proposal will not have any cumulative effects of any concern given the site dust management procedures. Further, the approximately 1km distance between the proposal area and the Coronation project would prevent any theoretical combined plume from forming to any substantial degree.

In turn, OceanaGold has proposed conditions consistent with those included on its existing resource consents for the Macraes Gold Operation and which have been proven successful in managing the effects of mining activities in this area. Of note they include:

- A requirement for all activities to be undertaken in accordance with a robust Dust Management Plan (**DMP**)[51]; and
- Conditions specifying limits on dust deposition and total suspended particulates, a requirement to monitor at key locations around the mining activities, and a requirement to review and take appropriate actions in response to any recorded exceedance of the specified limits.

The air discharge effects of the activity are expected to be no more than minor, provided that care continues to be taken and the outlined management measures in the Dust Management Plan are applied.

5.15 MANA WHENUA CULTURAL VALUES

As outlined in the Kai Tahu Natural Resource Management Plan 2005 (KTNRMP), The following Kai Tahu Values are known to be relevant and important with the relevant mana whenua in regard to a proposal of this type:

- *Preventing deterioration of water quality;*
- *Promotion of Accidental Discovery protocols and other measures to ensure protection of waahi tapu;*
- *Protection of cultural landscapes.*

[51] The site wide Dust Management Plan (DMP) is required to be updated to include this proposal through the proposed consent conditions attached as **Appendix S**.

Through consultation and engagement with Aukaha, OceanaGold is seeking to have mana whenua values of the site specifically identified (on behalf of Te Rūnanga o Moeraki, Kāti Huirapa Rūnaka ki Puketeraki and Te Rūnaka o Ōtākou (Ngā Rūnaka)). This engagement process is ongoing, and it is expected that identification of any specific cultural values will occur in the near future. Any values that need particular redress or response will be worked through with Aukaha in the first instance.

5.16 EFFECTS ON FARMING PASTURE

The immediate and wider area is dominated by farming land use where it is not being actively mined. The rehabilitation carried out at the site is conducted to a standard that is able to support the resumption of pastoral farming (grazing) and the methodology and outcomes of this rehabilitation are described in detail within the 2018 Macraes rehabilitation assessment report attached at **Appendix N** (Landcare research 2019). It is assessed that the existing rehabilitation techniques and ongoing refinements through research and monitoring are adequate to ensure that the effects on farming are no more than minor.

5.17 CONCLUSION

The Deepdell North Stage III Project will extend the life of mining at the Macraes Gold Operation by approximately 1 year. This represents significant additional economic activity that would otherwise not occur. There are both national and local economic benefits, the most obvious of which are in the continuation of economic activity and employment and the enabled ability of a significant number of people and their families to remain living and working in East Otago and the Waitaki District. Increases in exports, ongoing investment in the economy, and providing a strong core for a regional economy, are also benefits.

With respect to the actual and potential environmental effects of the Deepdell North Stage III Project, it is recognised that it will not be possible to ensure that all actual and potential adverse environmental effects associated with Deepdell North Stage III Project are avoided, remedied or mitigated such that there are no adverse effects remaining. In the specific case of terrestrial and freshwater effects, a biodiversity offset package is proposed to address any remaining residual negative impacts to achieve a no-net-loss or a positive outcome within the Macraes Ecological District for the values being affected. In addition, OceanaGold is taking an adaptive approach to water quality to control the source of effects to water quality and investigate options – such as irrigation – which offers the potential for benefits to the farming community

OceanaGold is proposing that the Deepdell North Stage III Project be undertaken in accordance with a range of consent conditions which will limit the potential for adverse

effects on the environment and which, in many instances, align with the permitted activity standards for mining in the Waitaki District Plan, or the existing resource consents held by the company. Management plans will also be utilised to ensure that OceanaGold undertakes practicable measures to minimise any potential disturbance caused by the Deepdell North Stage III Project (e.g. from dust and blasting). These various management measures proposed by OceanaGold are discussed in Chapter 6 of this AEE and are detailed in the proposed consent conditions contained in **Appendix S** to this AEE.

6. MANAGEMENT AND MONITORING OF ACTUAL AND POTENTIAL ENVIRONMENTAL EFFECTS

Section 5 of this AEE provides an assessment of the actual and potential effects of the Deepdell North Stage III Project, which is based on the various technical assessments commissioned by OceanaGold.

This assessment includes consideration of the positive effects associated with the project, which will include extending the life of mining by another year and economic gains for the region which will average approximately $84M. This represents significant additional economic activity that would otherwise not occur.

With respect to potential adverse effects on the environment, it is considered that proposal can be undertaken in a manner that will appropriately avoid, remedy, mitigate or offset adverse effects in a manner that will ensure that the sustainable management purpose of the Act is achieved.

That said, it is recognised that it will not be possible to ensure that all potential effects associated with the proposal are avoided, remedied or mitigated such that there are no residual adverse effects.

In this regard, there will be some visual, noise and vibration effects associated with the project at various stages of its development. However, OceanaGold is proposing that the project be undertaken using the same approaches that have been previously used at Macraes for mining activities, and in accordance with a range of consent conditions which will limit the potential for adverse effects on the environment and which, in many instances, align with the permitted activity standards for mining in the Waitaki District Plan or the existing resource consents held by the company. A number of management plans will also be utilised to ensure that OceanaGold undertakes practicable measures to minimise any potential disturbance or risk of adverse effects from the project.

OceanaGold have also undertaken consultation with immediately affected neighbours and landowners. As outlined in Chapter 8 of this application, the most directly affected party (C and E Howard) have been requested to provide affected party approval for the Project and to agree to a particular condition which controls the effect (noise) which affects them. Approval, which is thought to be likely, will be provided to Waitaki District Council when received.

The assessments identify that terrestrial ecology and waterbodies in the area have already been extensively modified by past and existing farming and mining activities. There will be some loss of aquatic habitat, wetlands and terrestrial vegetation with the Project footprint.

Individually some of these features trigger significance criteria under the relevant statutory plans and considerations. It is noted however that none of these features are specifically listed or scheduled sites and there are limited provisions in both regional and district plans that would ensure their protection from other permitted activities[52] that could occur as of right on the site. It is also evident that terrestrial vegetation, ephemeral drainage systems and wetlands currently in the area are vulnerable to damage from grazing and pugging from farm animals. Notwithstanding this existing or permitted environment, OceanaGold is proposing a series of measures to manage adverse effects on terrestrial and aquatic ecology values within the site. These are subject to a cascading management approach, firstly seeking to avoid, then remedy, mitigate and finally offset or compensate for any residual adverse effects. This is discussed in further detail in section 6.2 below.

With regard to mitigation of all adverse effects, the proposed consent conditions (refer **Appendix S**) are largely based on the existing measures used for the existing and consented underground and open pit mining activities undertaken by OceanaGold at Macraes. These measures have been very effective in managing the actual and potential effects of the existing mining activities.

Key management measures include:

- Limits on the hours of works (for certain activities);
- Limits on the generation of noise and vibration;
- The proposal to extend an existing noise bund;
- The preparation of a number of environmental management plans[53] which will further detail how potential effects associated with key activities will be managed and monitored. These environmental management plans allow mitigation and monitoring measures to be refined and updated over time as best practice evolves, and as additional information on the receiving environment and the effectiveness of the mitigation measures is gathered via monitoring;
- Mitigation and offsetting to manage effects on terrestrial and aquatic ecology features and water quality;

The key management measures proposed by OceanaGold are summarised further in Table 22 below.

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[52] For example, farming operations could clear some areas of indigenous vegetation for farming purposes as of right within the Macraes Mining zone, and also in some instances within the Rural Scenic Zone. Rules relating to the protection of wetlands are only applicable to scheduled wetlands in the Otago Regional Water Plan.

[53] For example, for noise, vibration, dust management.

Table 22: Summary of Key Management and Monitoring Measures for Deepdell North Stage III

Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action
Landscape and Visual Amenity		
Potential landscape and visual amenity effects	Progressive rehabilitation of the WRS	Monitor rehabilitation success and adapt method if necessary.
Potential landscape and visual amenity effects	Removal and restoration of the haul roads during closure phase of the Project.	Rehabilitation of haul roads
Potential landscape and visual amenity effects	Restoration of the areas disturbed around the margins of the Project;	Progressive rehabilitation of the project.
Potential nuisance effects of glare.	All flood lighting that could potentially cause a glare nuisance or a traffic hazard shall, as far as is practicable, be orientated so that the principal output is directed away from residences and traffic.	Conditions regarding lighting
Vibration and Noise		
Potential for increased noise at immediately adjacent properties.	Monitoring requirements will be set out in a Noise, Air blast and Vibration Management Plan.	Conditions regarding noise, vibration limits. Management Plan including monitoring. Extension of existing noise bunds

Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action
Effects of vibration on amenity values and vibration.	Blasting will be restricted to within the following hours: Monday-Friday 9.00am to 5.30pm, Saturday, Sunday and public holidays 10.00am to 4.30pm. Email notification to closest residents on morning of days with blasting. It will be also be managed to achieve specified vibration and air blast over pressure limits which are protective of amenity and property at the notional boundary of neighbouring residences.	Monitoring requirements and actions will be set out in a Noise, Air blast and Vibration Monitoring Plan. Conditions regarding noise and vibration hours and limits.
Potential for blasting, drilling, hauling and other noise to disturb nearby residences.	Implementation of Noise, Air blast and Vibration Management Plan Limiting times when blasting can occur on site and limiting times when hauling can occur	
Traffic		
Potential for limits to access at the Golden Point Historic Reserve	A traffic management plan will continue to allow private vehicle to access the site from north and south, Pedestrians will have safe access to the reserve from Horse Flat Road through pedestrian access protocols at a pedestrian crossing point to be established.	Conditions regarding access and reinstatement of public access on haul road post closure.
Potential for unsafe interactions between heavy mine traffic and vehicles using Horse Flat Road.	The manned vehicle crossing point on the haul road will continue to operate.	Monitoring and management of traffic will be set out in a Traffic Management Plan.

Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action
Surface Water		
Potential for water quality in the receiving watercourses and further downstream (Shag River) to be adversely affected by discharges of contaminants from the proposal.	Ongoing monitoring of water quality in the receiving environment to confirm projections for water quality Ongoing monitoring and management of on-site measures to prevent erosion and generation of leachates and to appropriately contain and /or treat contaminants prior to discharge Ongoing refinement of waste rock stack construction to improve seepage water quality Trialling of passive water treatment systems so that these can be implemented if deemed necessary due to water quality post closure. Trial study with the University of Otago examining the feasibility of using mine water for irrigation as a method of treatment. Construction of Camp Creek Dam (as part of other consented projects) in order to provide baseflow to Deepdell Creek during low flows	Conditions requiring water quality monitoring of the silt ponds, ground water and surface water. Conditions requiring a water quality management plan to address required actions in the event of water quality non-compliance.
Groundwater		
Potential for groundwater levels and quality to be adversely affected by dewatering of the pit and discharges of	Ongoing monitoring of groundwater quality and levels in the surrounding area to confirm projections for water quality and groundwater drawdown.	Conditions requiring monthly monitoring of groundwater levels and quality in groundwater monitoring bores DDB01 – 06.

Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action
contaminants from the proposal.		Conditions requiring a water quality management plan to address required actions in the event of water quality non-compliance.
Aquatic ecology		
Potential for aquatic weed introduction	Protect against weed/algae introduction (into waterways) Conduct checks and cleaning on new vehicles coming into the site and vehicles moving between Taieri and Shag catchments on site	Continue checks on site and include conditions requiring this. Continue aquatic surveys to monitor aquatic pests.
Adverse effects on freshwater crayfish through loss of intermittent length of Camp Creek tributary	Re-create habitat for freshwater crayfish in new, permanent clearwater drainage channel with overhanging vegetation, pooling water and some flow and variable bed materials such as logs or boulders if practical.	Condition requiring creation of suitable habitat in length of new drainage channel.
Air Quality		
Potential for unmitigated dust discharges to adversely affect the amenity of surrounding neighbours.	Update Dust Management Plan. Limits which trigger investigation and management actions in response to monitoring results. Dust management using on-site water sources.	In accordance with current practice, a comprehensive ambient air quality monitoring programme will continue for deposited particulate matter, total matter and PM_{10}, and particle size distribution.

Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action
Terrestrial Ecology		
Loss of indigenous shrubs within the project footprint, some of which have threatened status.	Rescue and relocation of the following vegetation within the WRS footprint: • The Locally Uncommon shrub *Melicope simplex* from the eleven individuals in the WRS to twenty individuals at one site in the nearby OceanaGold Highlay Creek Shrubland Covenant to create a new population there. • The Naturally Uncommon shrub *Myrsine divaricata* from the two individuals in the WRS to 10 individuals at one site in the nearby OceanaGold Highlay Creek Shrubland Covenant to create a new population adjacent to an existing population. The loss of shrubland, wetlands and low producing grassland is to be offset to no net loss using improved condition offset covenants.	Rescue and relocation of this vegetation prior to its loss from the WRS. Monitoring and maintenance of relocated vegetation. Monitoring and maintenance of vegetation in covenant areas.
Excavation of pit and deposition of WRS material – loss of vegetation and invertebrate communities, displacement of birds, potential mortality of reptiles;	Re-create lizard and bird habitat through rehabilitation. New pit lake will provide new nesting site opportunities for black backed gulls to replace nesting site lost at the Deepdell South Pit.	Conditions requiring rehabilitation including lizard rock stacks and bird habitat.
Encroachment of weeds (if unmanaged)	Weed surveillance and control	Condition detailing weed surveillance and control.

Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action
Potential displacement of indigenous animals through, mining activities, noise, vibration and lighting	Noise, Air blast and vibration management plan Direct lighting inwards	Conditions pertaining to noise levels and lighting.
Potential vehicle and disturbance effects in the buffer area surrounding the footprint.	Areas in the buffer area with higher ecological values will be isolated from unintended effects (such as vehicle movements) by clearly delineating in maps provided to mine operations staff and on the ground by using survey pegs.	Appropriate conditions requiring delineation of these areas on the ground prior to works.
Wind-blown dust accumulation affecting or covering plant species;	Dust management measures	Implement Dust Management Plan practices. Monitor dust fall rates at existing sites.
Potential for accidental fire (if unmanaged);	Fire response (emergency response)	Maintain Macraes Gold Operation emergency response. Condition regarding fire prevention.
Potential changes to surrounding hydrological regimes may result in decreased surface and subsurface flow and decreased	GHD (2019) states that ground water movement in surrounding rock is likely to be very minimal based on anecdotal observations of low flows in the area. As such, the drawdown from the pit is not likely to effect surrounding wetland or stream features.	Conditions requiring monitoring of surrounding ground water.

Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action
water retention in some wetlands and water courses.		
Potential for effects on ecology after avoidance, remedy and mitigate measures are implemented	Offsetting improved condition covenant at Redbank or other sites for diverse shrub land with reduced grazing and managed for ecological values.	Establish covenant, establish fund to manage covenant area. Conditions regarding offsetting requirements
Heritage		
Accidental discovery and disturbance of archaeological items.	Continued use of appropriate accidental discovery protocols. Prior to any land disturbance, a suitably qualified and experienced archaeologist will be engaged to complete a survey of pre and post-1900 archaeological sites within the Disturbed Land concerned. The Macraes site Heritage Management Plan will be updated in consultation with Heritage New Zealand Pouhere Taonga for the Deepdell North Stage III site.	Conditions relating to accidental discovery protocol
Hazardous Substances		
The release of hazardous substances into the environment or adverse effects on human health.	All hazardous substances will be stored in approved and bunded containment in accordance with the relevant New Zealand Standards and Codes of Practice and the Health and Safety at Work (Hazardous Substances) Regulations 2017.	Conditions managing the use and storage of hazardous substances on-site

Actual or Potential Effect	Recommended Mitigation / Management	Recommended Monitoring / Future Action
	Refuelling, lubrication and any mechanical repairs will be undertaken in a manner that provides sufficient mitigation measures to ensure that no spillages onto the land surface or into water occur. All fuels and oils used at the site will be contained in appropriately bunded or double skinned facilities and that all fuel/oil dispensers are fitted with non-return valves.	
Post-Closure Effects		
Risk of OceanaGold defaulting on its rehabilitation obligations.	The combination of the Project Overview and Annual Work and Rehabilitation Plan, contingency plan, and the bonds ensures that rehabilitation and closure of the site will occur under all circumstances, and that the costs associated with both the rehabilitation of the land and its long-term management will be met.	Bond conditions for rehabilitation
Risk of pit or WRS slope failure.	The geotechnical reports outline that the pit and WRS designs are appropriately stable in the long term.	Normal pit wall stability monitoring during mining.
Risk of water quality decline in receiving environment as a result of long-term discharges from site.	Water quality monitoring in receiving environment. Trialling of passive treatment systems to manage water quality if water quality results indicate that further treatment is required.	Monitor water quality and condition regarding water quality management plan. Bonding conditions

6.1 EROSION AND SEDIMENT CONTROL

Erosion and sediment control measures for the site have been discussed and designed in the attached Engineering Geology Ltd (EGL) 2019 report attached as **Appendix R.** The proposal has potential to discharge sediment laden run-off to land where it may enter water and as such, will require implementation of appropriate erosion and sediment control measures to prevent or reduce the occurrence of sediment laden runoff. Such measures will also intercept and prevent sediment laden run-off from entering water courses or ensure that it is appropriately treated. These measures are outlined in EGL (2019) and include the following:

- Preventing exposure of bare loess soils to rainfall or run-off (stripping during dry weather conditions);
- Clean water drains to divert run-on and clean water away from disturbed areas;
- Temporary clean water diversion drains will be designed for a 1 in 20 AEP storm with 0.25m freeboard;
- Any permanent clean water diversion drains or bunds will be designed for a 1 in 100 AEP storm with 0.25m freeboard. Where necessary (e.g. steeper ground, erosive soils) the drains will be lined (e.g. rockfill, geotextile) and energy dissipation will also be provided at high energy locations (i.e. at the bottom of steep sections of drain where velocities are high);
- Diversion drains to divert run-off from disturbed areas to silt ponds;
- Steep gullies are not stripped beneath the WRS, except in the base of gullies at the toe of the WRS, which minimises disturbed areas and leaves a buffer that acts to intercept sediment from areas stripped above;
- Use of pre-constructed silt ponds at the base of the WRS and pit backfill area, sized appropriately for the first 24 hours of a 2-year rainfall event (70mm). The existing ponds have sufficient capacity to manage surface water run-off and the two additional new silt ponds will be designed with sufficient capacity;
- Regular inspections of silt ponds and diversion drains to check condition and undertake maintenance if required.

During the operation of the Deepdell North Stage III pit, the collected water will either be used for dust suppression or pumped to the existing Deepdell North Silt Pond.

When backfilling of Deepdell South Pit commences, the water level will be drawn down to enable backfill by pumping into the existing Deepdell South Silt Pond where it will discharge via the existing decant system to Deepdell Creek.

Due to the ability of rainfall to infiltrate waste rock, the amount of surface run-off and mobilised sediment is expected to be very low if it occurs at all. Any that is produced will be intercepted by the silt ponds and deposited there before the treated water is decanted and discharged to the wider environment. Through the measures outlined above, it is assessed that the effects of the proposal on water quality through erosion and sediment control measures will be adequately minimised and controlled.

6.2 MANAGEMENT AND APPROACH TO ECOLOGICAL EFFECTS

As discussed above, there are some indigenous vegetation or ecological features within the footprint of the Project that will trigger the broad definition or classification of significant under the relevant plans and section 6 of the RMA. With regard to these matters OceanaGold has adopted a cascading approach to the management of adverse effects. It is noted that this is consistent with the approach that is promoted (or will be) in the Otago Regional Policy Statement with regard to the management of adverse effects arising from mining activities. This is in reference to Policy 5.4.8 of the Proposed Otago RPS which was the subject of a number of appeals. During Environment Court mediation and subsequent expert witness conferencing relating to the mining appeal, numerous changes were agreed to this policy. The agreed amended form of Policy 5.4.8 is yet to be confirmed by the Environment Court via consent order but it is anticipated to be in due course.

The agreed amended Policy 5.4.8 states:

[note red text are changes agreed through Environment Court mediation and green text are changes agreed in expert witness conferencing arising from an Environment Court hearing on the mining topic which were accepted by all parties]

Policy 5.4.8 Adverse effects from mineral and petroleum exploration, extraction and processing

~~Minimise~~Manage adverse effects from the exploration, extraction and processing of minerals and petroleum, by ~~all of the following~~:

a) Giving preference to avoiding their location in all of the following:

i. Areas of significant indigenous vegetation and significant habitats of indigenous fauna in the coastal environment;

~~ii. Outstanding natural features, landscapes and seascapes;~~

~~iii. Areas of outstanding natural character;~~

ii. Outstanding natural character in the coastal environment;

iii. Outstanding natural features and natural landscapes, including seascapes, in the coastal environment;

iv. Areas of significant indigenous vegetation and significant habitats of indigenous fauna beyond the coastal environment;

v. Outstanding natural character in areas beyond the coastal environment;

vi. Outstanding natural features and landscapes beyond the coastal environment;

vii.~~iv.~~ Outstanding water bodies or wetlands;

viii.~~vi.~~ Places or areas containing ~~significant~~ historic heritage of regional or national significance;

ix.~~v.~~ Areas subject to significant natural hazard risk;

b) Where it is not ~~possible~~ practicable to avoid locating in the areas listed in a) above, ~~avoiding significant adverse effects of the activity on those values that contribute to the significant or outstanding nature of those areas;~~ because of the functional needs of that activity:

i. Avoid adverse effects on the values that contribute to the significant or outstanding nature of a) i-iii;

~~ii. Avoid significant adverse effects on natural character in all other areas of the coastal environment;~~

ii. Avoid, remedy or mitigate, as necessary, adverse effects on values in order to maintain the outstanding or significant nature of a) iv-viii;

iii. Consider first ~~biodiversity~~ biological diversity offsetting, and then ~~environmental~~ biological diversity compensation, if adverse effects described in b) ii, on indigenous biological diversity cannot be practicably remedied or mitigated;

iv. Minimise any increase in natural hazard risk through mitigation measures;

v. Consider environmental compensation if adverse effects described in b) ii, other than on indigenous biological diversity, cannot practicably be avoided, remedied, or mitigated;

ba) Avoid significant adverse effects on natural character in all other areas of the coastal environment;

c) Avoiding adverse effects on the health and safety of the community;

d) Avoiding, remedying, or mitigating adverse effects on other values including highly valued natural features, landscapes and seascapes[54];

e) Considering biological diversity offsetting or compensating for residual adverse

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[54] Craig Barr maintains that direction is included on how to manage these values and the following is requested *'...including highly valued natural features, landscapes and seascapes in order to maintain their high values'.*

effects on other values;

~~f~~e) Reducing unavoidable adverse effects by

i. Staging development for longer term activities; and

ii. Progressively rehabilitating the site, where possible.

~~*f)g) Considering the use of offsetting, or compensatory measures, for residual adverse effects; and*~~

g) Applying a precautionary approach (including adaptive management where appropriate) to assessing the effects of the activity, where there is scientific uncertainty, and potentially significant or irreversible adverse effect~~s~~.

- *Where there is a conflict, Policy 5.4.8 prevails over policies under Objective 3.2, (except for policy 3.2.12) Policy 4.3.1 and Policy 5.2.3.*

Policy 5.4.8 adopts a cascading (or 'stepped') approach to the management of adverse effects:

- Preference is to be given to avoiding the location of mining activities in areas of significant indigenous vegetation and significant habitats of indigenous fauna;
- Where it is not practicable to avoid locating in such areas, because of the functional needs[55] of the proposed mining activity, then adverse effects should be - remedied or mitigated as necessary to maintain the outstanding or significant nature of such areas;
- If adverse effects cannot be practically remedied or mitigated, and there are residual adverse effects, consideration must be given first to biological diversity offsetting and then biological diversity compensation;
- The parameters for offsets are prescribed by Policy 5.4.6 and for compensation by Policy 5.4.6A (note that both of these policies remain under appeal).

Although Policy 5.4.8 should be given limited weight (for the reasons outlined at section 9.6.1.1) as a measure of good faith OceanaGold has followed the cascading approach to effects management for the Project, as was endorsed by all parties in the pORPS process.

The Project will not affect any sites that are deemed to have outstanding natural character or features.

With regard to the location of the pit this cannot be avoided as is the case with any mineral deposit which is being targeted - the functional needs of the proposed mining activity require this location. Alternatives for the location of the waste rock stack have however

[55] 'Functional needs' is defined to mean "The locational, operational, practical or technical needs of an activity, including development and upgrades".

been considered and are discussed further in section 7 of this AEE. The location of the waste rock stack in the preferred location was selected due to its avoidance of higher value, permanently flowing water courses and habitat, and because it is located partially within a previously mined pit and large areas of the waste rock stack are located on improved pasture with lower ecology values. There remain however some indigenous vegetation and habitat features within the footprint of the project that will be impacted. Some of which is considered to trigger the 'significant' criteria, for example the ephemeral wetlands. Where it has been impractical to avoid adverse effects on such features, OceanaGold has then sought to remedy or mitigate any adverse effects, consistent with the cascading approach under Policy 5.4.8. This is explained in the Impact Management Plan which is attached as **Appendix D**. Remediation and mitigation measures that will be employed by OceanaGold include:

- Site rehabilitation post mining closure
- Dust management
- Noise management
- Weed control
- Fire avoidance strategies
- Erosion and sediment control
- Management to prevent accidental spillages
- Protection against nuisance weed/algae introduction
- Translocation of higher importance plant species prior to mining activity commencing

6.2.1 Offsetting Proposal

Where residual adverse effects remain on areas within the Project footprint which exhibit significance, OceanaGold is proposing to offset such effects. The details of the proposed offset are contained in the Impact Management Plan (**Appendix D**) and the proposed conditions in **Appendix S**. The reporting in **Appendix D** confirms that the proposed offsetting will be designed to achieve at least a no-net-loss outcome and preferably a net gain in indigenous biological diversity. It will do so by adhering to the following principles in its design:

- The offset ensures there is no loss of individuals of rare or vulnerable species as defined in reports published prior to 14 January 2019 under the New Zealand Threat Classification System ("NZTCS");
- The offset is undertaken where it will result in the best ecological outcome, preferably:
    - Close to the location of development; or
    - Within the same ecological district or coastal marine biogeographic region;

- The offset is applied so that the ecological values being achieved are the same or similar to those being lost;
- The positive ecological outcomes of the offset last at least as long as the impact of the activity, preferably in perpetuity;
- The offset will achieve biological diversity outcomes beyond results that would have occurred if the offset was not proposed; and
- The delay between the loss of biological diversity through the proposal and the gain or maturation of the offset's biological diversity outcomes is minimised.

In accordance with best practice, a disaggregated accounting model was used to calculate the extent of works required in order to achieve a successful offset and no net loss of biodiversity. This is explained further in **Appendix D**.

6.2.2 Offsetting Location

OceanaGold currently manages six ecological covenants covering a total of 655 ha. Other protected lands in the vicinity of the Project site include the 590 ha Deighton Creek Nature Reserve, the 1,452 ha Redbank Scenic Reserve and the 332 ha Manuka Stream Conservation Area, giving a total of 3,029 ha of legally protected land in the Macraes Ecological District. This equates to 2.4% of the Ecological District's land area and is similar to the proportion protected of the ecologically similar nearby Manorburn Ecological District (ERA Ecology Ltd unpub. data). These are shown in Figure 37 below:

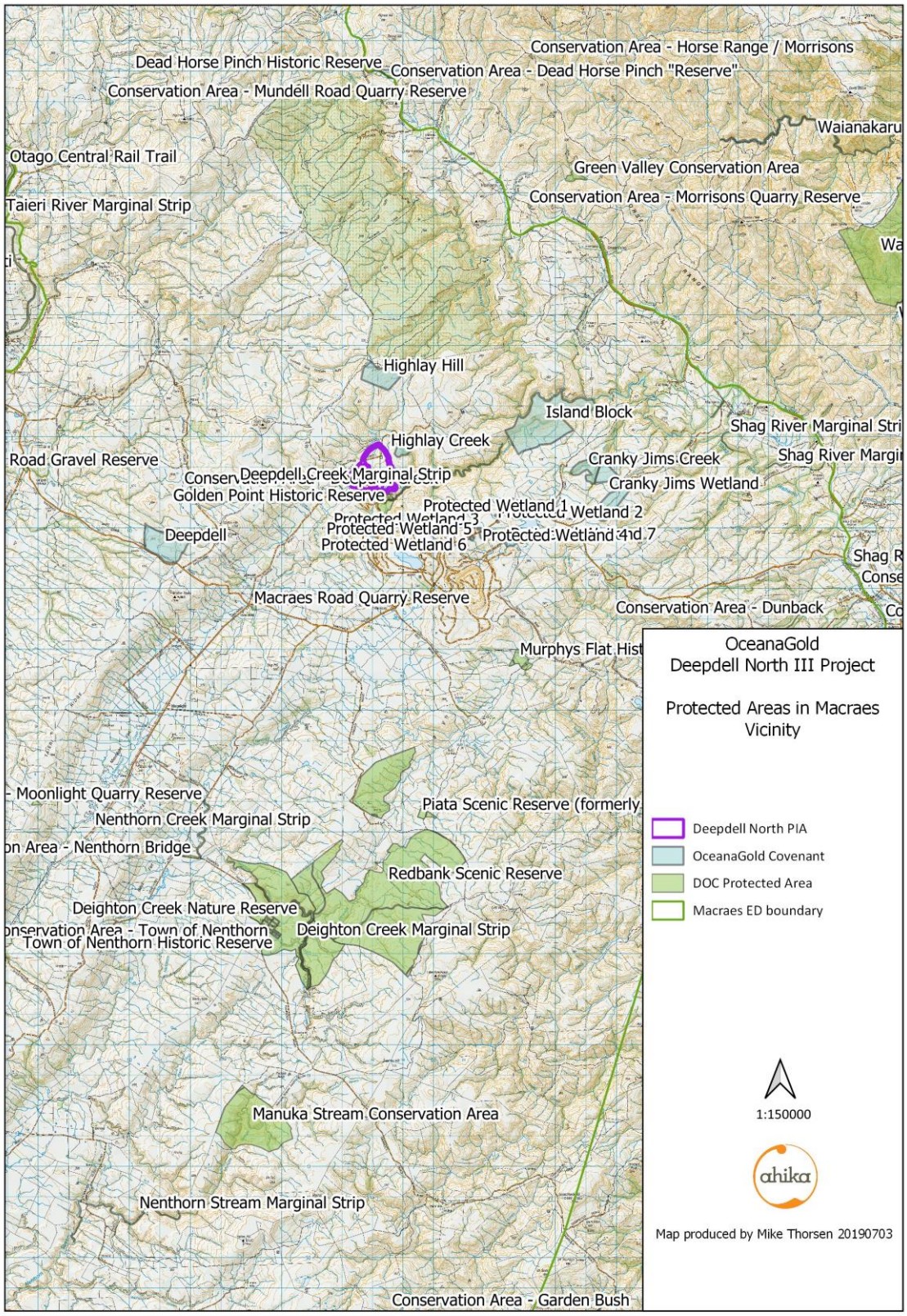

Figure 37: Location of Protected Areas in the Macraes Vicinity

With regard to the offsetting location for this Project, the upper Waikouaiti River North Branch offset site (Redbank Ecological Enhancement Area (EEA)) (Figure 38 below) has been chosen on the basis of discussions with both landowners who identify it as a site of low farming value and also chosen as a result of site examination that shows the location has considerable ecological value in terms of fauna, vegetation communities and as habitat for rare species. This site is part of a farming environment and currently has no protections beyond that afforded by regional and district plans and therefore ongoing damage to some ecological features is expected and the tussock grassland and shrubland could be actively managed to enhance livestock grazing. Some of the ecological features are restricted to areas where livestock are not able to access.

Figure 38: Location of Redbank EEA.

A covenant of 126 ha will be established under the Conservation Act at this site which contains biodiversity that is of similar character to that being lost, but of better quality, of a larger scale and with other inherent ecological values. Sensitive parts of this covenanted area will be fenced to exclude stock and limits will be placed on the type of stocking that can occur in the covenanted area and on any activities that could result in damage to the soils or to vegetation of high ecological importance. This land will be managed using the

income from a fund held by OceanaGold until cessation of mining when the fund will be ceded to another appropriate authority.

Important components of the offset are that it:

- Will have legal protection.
- Will be farmed as appropriate with the objective of protecting the important biodiversity features.
- Will be of sufficient size to compensate for uncertainties in ecological outcomes associated with retaining farming in the covenant.
- Will satisfy the offset criteria detailed in relevant regional policy.
- Will have a fund to support the management of the covenant on an ongoing basis.
- Will involve the farming community together with DOC and Councils in the offset design and placement.
- Will incorporate the Science and Traditional Knowledge offset principle by including farming community knowledge of biodiversity management in the Macraes Area.
- Will incorporate the Equity offset principle by sharing the risks and benefits between the farming community, DOC and Councils.
- Will be managed with ecological oversight.
- Will result in a Biobank of additional ecological gains that will be used to address a future project's ecological impact.

This offset is currently under further analysis to investigate its feasibility and will be further confirmed and developed in accordance with the conditions that are proposed in **Appendix S** which require the development and implementation of the offset.

This offset will also address the impact on the Declining matagouri, desert broom *Carmichaelia petriei*, skinks *Oligosoma inconspicuum* and *Oligosoma polychroma*, gecko *Woodworthia* "Otago/Southland large", Naturally Uncommon grass *Anthosachne falcis*, some components of the invertebrate and bird communities and on McCann's skink, through protecting areas inhabited by these species.

Offsetting the project impact loss of an estimated 3.73 ha of shrubland from the Deepdell North III site will be through including an equivalent plant community of better ecological integrity in the Redbank EEA as well as planting and maintaining an additional 5 ha of new shrubland comprising 18 species within the covenant.

Offsetting the project impact resulting in the loss of 0.07 ha of seepage wetland will be through including an equivalent existing plant community of larger size within the covenant

and managing this to better ecological integrity in the Redbank EEA. This offset is considered to have the elements of both an averted loss offset and an improved condition offset.

Offsetting the impact resulting in the loss of an estimated 49.47 ha of low producing grassland will be through including 24.55 ha of an equivalent plant community and managing this to better ecological integrity in the Redbank EEA.

Offsetting the impact resulting in the loss of 0.3 ha of ephemeral wetlands will be an improved-condition offset. The improvement work for the offset will be informed by a research project investigating ephemeral wetland form, function and threats. The offset will involve using weed control to produce a 25% improvement in indigenous vegetation cover at ephemeral wetlands at 5-7 sites totalling at least 2 ha and an improvement in indigenous plant diversity at each site of 11 species within a 10-year time period.

The implementation and management of the offsetting sites and programmes will be documented in an EEA Management Plan (sometimes also termed an Offset Plan). The offset proposed is intended to achieve a no-net-loss outcome in indigenous biodiversity associated with the Project, and is consistent with the guidance set out in Policy 5.4.8 (as set out above) on how a mineral extraction and processing activity should manage its adverse effects on the environment.

7. ASSESSMENT OF ALTERNATIVES

7.1 INTRODUCTION

Under the RMA, a consideration of alternative locations and methods is relevant in certain respects:

- Schedule 4 requires an AEE to include a description of any possible alternative locations or methods for undertaking the activity where it is likely that the activity will have a significant adverse effect on the environment;
- Where an activity includes the discharge of a contaminant, Schedule 4 also imposes an obligation on an applicant to provide a description of any possible alternative methods of discharge, including discharge into any other receiving environment;
- Similarly, section 105 of the RMA requires decision makers to have regard to various matters including "*any possible alternative methods of discharge, including discharge into any other receiving environment*"; and section 108 sets out that a condition may be imposed on a discharge permit requiring the consent holder to adopt the best practicable option in order to prevent or minimise any actual or likely adverse effects on the environment of the discharge.

7.2 PROJECT OBJECTIVES AND ALTERNATIVES ASSESSMENT

OceanaGold is continually reviewing the life of its mining operations at Macraes in light of the gold resource and the economic value of mining. Exploration success has highlighted opportunities for expansion of the mine area. The Deepdell North Stage III Project has been developed as a result of this and it is expected that if it proceeds it will add at least one year to the mine life at Macraes.

Mining activities by their nature, are constrained by the location of the gold bearing ore. Similarly, in an operation such as that run at the Macraes site, there are existing infrastructure assets and resource consents in place which mean greenfield sites would be much more difficult to establish and are therefore not practicable alternatives to the current proposal. OceanaGold is however conscious that this important mineral resource is co-located with other important values (i.e. ecological and cultural values) and the extraction of the mineral resource needs to be undertaken in a manner that avoids to the extent that it is able and practicable to do so, significant adverse effects on those other values. With this in mind, OceanaGold has assessed alternatives including differing mining methodologies and the siting of infrastructure associated with the extraction activities.

7.2.1 Mining Methodology – Open Cast vs Underground

Underground mining has a number of advantages to open cast mining including reduced footprint of the Project, and a reduction in amenity issues such as noise and dust. However

underground mining is considerably more expensive than open cast mining (on a cost per tonne basis) and the average ore grade for the Deepdell North Stage III is not sufficient to make an underground operation viable. In addition, experience has shown that process plant recovery of gold from underground mining is lower than in open cast mining at Macraes and hence a reduced value is obtained for the extraction of gold. In this location of the mine, it has been determined by OceanaGold that underground mining would result in a significantly greater cost than an open cast mine operation to the extent that it would questionable as to whether it would be economically viable to pursue.

7.2.2 Alternative Operating Hours

As a result of the initial Assessment of Environmental Noise Effects (AES, 2018)[56] and the alternatives assessment of Waste Rock Stack locations, an internal investigation was conducted to determine the impact on productivity if work hours were to avoid night-time noise nuisance from the Horse Flat Waste Rock Stack (Option B). Thus, in line with the section 6.5 of the Waitaki District Plan, working hours were set to:

- Monday to Friday 07:00 to 22:00
- Saturday 08:00 to 17:00
- No work on Sunday's and Public Holidays.

As part of the investigation it was assumed that utilisation of equipment was maximised during the working hours and that planned maintenance was conducted during the hours outside of the operating hours.

The investigation found that in the first year of production resulted in a shortfall of 25 million tonnes of material movement which was differed to year 2 and 3[57]. This would result in a subsequent shortfall of delivery of ore to the processing plant in the order of 14,000oz of gold per year for years 1, 2 and 3. In order to overcome these production shortfalls, the equivalent of 2 additional load and haul fleets (i.e. 2 excavators and 4 trucks) would be required. The economic impact of this additional fleet either through purchase or rental would make the development of the Deepdell North Stage III pit un-economic. Accordingly, the decision was made to look at further alternative options for disposal of waste rock as well as to pursue negotiations with the residents of 406 Horse Flat Road in order to find a way to enable longer hours of work at the site (excluding blasting) to ensure that the proposal could remain economic.

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[56] AES (2018) was a technical report on noise produced to assess the effects of the Horse Flat WRS (Option B in figure 39).

[57] This alternative would have had 3 years of mining due to different work hours instead of the current proposal which has two.

7.2.3 Waste Rock Disposal Location

Unlike the location of mining of the ore body, waste rock disposal location is not specifically constrained. From a technical perspective, it remains important that waste rock is stored in a manner that is stable geotechnically and geochemically. Where available, backfilling of pits, which aside from meeting those technical requirements also includes benefit from a reduced environmental footprint is often the most desirable outcome.

For the Deepdell North Stage III, the most realistic option for backfilling of mined-out pits is Deepdell South Pit. The close proximity of the Deepdell South Pit to the proposed development has meant that its backfilling automatically forms part of the mine design. Aside from the benefits of reducing the environmental footprint, depositing waste rock into Deepdell South Pit creates an opportunity to improve the visual impact of previous Macraes Operations from viewpoints at the Golden Point Historic Reserve. The Deepdell South Pit can store approximately 13 Mt, leaving a further 45 Mt of waste rock to be stored at an alternative location.

The next closest pit is Coronation Pit, which is lies approximately 2km to the north west of the proposed development. The distance, combined with the uphill haul of waste rock to Coronation Pit, would combine to make waste rock transport costs excessive and hence the Deepdell North Stage III development uneconomic. In addition, the Coronation Pit remains open as gold resource estimates indicate that a further cut back of the pit may be economic. Additional drilling on the eastern side of the Coronation Pit is required to better quantify the resource estimates.

Early in the Project Design options to establish a Waste Rock Stack to the south of Horse Flat Road, either to east or the west of the Mine Pit were scoped but were considered unlikely to be feasible for a variety of technical and non-technical considerations (i.e. proximity to neighbours, water management, geotechnical stability, landscape). Further design work during 2018 identified four possible alternatives. These options included and are illustrated in Figure 39:

A - North west of the proposed Pit, against Taieri Ridge and in the location of the current Coronation Haul Road.

B - Immediately north of the proposed pit, against the Taieri Ridge, also known as the Horse Flat Waste Rock Stack.

C - East of the proposed pit, within the Highlay Creek catchment main branch.

D - Immediately east of the proposed pit, backfilling the Deepdell South pit and extending uninterrupted, into a WRS northwards onto the relatively flat farmland of Horse Flat and overlapping the eastern end of Horse Flat Road. This is known as Deepdell East Waste Rock Stack.

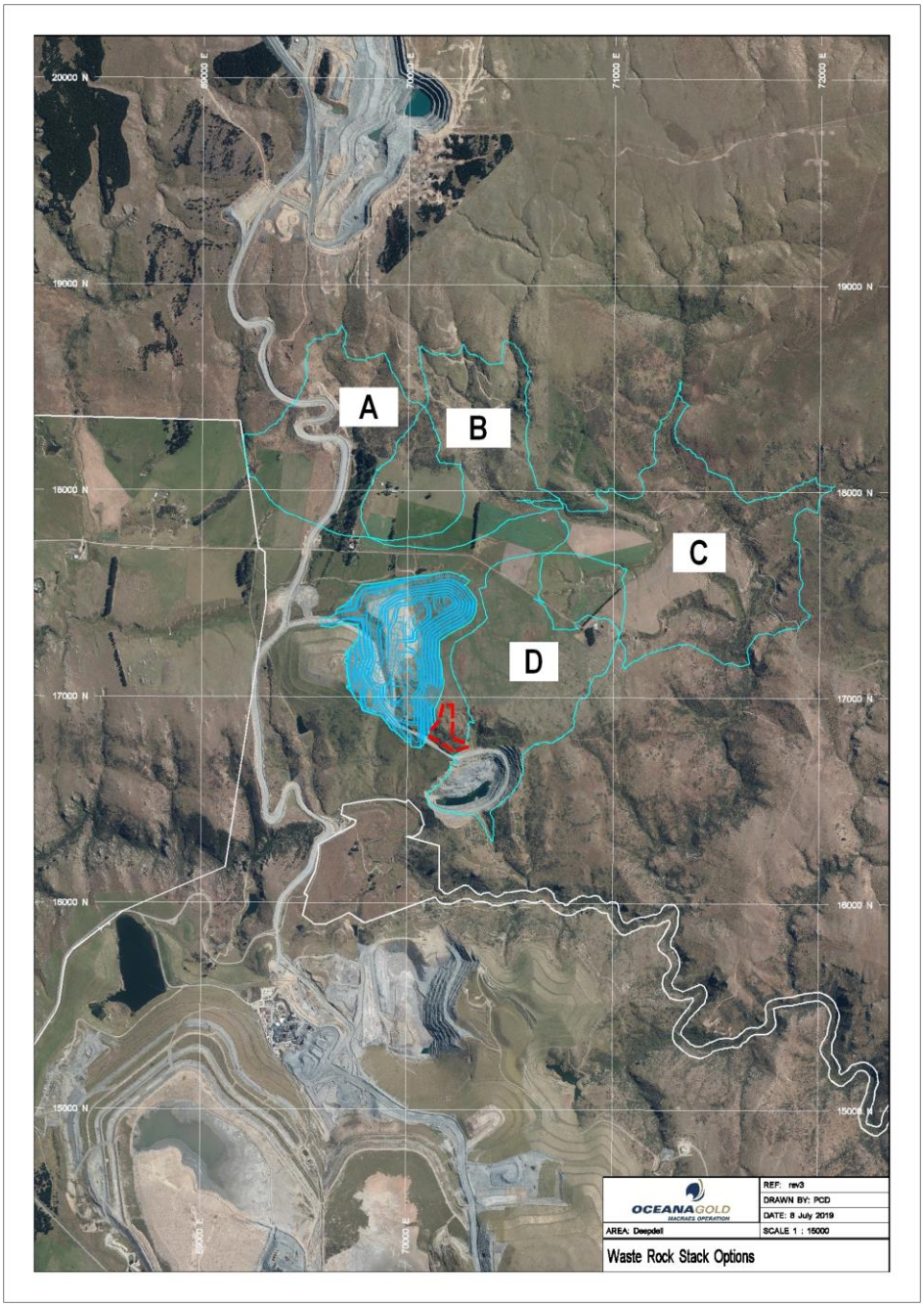

Figure 39: Considered Waste Rock Stack Locations

Analysis of these alternatives determined that Option A would result in significant noise and visual impacts on adjoining (and well established) sensitive land use activities that could not be readily mitigated, offset or compensated. Option A also affected a significant area of land that was not owned by OceanaGold. Option C would result in significant additional costs to allow for stable and appropriate disposal of waste rock in a valley with higher water flows, and it was identified that there would likely be significant adverse

effects on heritage features, ecological features and water quality. For these reasons, further analysis of Options A and C were not conducted.

Options B was initially selected as the preferred option, and detailed studies and consultation with affected parties were conducted to further understand the effects associated with this option. The studies and consultation revealed significant adverse effects to terrestrial and freshwater ecology including; loss of habitat of the Taieri flathead galaxias, Loss of a large, mature specimen of *Olearia fimbriata*. Further, option B would necessitate loss of a portion of the Bellfield Homestead and sections of a water race, both being heritage features. As outlined below in consultation with local landowners, significant concerns were raised regarding noise and the immediate loss of land associated with quality pasture paddocks as a result of Option B.

As a result of the study outcomes and the concerns raised in consultation, further investigations were undertaken for option D. The studies found that option D presented several advantages over Option B including reducing exposure to noise and visual effects on neighbours, reduced effects to the length and values of stream beds affected, and reduction in effects on heritage. In addition, Option D presented the most efficient option in terms of economic viability and utilisation of existing resources at the site due to its proximity to the proposed pit and incorporation of the WRS with Deepdell South Pit backfilling.

Table 23 below compares aspects of the ecological effects of Options B and D and illustrates that Option D has lower impacts on the key ecological impact parameters listed (except for the small areas of ephemeral wetlands). Option D is located on a sub-catchment boundary between Highlay, Deepdell and Camp Creeks so is occupying less stream bed and the stream bed affected has lower values than those. The Option B WRS occupies a main tributary and therefore has a higher aquatic impact. As such, the Option D WRS is also the preferred option over option B when considering ecological impacts.

Table 23: Comparison of direct WRS ecological impacts of options B and D

Option	Direct stream length impact	Impact on narrow leaved tussock grassland communities	Impact on shrubland communities	Impact on Threatened plant species	Impact on ephemeral wetland
B – Horse Flat WRS (76 ha)	Approximately 1.98 km within Highlay Creek, approximately two thirds of which is intermittent.	6.16 ha	17.61 ha	The Nationally Vulnerable *Olearia fimbriata.*	0 ha

Option	Direct stream length impact	Impact on narrow leaved tussock grassland communities	Impact on shrubland communities	Impact on Threatened plant species	Impact on ephemeral wetland
D – Deepdell East WRS (60 ha)	Approximately 350 m of ephemeral seepage and approximately 130 m of intermittent watercourse in Highlay Creek.	0 ha	3.65 ha	None present in footprint.	0.3 ha

As a result of the investigations in which the differing values were assessed, Option D was determined to be the preferred option for the waste rock stack and was selected to be progressed through to the consenting phase.

7.2.4 Section 105 of the Resource Management Act 1991

Section 105 of the RMA sets out additional matters which must be considered by a consent authority when considering an application for a discharge permit. Section 105(1) of the RMA states:

> *"If an application is for a discharge permit or coastal permit to do something that would contravene section 15 or section 15B, the consent authority must, in addition to the matters in section 104(1), have regard to—*
>
> *(a) the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and*
>
> *(b) the applicant's reasons for the proposed choice; and*
>
> *(c) any possible alternative methods of discharge, including discharge into any other receiving environment."*

All of the relevant matters set out in Section 105(1) of the RMA are addressed in this AEE and are summarised in Table 24 below. In particular, the nature of all discharges to the environment are detailed in Chapter 5 of this AEE, while the sensitivity of the receiving environments is discussed in Chapters 2 and 5. However, it is concluded that the proposed discharges of contaminants to air, land and water (via seepage and runoff) are the best practicable option for managing the activities associated with Deepdell North Stage III Project and any potential effects on the environment.

Table 24: Alternative effects assessment for discharges

Discharge	Receiving Environment	Alternative Methods of Discharge
Discharge of contaminants to air.	Chapter 2 of this AEE.	Beca (2019) considered alternative methods of managing the proposed discharges to air. The recommended methods are those considered to be most appropriate considering the nature of those discharges and the receiving environment.
Discharge material to land associated with the waste rock stack where it may enter water.	Refer section 2.14 of the AEE. The Macraes mine site is located within the Shag/Waihemo River catchment. Discharges from the site ultimately reach the Shag River via a number of tributaries including Deepdell Creek. For Deepdell North Stage III Project the relevant tributaries are the Deepdell Creek and its tributaries Highlay Creek and Camp Creek.[58]	The effects arising from the discharge to land and potential for seepage and runoff into the downstream receiving environment in the preferred location for the Waste Rock Stack are not considered to be significant. Alternative locations for the Waste Rock Stack have been considered as discussed above, and it was determined that the alternative locations could potentially give rise to a higher degree of impact on adjoining streams and waterways. For example, with regard to Option C and D, it was identified that there could be a moderate effect on Highlay Creek in terms of flows, instream habitat loss and water quality.
Discharge of runoff water to land associated with the mining of the pit surface within the Deepdell North Stage III pit.	As above.	The pit footprint will result in minor effect to flow in sub catchment and no measurable increase in contaminants.

[58] Note that camp Creek is not to receive treated runoff from the project WRS or pit.

8. CONSULTATION

8.1 STATUTORY MATTERS

Consultation in the RMA sense has been clearly articulated through case law over time as follows:

> *"Consulting involves the statement of a proposal not yet finally decided upon, listening to what others have to say, considering their responses and then deciding what will be done".*

and

> *"(i) The nature and object of consultation must be related to the circumstances.*
>
> *(ii) Adequate information of a proposal is to be given in a timely manner so that those consulted know what is proposed.*
>
> *(iii) Those consulted must be given a reasonable opportunity to state their views.*
>
> *(iv) While those consulted cannot be forced to state their views they cannot complain, if having had both time and opportunity, they for any reason fail to avail themselves of the opportunity.*
>
> *(v) Consultation is never to be treated perfunctorily or as a mere formality.*
>
> *(vi) The parties are to approach consultation with an open mind.*
>
> *(vii) Consultation is an intermediate situation involving meaningful discussions and does not necessarily involve resolution by agreement.*
>
> *(viii) Neither party is entitled to make demands.*
>
> *(ix) There is no universal requirement as to form or duration.*
>
> *(x) The whole process is to be underlain by fairness."*

Although there are no specific statutory requirements for consultation under the RMA[59], it makes sense to do so, particularly for a project of this nature and scale. It also makes sense to conduct a careful and strategic consultation process that informs the AEE. In particular, Fourth Schedule, Clause 6(1)(f) of the RMA requires that an AEE must include identification of the persons affected by the activity, any consultation undertaken and any response of the views of any person consulted. As such, this information is included in Sections 8.3 – 8.8 below.

[59] Reference to consultation is set out in the Fourth Schedule (persons affected by the application must be identified, any consultation undertaken, and any response to the views of any person consulted must be set out), and with reference to section 8 – Treaty of Waitangi.

8.2 NOTIFICATION

OceanaGold requests that this consent application is publicly notified pursuant with s.95A(3)(a)

8.3 CONSULTATION PROCESS

As noted above, OceanaGold commenced with consultation with key stakeholders and potentially affected parties in early 2018. A record and summary of these consultation events is set out below:

8.4 DEPARTMENT OF CONSERVATION

Several meetings and site visits were conducted with Department of Conservation to discuss terrestrial and ecological effects and potential mitigation, including:

- 3rd May 2018 – Site visit and meeting in conjunction with Otago Regional Council, Waitaki District Council and representatives of the Macraes Community Incorporated (MCI), specifically to discuss terrestrial and freshwater ecological effects of Deepdell North Stage III and possible mitigation.
- 28th June 2018 – Meeting in OceanaGold Dunedin Office to further discuss progress on mitigation for terrestrial and freshwater ecological effects. It was at this meeting that DoC freshwater specialist revealed evidence of the presence of the Taieri flathead galaxias within the proposed Horse Flat waste rock stack footprint.
- 1st November 2018 – Site visit to Deepdell, includes a walkover of the then -proposed Horse Flat waste rock stack location (Option B), by specialists. During this visit a question is put forward by the Department of Conservation on why the Waste Rock Stack could not be placed immediately to the east of the pit on cultivated land.
- 26th June 2019 – Site visit by DoC Specialist & Aukaha. Although the focus of this visit was the Coronation North Extension consent, the site visit also included stopping at the Deepdell North Stage III Project Site and explaining the subsequent changes in the waste rock stack location from the Horse Flat WRS (B Option) to the Deepdell East (D Option).
- 26th July 2019 – presentation of Macraes Operations to Department of Conservation Regional Manager and Statutory Manager, which included an update of the Deepdell North Stage III Project and the changes to the waste rock stack design and location.

8.5 IWI

A series of meetings have been held with iwi and/or its representatives regarding the proposal. A summary of these meetings and visits is set out below.

- 21st February 2019 – Iwi Site Visit by Ms Kathryn Gale (Aukaha) and Mr John Youngson (Kati Huirapa ki Puketeraki) to Macraes Gold Operations prior to the Powhiri in Karitane, overall purpose was to engage with Iwi and provide an overview of the entire site. This site visit included a stop at Deepdell North Stage III Project Site and discussions about the proposal that was being explored.
- 1st March 2019 – Ms Jackie St John of OceanaGold organised a meeting with Aukaha prior to the a Powhiri at the Karitane Marae. This was to discuss consents that OceanaGold were currently exploring, and to provide an overview of the Deepdell North Stage III Project Site project that was being planned. Aukaha were advised that an application for the Project would be provided to them when it is available.
- 2nd May 2019 – Meeting at the Aukaha office with Ms Kathryn Gale, focus of the meeting was discussion surrounding developing the partnership between Iwi and OceanaGold. initial concepts discussed about future projects of interest to Iwi. Brief overview of current consents was provided to Auhaka and the concept map of Deepdell North Stage III Project Site was also provided.
- 26th June 2019 - Site visit to the Macraes Gold Operations by a DoC Specialist & Aukaha representatives. Although the focus of this visit was primarily the Coronation North Extension consent, the site visit also included stopping at the Deepdell North Stage III Project Site and presenting details of the proposed changes in the waste rock stack location and design.
- 22nd July 2019 – Meeting at the Aukaha office with Ms Kathryn Gale. The focus of the meeting was to hear any concerns and/or updates from Iwi surrounding the consent applications that had been provided to them. Ms Gale stated that work would start on the Cultural Impact Assessment Report for the Deepdell North Stage III project, once they have received the AEE. OceanaGold requested an Iwi contact person to undertake an updated Takata Whenua Archaeological Assessment of the project area to update that carried out by Mr BJ Allingham in March 2018.
- 16th August 2019 - Meeting at the Aukaha office with Ms Kathryn Gale, the focus of the meeting was to discuss the consent applications for the Macraes-Dunback Road realignment and the proposed Frasers West Pit Extension as OceanaGold was awaiting their written response in regard to these particular applications. There also discussion about the Cultural Impact Assessment Report for the Deepdell North Stage III project. Ms Gale advised that once they have received the AEE for the Deepdell North Stage III project, the timeframe for the CIA to be completed by iwi would be approximately 6-8 weeks.

8.6 LOCAL LANDOWNERS

OceanaGold has an ongoing and active relationship with its adjoining landowners and neighbours. A summary of the meetings and visits held with regard to this Project is provided below. Figure 2 below illustrates the leased land of the Deepdell Norths Stage III area.[60]

[60] Note that Bren O'Connell (name on lease) is Mick O'Connell's father and that Ray O'Connell (name on lease is Mat O'Connell's father.

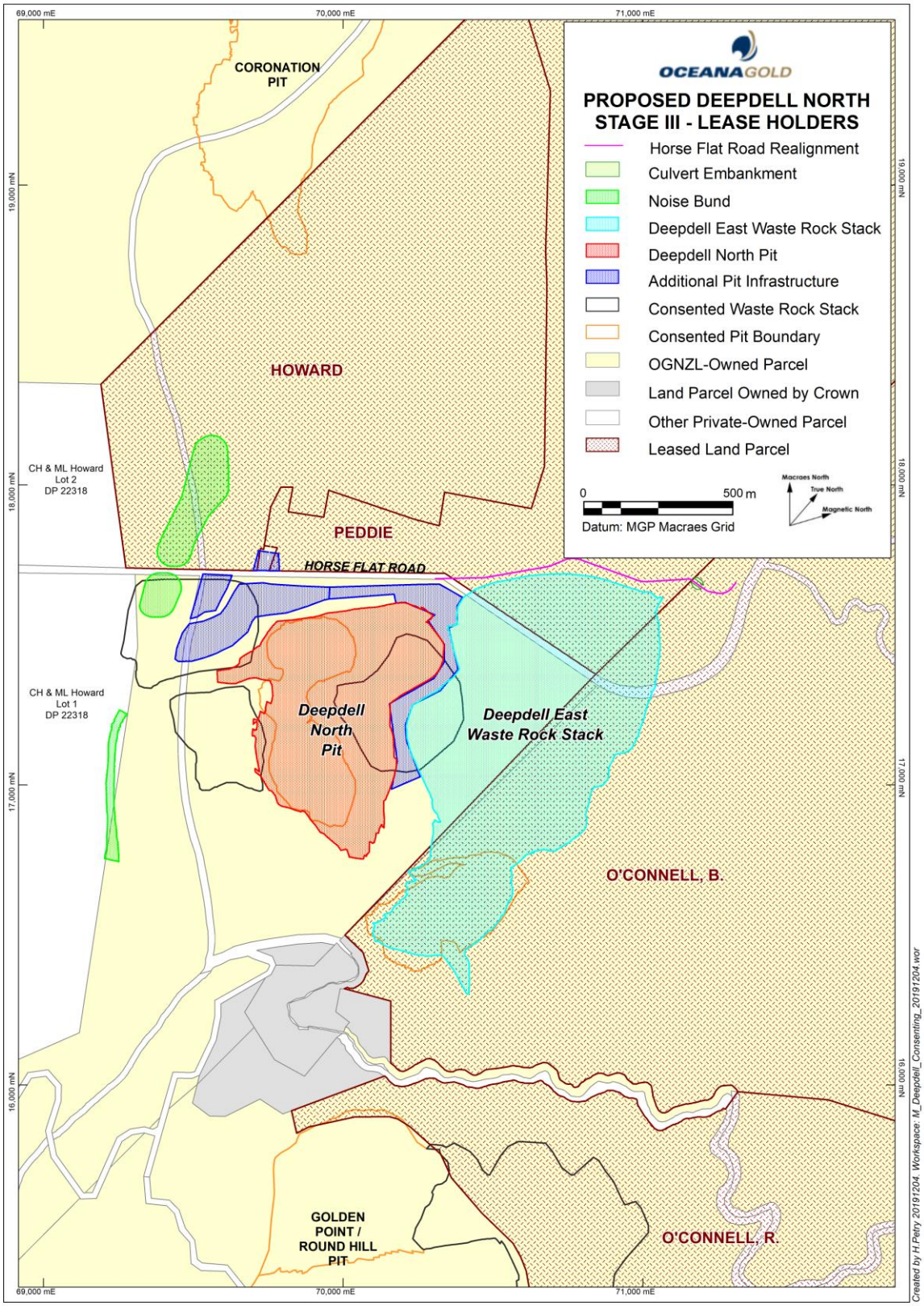

Figure 40: Grazing Lease Areas

8.6.1 Mr C Howard and Mrs E Howard

Craig and Erin Howard are the residents of the property located at 406 Horse Flat Road.

- As the closest residents, consultation commenced early with meetings at the beginning of 2018 (11th & 22nd January) in which the project design for Deepdell North was still early in its development and the Horse Flat WRS was the leading option. As with previous consent applications, Mr and Mrs Howard raised concerns regarding noise, particularly associated with the possible waste rock stack location. They were also concerned about the loss of good quality leased land in the paddocks at the base of the waste rock stack.
- On 17th July 2018, a further meeting was held with Mr and Mrs Howard on the leased land and grazing rights associated with the Deepdell North Stage III Pit and Waste Rock Stack. It was mutually agreed that the lease would not be renewed at this time and however they would continue to graze the area informally until mining commenced.
- Following the development of the changes in design of the WRS in December 2018 to the current Deepdell East WRS design, Mr and Mrs Howard were again consulted with regards to the new design (12th December 2018) and it was explained that one of the drivers for the change was to limit noise effects.
- OceanaGold have met Mr and Mrs Howard on the occasions above to discuss both this proposal and the Coronation North Extension which has recently been consented. As a result of these discussions, informal agreement has been reached regarding noise limits at the notional boundary of their dwelling and as a result of this, a condition is proposed for the Deepdell North Stage III that replicates the intent of the condition granted for the recent Coronation North Extension. This is condition 8.2 in the proposed Waitaki District Council consent conditions attached as **Appendix S.**

8.6.2 Mr M O'Connell

Mr O'Connell is the lessee of the ex-O'Connell Farm; the land is now owned by OceanaGold.

- On 6th November 2018, Mr Mick O'Connell was contacted to discuss the possibility of establishing an ecological covenant on Highlay Creek (as a result of effects to freshwater ecology). As Mr O'Connell was not agreeable with the idea of establishing further covenants on land that he leased from OceanaGold, it was decided that it was better to meet face-to-face. This meeting occurred on 28th November 2018. During this conversation concerns were raised by Mr O'Connell about ensuring that stock

had access to water and the ongoing responsibility for the management of the covenanted area once OceanaGold had sold the land.

- On 12th December 2018, Mr O'Connell was consulted with again on the new design (Deepdell East WRS, Option D) for the proposal. Mr O'Connell expressed concerns about the WRS location necessitating the relocation and/or rebuilding of the woolshed.
- On 1st May 2019, OceanaGold followed up to consult again with Mr O'Connell on the waste rock stack location. Mr O'Connell remained concerned about the woolshed relocation and did not provide a suggested alternative location. A subsequent meeting was held regarding the woolshed location however no proposed replacement location has been confirmed at the time of lodging this consent.

8.6.3 Mr James Peddie

Mr Peddie is lessee of Longdale Farm and has a partial lease on Redbank Farm.

- On 12th February 2018, OceanaGold met with Mr Peddie to discuss the potential loss of land on the Longdale Farm lease as a result of the Horse Flat waste rock stack location. Mr Peddie was especially not happy about the loss of higher productivity pasture in the winter paddocks. A subsequent discussion was held on 15th April 2018 in which alternative paddocks were offered in replacement of the expected loss of leased land. No decision was made on this matter. Then in July 2018, James was successful in the tender for the partial lease of the Redbank property.
- On 14th March 2019, consultation with James on the potential to establish a covenant on a section of land on the Redbank lease. Note the establishment of covenants had already been flagged as part of the tender process. James identified an area of lease which could be appropriate for the establishment of an ecological covenant.

8.7 WAITAKI DISTRICT COUNCIL AND OTAGO REGIONAL COUNCIL

OceanaGold has also had early and ongoing consultation with both regulatory authorities. The meetings and site visits that have occurred prior to lodgement are set out below:

- 24th January 2018 – Combined meeting and site visit with Otago Regional Council and Waitaki District Council staff[61] included presentation of the Deepdell North Stage III design and outcome of the initial screening to determine the studies required for the AEE.

[61] ORC: Chris Shaw (Consent Manager), Tracey Winter, Elyse Neville (Consenting Officer), Tracey Diack WDC: Hamish Barrell (Planning Manager), Sherilyn Byron (Planning Officer).

- 3rd May 2018 – Site visit and meeting with Waitaki District Council in conjunction with Otago Regional Council, Department of Conservation staff and representatives of the Macraes Community Incorporated (MCI) [62], specifically to discuss terrestrial and freshwater ecological effects of Deepdell North Stage III and possible mitigation.
- 19th September 2019 – Site visit and meeting (Otago Regional Council[63] only) at the Macraes Gold Operation specifically to discuss the Innes Mills consent application and the Water usage consents. There was brief discussion regarding the Deepdell North Stage III project as part of new application proposals.
- 15th November 2019 – Site visit and meeting with Waitaki District Council[64] to discuss pre-lodgement, Deepdell North Stage III Project Design, key environmental and social issues and assessment of alternatives.

8.8 HERITAGE NEW ZEALAND POUHERE TAONGA

The proposed Deepdell North Stage III project was initially discussed with Heritage New Zealand Pouhere Taonga (HNZPT) in 2017 with a site visit attended by Dr Matthew Schmidt, (Senior Archaeologist for HNZPT) was held on 6 December 2017 to inspect the proposed development areas. This included inspecting the Deepdell and Evans Workings, the Bellfield Homestead and water race features on the hillside behind the Bellfield Homestead.

The Bellfield Homestead and waster race features were within the footprint of the then proposed Horse Flat WRS that has subsequently been replaced by the proposed Deepdell East Waste Rock Stack. A meeting was held at the Dunedin Office of the Otago and Southland Branch of HNZPT on 23 April 2018 where the archaeological assessments of the Deepdell and Evans area and proposed Deepdell North Stage III development area were presented and discussed with Mr Jonathan Howard, the then Otago Southland Area Manager for HNZPT. Following this, a further site visit was held on 28 September 2018 to inspect the Deepdell and Evans area in more detail. This visit was attended by Dr Matthew Schmidt and Ms Susan Irvine from HNZPT. It was confirmed that mine workings associated with the Deepdell and Evans areas are post 1900 and therefore do not require an archaeological authority to modify or destroy. A copy of the Deepdell North Stage III Archaeological Assessment, October 2019 which includes assessment of the Deepdell East Waste Rock Stack area has been supplied to Dr Matthew Schmidt of HNZPT. This assessment identified no archaeological features within the Deepdell East Waste Rock Stack and associated project area with the only sites impacted being features associated

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62 WDC: Andrew Purvis (Council Planning Consultant), Max Crowe (Biodiversity Specialist) ORC: Charles Horrell (Consenting Officer) MCI Paul Roy, John Harvie, Mat O'Connell.

63 ORC Rebecca Jackson (consenting Officer), Richard Green (Compliance Officer).

64 WDC Hamish Barrell (Planning Manager) , Anna McKenzie, (Manager Responsible for 2GP).

with the Deepdell and Evans Workings that are post 1900 and therefore do not require an archaeological authority.