ORC STAFF RECOMMENDING REPORT

ID Ref:	A926308
File No:	RM16.138
Application No:	RM16.138.01 – RM16.138.20
Prepared For:	Hearings Panel
Prepared By:	Charles Horrell, Consents Officer and Elyse Neville, Consents Officer
Date:	5 October 2016
Subject:	**Application RM16.138 by Oceana Gold (New Zealand) Limited for various actives associated with the Coronation North Pit, Coronation Pit extension and Coronation North Waste Rock Stack, Macraes Gold Project, Macraes Flat**

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1. Purpose

To report and make recommendations on the determination of the above application under the notified provisions (Section 95) of the Resource Management Act 1991 (the Act).

2. Background Information

Applicant: Oceana Gold (New Zealand) Limited

Activity:

RM16.138.01: To disturb, deposit and reclaim the bed of unnamed tributaries of Maori Hen Creek, Trimbells Gully, Mare Burn and Coal Creek for the purpose of constructing the Coronation North Waste Rock Stack.

RM16.138.02: To place a structure and disturb the bed of Coal Creek for the purpose of constructing the Coal Creek Freshwater Dam embankment.

RM16.138.03: To discharge silt and sediment to water while constructing the Coronation North Waste Rock Stack.

RM16.138.04: To discharge contaminants and water from silt ponds to unnamed tributaries of Maori Hen Creek, Trimbells Gully, Mare Burn and Camp Creek for the purpose of operating silt ponds for the Coronation North Waste Rock Stack.

RM16.138.05: To discharge contaminants to water from the base and toe of the Coronation North Waste Rock Stack for the purpose of waste rock stack disposal.

RM16.138.06: To discharge water from Coronation North Pit lake to unnamed tributaries of Maori Hen Creek, Trimbells Gully, Mare Burn and Camp Creek.

RM16.138.07: To discharge silt and sediment to Coal Creek for the purpose of constructing the Coal Creek Freshwater Dam.

RM16.138.08: To discharge water from the Coal Creek Freshwater Dam to Coal Creek for the purpose of operating the Coal Creek Freshwater Dam and supplementing flows in Coal Creek and Mare Burn catchments.

RM16.138.09: To discharge waste rock and contaminants from waste rock to land for the purpose of constructing the Coronation North Waste Rock stack.

RM16.138.10: To discharge waste rock to land within the Coronation North Pit for the purpose of disposing of waste rock.

RM16.138.11: To take surface water for the purpose of dewatering Coronation North Pit.

RM16.138.12: To take surface water for the purpose of creating the Coronation North Pit Lake.

RM16.138.13: To take groundwater for the purpose of dewatering Coronation North Pit

RM16.138.14: To take groundwater for the purpose of creating the Coronation North Pit Lake.

RM16.138.15: To divert water around the open pit known as Coronation North Pit for the purpose of preventing surface water ingress and managing the surface water runoff.

RM16.138.16: To divert water for the purpose of constructing Coal Creek Freshwater Dam.

RM16.138.17: To dam water in Coronation North Pit for the purpose of creating the Coronation North Pit Lake.

RM16.138.18: To dam water in for the purpose of operating Coal Creek Freshwater Dam.

RM16.138.19: To discharge contaminants to air from mining operations and post mining rehabilitation to air for the purpose of undertaking mining operations at Coronation North Pit, Coronation Pit extension and Coronation North Waste Rock Stack.

RM16.138.20: To permanently divert water around the Coronation North Waste Rock Stack and into unnamed tributaries of Maori Hen Creek, Trimbells Gully, Mare Burn and Coal Creek for the purpose of preventing surface water ingress and managing stormwater runoff.

Location: Macraes Gold Project, approximately 6.5 kilometres to the northwest of the intersection of Macraes Road and Red Bank Road, Macraes Flat.

Reason: For various actives associated with the Coronation North Pit, Coronation Pit extension and Coronation North Waste Rock Stack.

2.1 Proposed Activities

2.1.1 Overview

The Macraes Gold Project ("MGP") is the largest goldmine in New Zealand and since the commencement of operations, 4.4 million ounces of gold has been produced. The MGP site is located approximately 30 kilometres (km) to the northwest of Palmerston. The existing mining operation is located 1 to 2 km to the east of the Macraes township and is predominantly surrounded by farmland. The applicant is proposing to expand on the current Coronation Project at the site. The proposed Coronation North Project is located to the north of the existing mining operations.

Key features of the proposed Coronation North Project (the Project) are:

- The Coronation North Project continues to be located on the ridgeline to the north of Horse Flat Road along the Shag River and Taieri River catchment divide, situated between the features known as Sister Peaks and Highlay Hill;

- Development will continue to be within the upper reaches of Maori Hen Creek, the Mare Burn and Trimbells Gully Creek (Taieri Catchment).
- The estimated duration of the operation and rehabilitation phases of the Project will be approximately 5 years and the project will add approximately 3 years to the overall MGP mine life.
- Mining operations will occur 24 hours a day, 7 days a week.
- The existing Coronation Pit, which is currently consented to cover an area of about 62 hectares (ha) will be extended primarily to the south to cover an area of approximately 85 ha (an increase of 23 ha). The existing pit was estimated to contain approximately 5 Mt (Million tonne) of ore, and exploration activity has confirmed additional ore is present. The estimated ore contained in the revised pit (including that which has already been processed) is approximately 8.5 Mt. A pit lake, similar to that currently consented will remain on closure.
- A resource has been identified within the area of the consented Coronation Waste Rock Stack which will be mined, and a new open pit (Coronation North Pit) will be developed. The Coronation North Pit is estimated to contain approximately 9 Mt of ore (for total additional ore stocks comprised in this application of 12.5 Mt) and will cover an area of about 63 ha. The Coronation North Pit will be opportunistically partially backfilled where practicable and will be closed as a pit lake.
- The ore mining rate for the Pits will be approximately 5 Mt per annum or 20 Mt of material excavated per pit, per annum.
- The existing Coronation Waste Rock Stack will not be constructed to the fully consented extent. The total volume of waste rock will reduce from a currently consented 94 Mt (an area of approximately 105 ha) to approximately 29 Mt (an area of approximately 41 ha). This is a reduction of approximately 65 Mt and 64 ha in area.
- A new waste rock stack (Coronation North Waste Rock Stack) will be constructed to the north east of the consented Coronation Waste Rock Stack. The waste rock stack design is capable of containing the total excavated waste material from Coronation North Pit and the Coronation Pit expansion (approximately 280 Mt). It is designed to a maximum height of 695 mRL and a maximum potential area of 230 ha. With the potential for opportunistic backfill placement within the Coronation pits, the size of the waste rock stacks may reduce in proportion to the amount of backfill placed in the pits. There will be no change in the maximum height of the currently consented Coronation waste rock stack (730 mRL).
- All water from the Coronation North Pit and Coronation North Waste Rock Stack is expected to report to the Mare Burn catchment, a tributary of the Taieri River.
- A freshwater dam may be constructed within the Coal Creek catchment. The proposed dam will consist of an embankment with an approximate height of 27 m behind which approximately 670 million litres of water will be stored when at full capacity, with a footprint of approximately 9.3 ha. This dam will provide a constant water supply downstream, of approximately 5 litres per second, to supplement naturally occurring low flows in Coal Creek and Mare Burn for water quality purposes.
- Surface water runoff around the pits, waste rock stack(s) and haul road will be managed with diversion drains and silt control dams located in gullies downstream of disturbed areas. Sediment control will be installed prior to any disturbance within each catchment area.

- Surface water and groundwater collected in the pits during operations will be pumped out to a water sump adjacent to the pits. Water from the sump will be used for dust control and any surplus water will be discharged via a silt pond.
- The closure plan will comprise progressive rehabilitation of the Coronation and Coronation North Waste Rock Stacks, opportunistic backfilling of the pits during operations, formation of pit lakes within both pits, removal of any buildings and other temporary structures, decommissioning of the silt ponds to become stock water ponds, removal of the haul road crossing over Horse Flat Road, rehabilitation of the main haul road from the pits and waste rock stacks to Horse Flat Road and reinstatement of Matheson Road on a new alignment. On the completion of mining Golden Point Road will be reopened for public access.

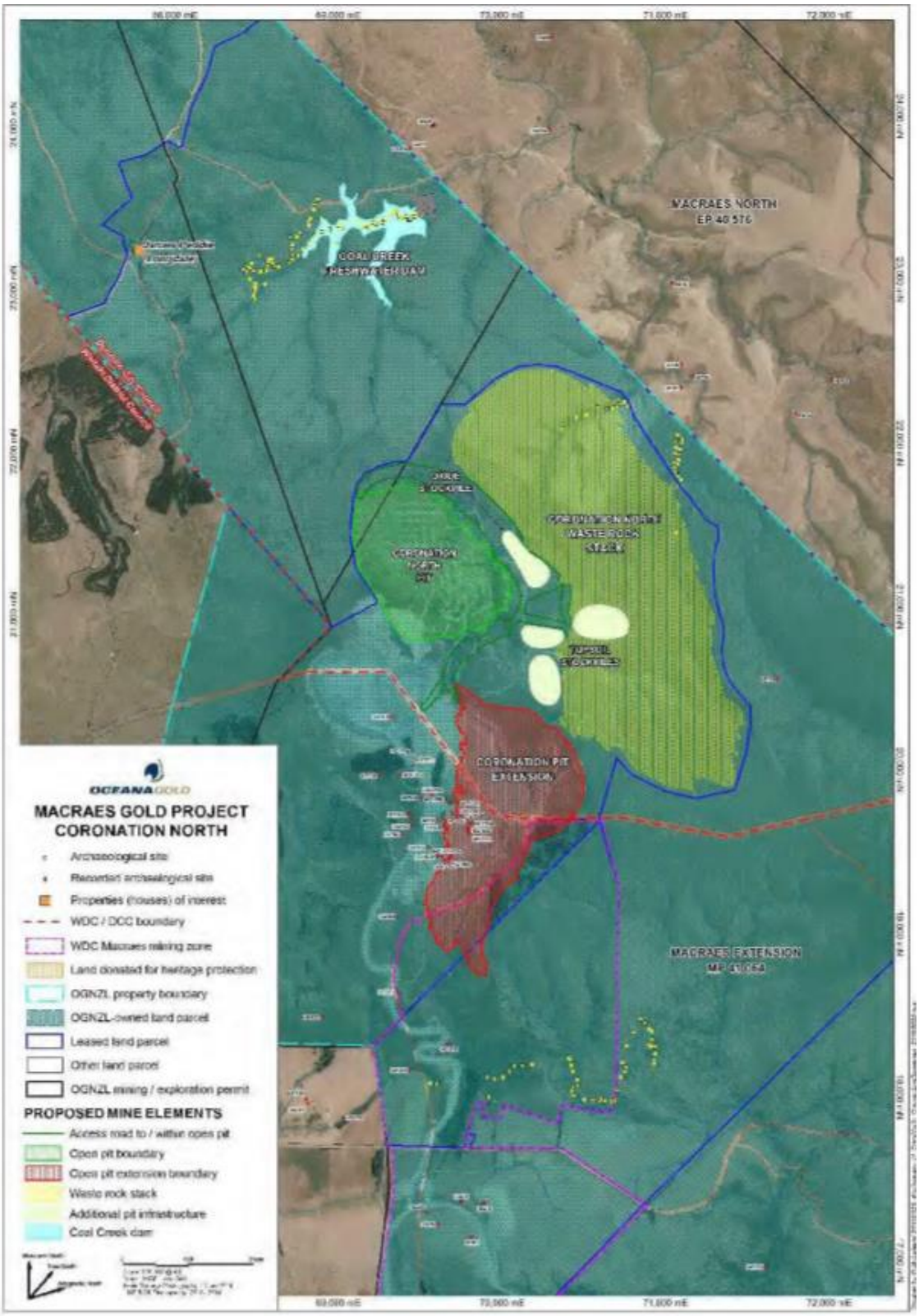

Figure 1: Location of Coronation Pit Extension, Coronation North Pit and Coronation North Waste Rock Stack

2.1.2 Project Description

Extraction and Processing

The Coronation North Project will be carried out, managed and monitoring on substantially the same basis as the consented Coronation Project during operations in terms of mining methods, operating 24 hours a day, seven days a week, drilling and

blasting, use of the existing fleet of diesel powered mining equipment, transport movements, dust management, surface water and groundwater management, sediment control, progressive rehabilitation of waste rock stacks, and opportunistic backfilling of pits during operations.

Open pit mining at the Coronation North Pit will use standard blasting and ripping methods used at the MGP since operations commenced, using a diesel powered mobile fleet of equipment. Ore and waste rock will continue to be drilled and blasted with blasting done on average 3 to 5 times per week during daylight hours. In practice this will represent little change from current MGP operations.

Hydraulic excavators will then load the fleet of dump trucks, which will transport the ore to the run of mine stock-piles located at the MGP processing plant or low grade stockpiles for later re-handling. Waste rock will be hauled to the nearby Coronation North Waste Rock Stack (Coronation North WRS) for final deposition. A fleet of support equipment such as bulldozers, graders and water carts will assist the main mining fleet. Ore from the Coronation North Project will be processed at the MGP processing plant. The processing rate at the MGP processing plant will be unchanged by the Coronation North Project

The CNWRS slopes have been designed both to ensure stability and to mirror similar slopes as occur naturally in the area. The construction process for the WRS will generally be the same as currently employed for the construction of other WRSs at the MGP and will include:

- Involvement of a landscape architect in the design phase;
- Fencing and making the area safe;
- Topsoil stripping and storage or if available, direct relocation to another rehabilitation ready area;
- Construction of a perimeter safety bund, to protect from rolling rocks;
- Direct mine truck dumping and pushing by dozers in vertical lifts not exceeding 20 m.

Rehabilitation of the WRS will be undertaken by mining equipment on a progressive basis, meaning that rehabilitation occurs once a section of a WRS is complete rather than waiting until the whole stack is completed. Once final profiles are achieved in a section of the WRS a 300 mm layer of brown rock (highly weathered schist) will be placed over the fresh waste rock and track rolled down with a dozer. A 150 mm layer of topsoil will be placed on top of the brown rock layer. Fertilising and seeding of vegetation shall then be undertaken, with use of both native plants and exotic pasture seed that is compatible with existing vegetation patterns on the site, to return the ground to agricultural pasture.

Access to the Coronation North Project from the MGP processing plant will be via the existing Deepdell and Coronation haul roads. There will be no change to these roads as a result of the Coronation North Project. The access road to the Golden Point Historic Reserve and Horse Flat Road itself will both remain open to the public during the Project. Golden Point Road will be temporarily closed.

General Ground and Surface Water Management

The areas of disturbed land associated with the Coronation North Project that will require erosion and sediment control are:

- Coronation North WRS;
- Coronation and Coronation North Pit perimeters; and
- Haul road extensions.

Prior to commencement of construction, Erosion and Sediment Control Plans (ESCP) will be prepared. The ESCPs will detail the design of specific erosion and sediment control devices, responsibilities for implementation, construction details and standards, construction timetable, maintenance, monitoring and reporting procedures, response to storm events and contingency measures. The ESCPs will incorporate modern erosion and sediment control practices that are documented in the Environment Canterbury (ECan) Guidelines (Environment Canterbury, 2007, *Erosion and Sediment Control Guidelines*) except that site specific design criteria will be adopted for sizing silt ponds based on experience at the site. In general terms, the design of erosion and sediment control measures will follow existing practice. Specific erosion and sediment control measures will include:

- Clean water diversion drains with small dams located in gullies where necessary to divert runoff into the diversion drains;
- Silt ponds downstream of disturbed areas. Permanent silt ponds will be designed according to existing criteria. The sizing depends on the catchment area and runoff coefficient. Decants similar to those currently on site will be adopted. Service and emergency spillways will be provided and designed to pass the flows from 10 year and 100 year return period rainfall events;
- Shoulders of the Coronation North WRS are progressively rehabilitated and will have benches every 20 m vertical height to control runoff;
- Perimeter surface water drains located around the perimeter of the Coronation North WRS and Pits where appropriate, to ensure runoff is conveyed to the base of gullies without erosion;
- Progressive stripping of the Coronation North WRS footprint, with shaping only undertaken in dry weather conditions.

Temporary diversion drains will be constructed on the upstream catchment side of the haul road and the water directed to the natural drainage gullies. Where the haul road crosses gullies, culverts will be constructed in the bottom of the fill to allow the continued flow of storm water runoff down the gully. Silt ponds will be constructed along the length of the haul road to collect storm water runoff from the haul road surface in accordance with ECan Guidelines.

The applicant has stated that the proposed silt ponds will not breach any of the permitted standards (Rules 12.3.2.1 and 13.2.1.3) in the Regional Plan: Water for Otago and therefore will not require any resource consents.

When mining is completed in the area, the silt ponds could be retained as permanent stock water ponds or perhaps as wetlands.

Groundwater bores will be located around the perimeter of the Coronation North WRS for in-house monitoring of the groundwater movement and chemical constituents to the Mare Burn catchment. This data will be used to refine the groundwater model and to refine the model of pit lake formation.

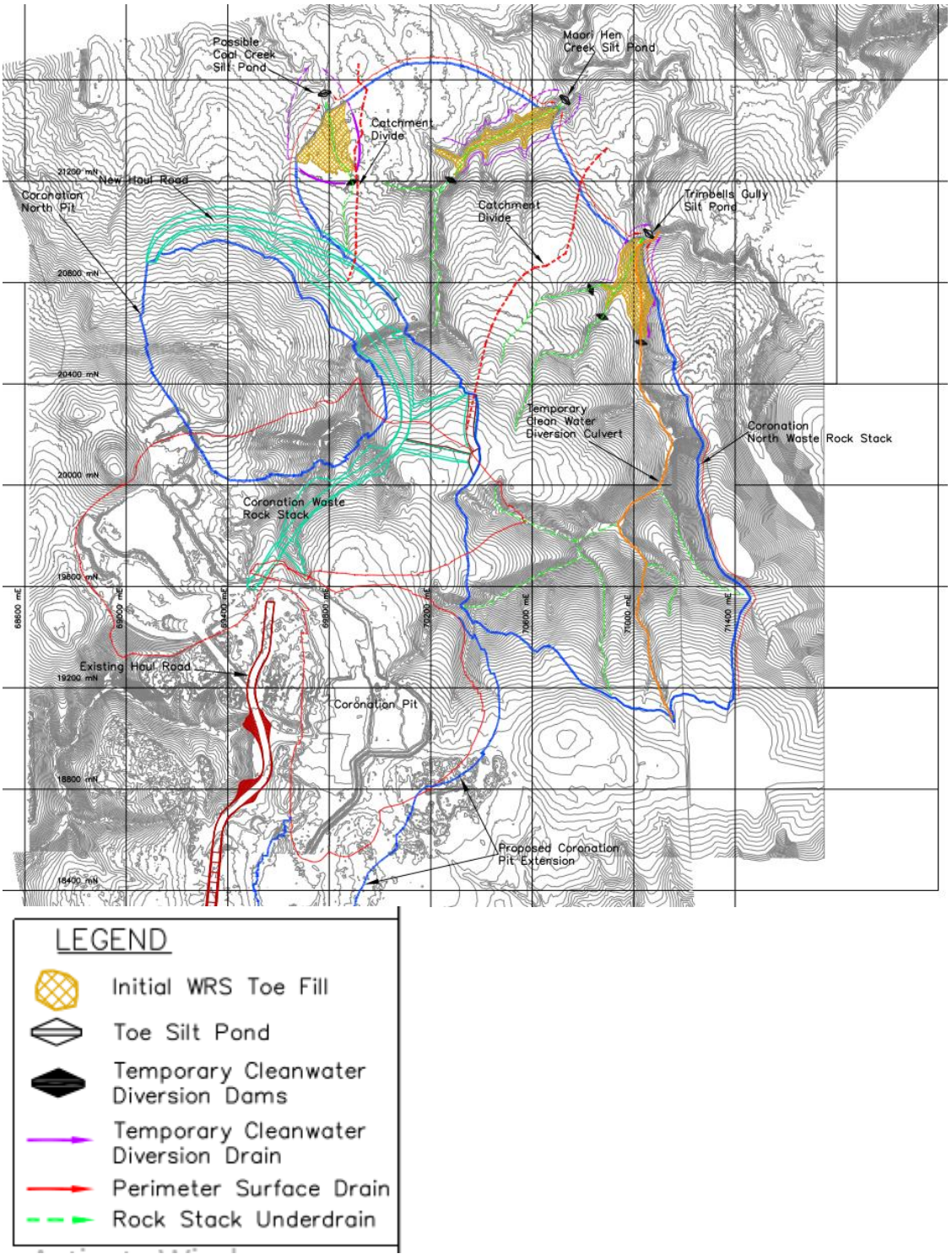

Figure 2: Erosion and Sediment Control Features

Modelling of future water quality has been undertaken to assess the impact of mining related surface water flows. These studies have shown there is a potential deterioration in some of the water quality for creeks downstream of the Coronation North Project unless management strategies are put in place.

The applicant has determined that the construction of a freshwater dam in Coal Creek is presently the most appropriate option to supplement low flows in the Mare Burn and reduce sulphate concentration. While the applicant is currently seeking to consent the Coal Creek Freshwater Dam, it has stated that further investigation will be required in

the form of a best practice options (BPO) report to clarify mitigation options that may be utilised together with, or instead of, the dam. The findings of this report will be made available to the consent authorities. Figure 3 below shows the location of the proposed Coal Creek Freshwater Dam.

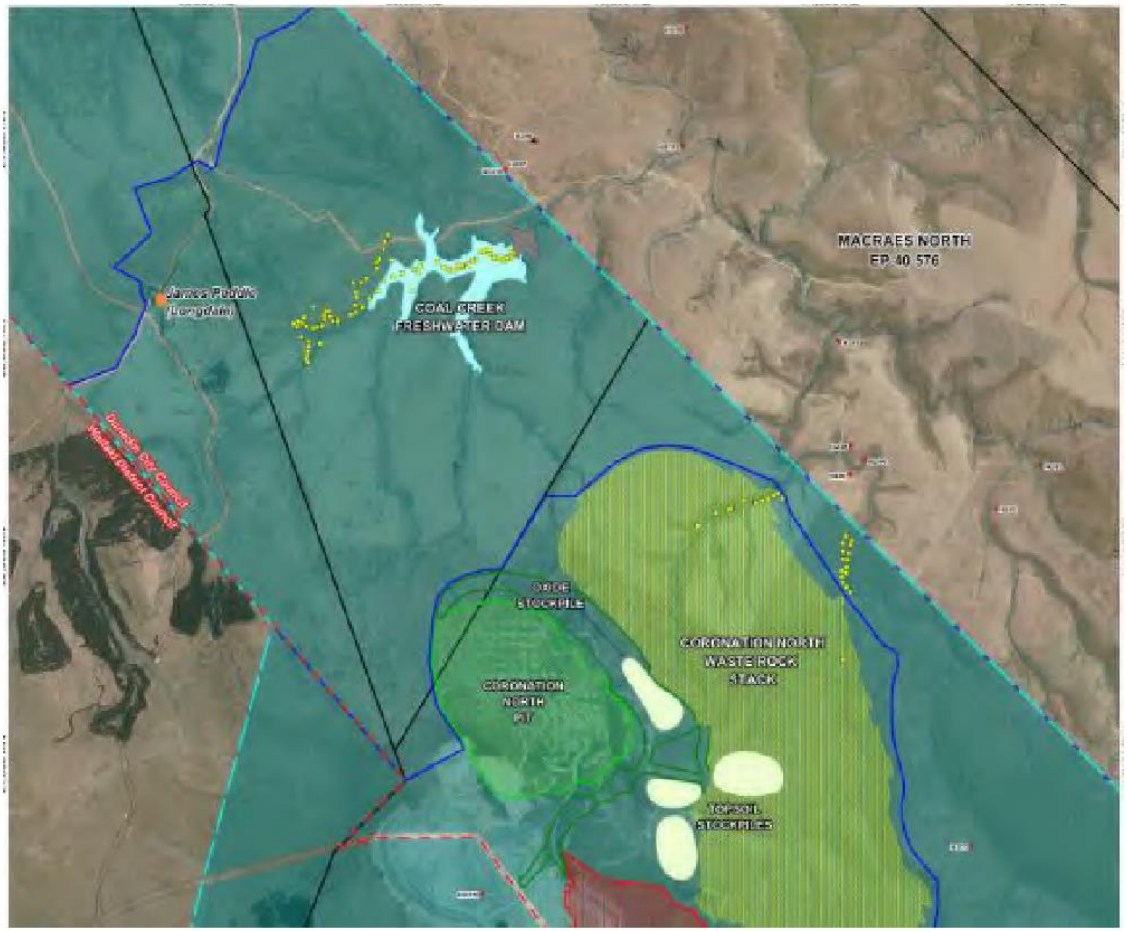

Figure 3: Location of Coal Creek Freshwater Dam

Closure and Rehabilitation

Rehabilitation is an integral part of the mining operation and a key issue considered in all mine planning. The approach to rehabilitation taken for the Coronation Project includes the following features:

- The surface area disturbed at any one time is the minimum necessary compatible with day to day operations.
- All statutory obligations are met.
- The sites are rehabilitated as soon as possible to a safe and stable condition.
- All contaminants on site are contained and treated in such a manner that they do not pose a long term safety or environmental hazard.
- A suitable sustainable post-mining land use is achieved.

Rehabilitation will be undertaken progressively in order to minimise areas of disturbance. As areas are rehabilitated one of the objectives that must be achieved is that they are left safe and stable. Vegetation on finished area must be visually integrated into the landscape and the land must be returned to its original productive capacity where appropriate. The applicant is precluded from planting certain exotic species in accordance with the requirements of local regulatory authority plans.

In-pit backfill options will be evaluated over the life of the Coronation North Project along with economic factors and, where it is viable, will be utilised to reduce the size of the Coronation North WRS. At closure, a pit lake will naturally form in the Coronation and Coronation North Pits.

The Coronation North WRS will be constructed in such a manner that should it not be constructed to fully consented limits it can be rehabilitated in accordance with the final design slopes and contours proposed.

As part of mine closure the Coal Creek Dam impoundment will remain in place and will provide water fowl habitat.

In summary, the Coronation North Project closure involves completing rehabilitation with native and pasture vegetation, undertaking such drainage works as will accelerate filling of Coronation Pit Lake, construction of an engineered overflow on the pit rim, re-opening Golden Point Road to the public and rehabilitation of the haul roads leaving a single lane vehicle access track.

2.2 Description of the Environment

2.2.1 General

The MGP is located within a relatively remote rural part of the Waitaki District. Other than mining, the area supports typical farming activities dominated by sheep and cattle grazing, and some areas of plantation forestry and deer farming. The MGP is by far the dominant economic activity in the area. The nearby township of Macraes Flat provides a focal point for the local community, including people associated with the mine who live locally. The township comprises a small number of dwellings, a primary school, church and a hotel and mine visitor centre (both owned by the applicant).

The applicant owns the land upon which the Coronation North Project is to be located. including two residences. The applicant leases properties to the Howard and Peddie families, who have also been consulted about the Project.

2.2.2 Climate

Rainfall at the Macraes Mine is slightly seasonal, with the greatest rainfall occurring during the summer months of December and January. Throughout the remainder of the year the rainfall is relatively consistent. Rainfall data for the period 1959 - 2015 for Macraes Flat, compiled from Glendale and more recently Golden Point Road rain gauges, has been used to establish a statistical distribution for rainfall. The mean rainfall was 634 millimetres per year (mm/year) with a standard deviation of 122 mm/year.

From previous hydrological studies carried out at the MGP it is estimated that approximately 80% of the mean rainfall is lost from the area through evaporative process. These processes include evaporation from surface water features (such as streams and ponds) and the soil capillary fringe, as well as transpiration.

2.2.3 Geology

The eastern area of Otago is underlain principally by Mesozoic age schist of the Torrlesse Terrane. Weathering and erosion over a long period formed the distinctive

low relief of the Otago peneplain (ancient erosional surface). The landscape in the Macraes area comprises widespread outcrops of schist and thin cover soils. The Hyde-Macraes Shear Zone, which is the gold bearing structure mined by the applicant, dips gently (-15ºC) to the east.

2.2.4 Topography and Soils

The topography of the Macraes Flat area is that of an ancient erosional surface, or peneplain, which has been bisected by Deepdell Creek, Camp Creek to the south and Maori Hen Creek and Trimbells Gully to the north. Deepdell Creek, which flows toward the northeast discharges into the Shag River. Maori Hen Creek and Trimbells Gully discharge into the Taieri River.

Exploratory and geotechnical drilling and landform comparison indicates that a thin layer of loess covers much of the MGP area. The loess soils comprise a very stiff, light yellow grey silt, sandy silt or silty fine sand. Subsurface investigations identified a surficial cover of loess, colluviums and topsoil.

Colluvium has accumulated at the base of steep slopes around the Coronation Project site. Colluvium mainly comprises fine angular schist gravel in a sandy or silty matrix, with the matrix mainly derived from reworked loess. The soils are directly underlain by schist comprising well foliated, fine grained pelite to coarser grained psammite.

2.2.5 Surface Water

The proposed Coronation North Project is situated on the ridgeline along the Shag River and Taieri River catchment divide. Surface runoff and seepage will report to Coal Creek, Maori Hen Creek and Trimbells Gully Creek which all contribute to the Mare Burn within the Taieri River catchment.

The Coronation North Project is situated entirely within the Mare Burn catchment. The estimated catchment area is dependent on where the compliance point is location, as shown below in Table 1. A new surface water compliance monitoring point (MB02) is proposed downstream from the current compliance monitoring point (MB01) as the Coronation North Project will affect water quality downstream from MB01. It is proposed that MB02 will become the compliance point for the Coronation North Project.

Table 1: Estimated catchment areas of Coronation North Project elements.

Stage	Catchment	Area (ha)	Total Area (ha)	Comments
Baseline	Undisturbed	1,384	1,384	Areas calculated to existing compliance point at MB01
Pre-mining	Undisturbed	2,930	2,930	Areas calculated to existing compliance point at MB02
Mining Coronation North	Impacted	127	2,987	Areas calculated to proposed compliance point at MB02
	WRS	234		
	Undisturbed	2,626		
Post closure	Impacted	180	2,987	Areas calculated to proposed compliance point at MB02
	WRS	234		
	Undisturbed	2,573		

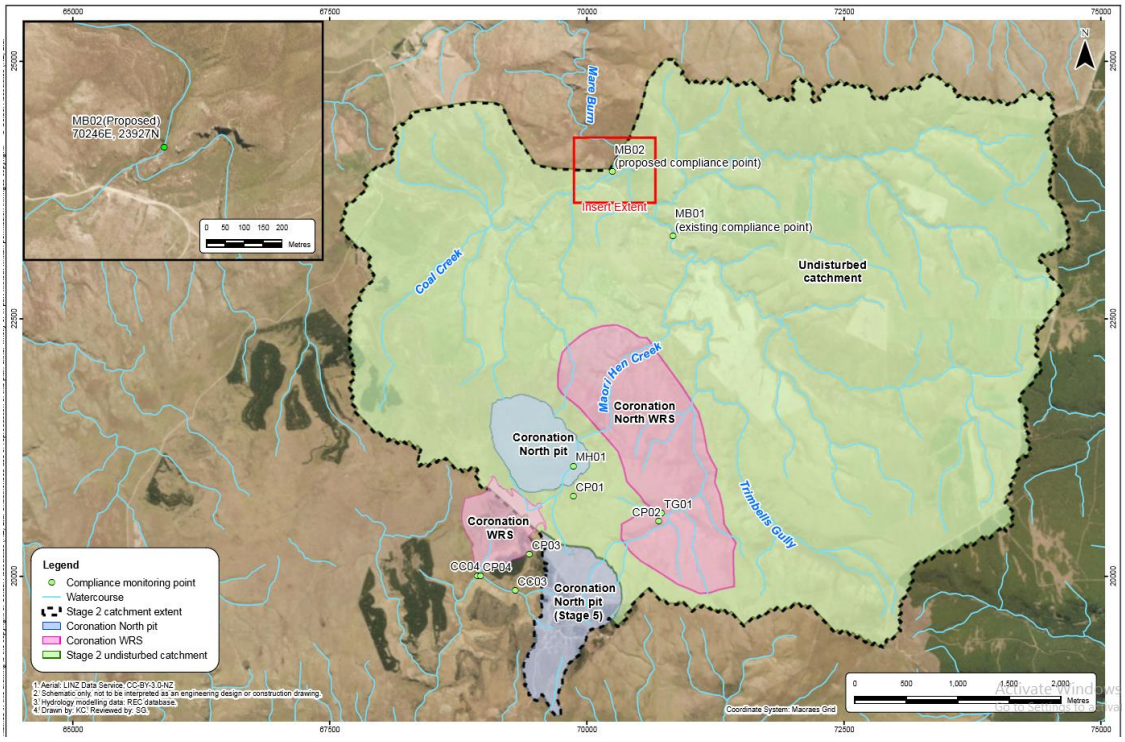

Figure 4: Existing MB01 Compliance Point, Proposed MB02 Compliance Point and Catchment Areas

Flows in Deepdell Creek have been monitored at the Deepdell Creek flow gauge at Golden Point weir since 1985. Rainfall records have been monitored at the same location since 1991. There are some gaps in the flow record, so rainfall data was used to fill the gaps in the flow record and produce a modified flow record for use in the water modelling for this project. The flow statistics are shown below in table 2.

Table 2: Deepdell Creek flow statistics

Parameters	Min	Lower Quartile	Median	Average	Upper Quartile	Maximum
Instantaneous (L/s)	0.0	10.7	28.1	110.1	83.5	73,695
Daily Average (L/s)	0.0	10.7	28.7	108.2	85.0	44,220
Instantaneous (L/s/km²)	0.00	0.26	0.69	2.70	2.05	1,806
Daily average (L/s/km²)	0.00	0.26	0.70	2.65	2.08	1,084

Given the climate, geology and elevation of the Mare Burn catchment, it is likely to be hydrologically similar to Deepdell Creek. For the purposes of understanding the likely flow regime of the Mare Burn, specific flow data from Deepdell Creek has been utilised and scaled to the Mare Burn catchment area upstream from the MB01 compliance site and the proposed MB02 site. This data are shown below in Table 3.

Table 3: Mare Burn derived flow statistics

	Min	Lower Quartlie	Median	Average	Upper Quartile	Maximum
MB01 Daily average (L/s)	0.0	3.6	9.7	36.6	28.8	14,960
MB02 Daily average (L/s)	0.0	7.7	20.6	77.7	61.0	31,760

Surface water quality is currently monitored across the MGP site and beyond. Some of the monitoring points are used as compliance points i.e. compliance with the relevant water quality standards is to be achieved at these points as required by the relevant consents.

Compliance Limits

Existing compliance criteria for the current Coronation Project compliance point MB01 are presented in Table 4 along with the consented Deepdell Creek compliance criteria for comparison. These proposed criteria have been compared to New Zealand Drinking Water Standard (NZDWS) 2008 and the ANZEC stock water standards.

Table 4: Water quality compliance criteria

Parameter	Exisiting at MB01	*Deepdell Creek at DC07*	*ANZEC 2000 (stock water)*	*NZDWS 2008*
pH (unitless)	6.0-9.5	*6.0-9.5*	-	*7.0-8.5*
Sulphate	1,000	*1,000*	*1,000*	*250*
$Cyanide_{WAD}$	0.1	*0.1*	*N/A*	*0.08*
Arsenic	0.15	*0.15*	*0.5*	*0.01*
$Copper^{(1)}$	0.009	*0.009*	*0.5*	*2*
Iron	1.0	*1.0*	*N/A*	*0.2*
$Lead^{(1)}$	0.0025	*0.0025*	*0.1*	*0.01*
$Zinc^{(1)}$	0.12	*0.12*	*20*	-

Notes: All units in g/m^3 unless otherwise stated.

(1) Copper, lead and zinc standards are hardness related.

a) Copper Limit (g/m^3) = $\frac{0.96.e^{0.8545[\ln(\text{hardness})] - 1.702}}{1000}$

b) Lead Limit (g/m^3) = $\frac{(1.46203 - [\ln(\text{hardness})(0.145712)].e^{1.273[\ln(\text{hardness})] - 4.705}}{1000}$

c) Zinc Limit (g/m^3) = = $\frac{0.986.e^{0.8473[\ln(\text{hardness})] + 0.884}}{1000}$

Schedule 1B of the Regional Plan: Water

Schedule 1B of the Regional Plan: Water for Otago (RPW) outlines water supply values of Otago's surface water bodies. The Mare Burn is not listed within this schedule; however, the Taieri River is identified as having water supply values. The closest take on the Taieri River is at Outram, over 80 km downstream from the proposed activities.

2.2.6 Groundwater

The transport of mining related elements within groundwater has previously been assessed to evaluate transport rates. The elements for the Coronation North Project which are derived from the opencast pits and waste rock stacks will almost entirely discharge to surface water bodies within the Mare Burn catchment upstream from a proposed surface water monitoring point and compliance point at MB02.

Groundwater seepage through the Coronation North WRS has been calculated based on a rainfall infiltration rate of 32 mm/year, which is equivalent to the regional groundwater recharge rate. This assumption with respect to infiltration rate has been

based on the calibration of groundwater flow and contaminant transport models developed for the wider MGP. The infiltration rate for the entire planned WRS which is 233.5 ha in area, average approximately 205 m3/day. It is expected that this discharge rate will vary slightly on a seasonal and annual basis, and potentially over shorter periods in response to major rainfall events.

Table 5: Coronation North WRS seepage areas and rates

Seepage discharge location	WRS infiltration area (ha)	WRS seepage rate (m^3/day)
Main WRS seepage discharge point	142.4	124.8
Maori Hen Gully	73.7	64.6
Coal Creek 1	3.7	3.2
Coal Creek 2	13.7	12.0
Total	**233.5**	**204.7**

The development of, and seepages from the Coronation and Coronation North Pits has been modelled by Golder Associates. As the pit lakes approach overflow, small seepage losses through the soils and schist bedrock are expected to develop. These seepage flows are small compared to the inflows to the pit but may affect the rate of pit lake development. Modelling indicates that the Coronation pit lake will take in the order of 160 years to fill and Coronation North pit lake will fill to overflow in around 400 years.

2.2.7 Ecology

The proposed Coronation Project is situated within the Macraes Ecological District (ED), which is one of the two Ecological Districts that make up the Lammerlaw Ecological Region. The area has been heavily modified by over 120 years of farming. As a result the present vegetation of the Macraes ED is of a highly modified nature with a large amount of the district dominated by improved pastureland. The wider Macraes Flat area has a high diversity of threatened and uncommon plants and is considered a stronghold for several threatened plant species. These species of interest are widespread in the Macraes ED.

The Coronation North Project area lies in the upper catchment of Coal Creek and Maori Hen Creek, the Mare Burn and Trimbells Gully Creek which are tributaries of the Taieri River.

The New Zealand Freshwater Fish Database (NZFFD) identifies a number of fish communities to be present within the Mare Burn catchment, this information is summarised in Table 6 below as well as showing five other nearby tributaries of the Taieri.

Table 6: Number of NZFFD records for fish species identified in the Mare Burn catchment and five other nearby tributaries of the Taieri River (database accessed February 2016).

Fish species	Mare Burn	Cap Burn	Filly Burn	Horse Burn	Prices Creek	Scrub Burn
Brown trout (*Salmo trutta*)	4	1			2	1
Flathead galaxias (*Galaxias depressiceps*)	1	5		1		
Galaxias species (unidentified)	1	1				1
Longfin eel (*Anguilla dieffenbachii*)	3		1			
Roundhead galaxias (*Galaxias anomalus*)					1	3
Shortfin eel (*Anguilla australis*)	1					
Upland bully (*Gobiomorphus breviceps*)						1

Although there are a number of species recorded in the Mare Burn, Council's Resource Science Unit (RSU) has noted that only Freshwater crayfish or Koura and Taieri flathead galaxias are present in the area of Mare Burn that is directly affected by Coronation North Project. A barrier located downstream of the affected area separates the presence of Trout or Eel species.

Freshwater crayfish, which are classified by the New Zealand Threat Classification System (NZTCS) as 'At Risk – Declining', are widespread and relatively common in Maori Hen Creek, Trimbells Gully tributary and mainstem and Coal Creek within the potentially affected area. Taieri flathead galaxias, which are classified by the NZTCS as 'Threatened – Nationally Vulnerable', are present in the tributaries of the Mare Burn from Coal Creek up to the confluence with Trimbells Gully. Assessments by Ryder Consulting over recent years have not identified the presence of any suitable salmonid spawning habitat, nor have any salmonids been caught in Mare Burn tributaries. It is likely that this type of habitat is located further downstream in the catchment and well outside of the proposed Project area. Barriers to upstream passage are also likely to restrict the presence of salmonids in the upper Mare Burn catchment. Eel abundance in the vicinity of the tributaries subject to existing and proposed mining operations is very low to non-existent, with only one eel having been observed since surveying began in 2012. Therefore, significant eel populations are not at risk from existing or proposed mining operations associated with the Coronation North Project.

Wetlands

The Coronation North Project Area does not contain any wetlands of National Importance or Ramsar sites. There are no wetlands identified as Regionally Significant, including any wetlands 800 metres above sea level within the Coronation North Area.

Schedule 1A of the Regional Plan: Water

Schedule 1A of the Regional Plan: Water for Otago (RPW) outlines the natural and human use values of Otago's surface water bodies. The Mare Burn is identified as having the following values:

- Presence of significant fish spawning areas for trout.
- Presence of significant areas for development of juvenile trout.
- Presence of riparian vegetation of significance to aquatic habitats.

2.2.8 Heritage Values

The Macraes district consists of a complex and extensive heritage landscape. Currently the applicant uses the Oceana Gold Heritage Management Plan to assist in identifying and protecting significant archaeological sites. The Management Plan was developed with the objective of ensuring that "*identified heritage sites (including*

archaeological sites both pre- and post- 1900 in origin) would only be modified or destroyed where no other reasonable options exists". Historic sites that will be affected by the proposed Coronation Project works are detailed below.

Coronation North Waste Rock Stack

- One water race (I42/86) that starts at the northern tributary of Trimbells Gully, continuing into Maori Hen Creek then through the true left of Trimbells Gully. Segments of this race will be destroyed by the Coronation North WRS. The proposed Coronation North WRS will disturb a series of water races in Trimbells Gully and sites in Maori Hen Creek.
- Remains of a Miner's house with associated alluvial workings in the nearby creek. A single upright stone slab has been placed in the centre of a platform demarcated by rectangular earthworks (I42/222).

Coronation North Pit

The proposed Coronation North Pit will not directly impact upon any identified sites.

Coronation North Roads and Infrastructure

The proposed pit infrastructure will not directly impact upon any identified sites.

Coal Creek Freshwater Dam

- The creation of Coal Creek Freshwater Dam will destroy stone revetting and associated features of the main mine for the New Zealand Gold and Tungsten mine (I42/97).
- The remains of the battery for the New Zealand Gold and Tungsten Mine, located within Coal Creek. This site should be considered part of the larger mine complex of site I42/97 (I42/98).
- Early Coal Creek alluvial workings scattered along both sides of the creek for a considerable length. (I42/221)

Five other sites exist within the project area, but should not be impacted by the proposed mining activity.

Schedule 1C of the Regional Plan: Water

Schedule 1C of the Regional Plan: Water identifies registered historic places which occur in, on, under or over the beds or margins of lakes and rivers. There are no Schedule 1C values listed that are in close proximity to the proposed activities.

2.2.9 Cultural Values

The Coronation Project is situated within the takiwās of Kāti Hūirapa Runaka Ki Puketeraki, Te Runanga o Moeraki and Te Runanga o Otakou. In recognition of their special affinity with the area, the applicant entered into a Memorandum of Understanding with Kāti Hūirapa Runaka Ki Puketeraki on 6 December 2004. The objective of the Memorandum of Understanding was to establish an effective and efficient working relationship between the applicant and Kāti Hūirapa Runaka in relation to their specific interests in the area, and in particular to:

- Manage the effects of mining and other related activities so as to take into account and have regard to the spiritual and cultural values and customary rights of mana whenua as they apply to the use and management of natural and physical resources;

- Ensure the effects of mining are remedied, avoided or mitigated as required by the Resource Management Act 1991 and having regard to the interests of Kati Huirapa Rünaka;
- Manage the effects of mining as far as practicable, so as to specifically avoid, remedy or mitigate any adverse effects on waahu tapu, mahika kai and waahi taoka;
- Ensure timely consideration by Kāti Huirapa Rūnaka of any proposals for resource consents made by Oceana Gold, and to ensure that wherever possible Kāti Huirapa Runaka provides its written approval to such consent applications;
- Provide necessary and other relevant information to ensure effective and informed consultation as outlined in the terms and reference;
- Develop and maintain an ongoing and meaningful consultative process between mana whenua and Oceana Gold; and
- Establish a Trust with mana whenua representation responsible for the future development and monitoring of Macraes Mine beyond mine life.

The applicant has stated that they seek to complete a similar Memorandum of Understanding with Te Runanga o Moeraki and Te Runanga o Otakou.

Schedule 1D of the Regional Plan: Water

Schedule 1D of the Regional Plan: Water identifies the spiritual and cultural beliefs, values and uses associated with water bodies of significance to Kai Tahu. The Mare Burn is not listed in this schedule. The Taieri River is identified as having the following values:

- ***Kaitiakitanga:*** *the exercise of guardianship by Kai Tahu, including the ethic of stewardship.*
- ***Mauri:*** *life force.*
- ***Waahi tapu and/or Waiwhakaheke:*** *sacred places; sites, areas and values of spiritual values of importance to Kai Tahu.*
- ***Waahi taoka:*** *treasured resource; values, sites and resources that are valued.*
- ***Mahika kai:*** *places where food is procured or produced.*
- ***Kohanga:*** *important nursery/spawning areas for native fisheries and/or breeding grounds for birds.*
- ***Trails:*** *sites and water bodies which formed part of traditional routes, including tauraka waka (landing place for canoes).*
- ***Cultural materials:*** *water bodies that are sources of traditional weaving materials (such as raupo and paru) and rongoa (medicines).*

3. Status of the Application

Each of the activities for which resource consent is required is a ***discretionary*** activity under the relevant rule of the RPW, RPWa and RPA.

The Council may grant or decline the applications and, if granted, may impose conditions under Section 108 of the Act

Various Land Use Consents and Building Consents will also be sought from the local territorial authorities, Waitaki District Council (WDC) and Dunedin City Council (DCC). The details of these are beyond the scope of this report.

4. Public Notification

As the effects of the proposed activities are likely to extend beyond neighbouring property boundaries, it is not feasible to identify all affected parties. As such, the application was publicly notified on 23 July 2016. By the close of submissions on 19th August 2016, eight submissions were received. The nature of these is summarised in Table 7 below:

Table 7: Summary of Submissions Received

Submitter Category	Number
Neutral	3
Support	2
Oppose	4

Of the 9 submissions received, 6 submitters stated that they wished to be heard.

Neutral Submissions

The 3 neutral submissions raised the following matters:

- Mr C A and Mrs E M Howard expressed concerns about noise, particularly at night, water quality, increased dust and visual pollution, road use and associated safety.
- Kai Tahu ki Otago (KTkO) requested that if the consents are to be granted they should be subject to conditions that achieve:
    - Mitigation of the effects on water quality in the lower catchments
    - Protection of in-stream habitat for native fisheries, including non-migratory galaxiid species
    - The engagement of Manawhenua in the development of environmental offsets that provide for the restoration and enhancement of riparian margins and indigenous biodiversity.
    - Cultural Impact Assessment (CIA) review conditions and dispute resolution process
    - Emergency plans that effectively provide for the protection of the quality of the natural environment in the event of failure of the water rock stacks or Freshwater Dam.
- Mr D B and Mrs J W S Kinney expressed concerns around security of their current water permits (in particular the stock and domestic water requirements) in regards to effects on water allocation as well as WRS leachate. They note that the application does not mention the potential impact on groundwater and surface water users. They also expressed concerns around noise created from mining operations, particularly at night. They ask that potential effect on their domestic and stock water be assessed, possible solutions to the effect of noise levels on their family be considered and that appropriate conditions of consent be implemented.

Recommended conditions of consent developed in consultation with Council's Resource Science Unit require adequate mitigation for loss of habitat for aquatic fauna. Effects on terrestrial fauna and flora will be addressed in the S42A report prepared on behalf of Waitaki District Council (WDC)/Dunedin City Council (DCC).

A condition has been recommended that requires review of the consent conditions, as necessary, following the outcomes of the CIA.

Conditions requiring that there are no effects on downstream lawful water users have been recommended on any consents for activities that may potentially cause such an effect. Council has no record of the location of permitted activity takes, such as the taking of surface water for domestic and stock water needs, and so direct effects on such users cannot be assessed any further at this stage.

As discussed in Section 5 of this report, effects relating to dust are expected to be no more than minor.

Effects relating to noise, hours of operation, visual pollution, access, road use and safety will be address in the WDC/DCC S42A report.

Submissions in Support

The 2 submissions in support raised the following matters:

- Mr M A O'Neill and Mrs V C O'Neill support the application, stating that the applicant are good neighbours and support the Macraes community. They expect that roading is maintained to a high and acceptable standard.
- Mr N J Roy raised concerns with the roading closures, post mining roading realignment and potential dust emissions. Mr Roy asked that the applications be granted with appropriate conditions of consent.

Effects relating to access and road closures will be addressed in the WDC/DCC S.42A report.

Submissions in Opposition

The 4 submissions in opposition raised the following matters:

- The Department of Conservation (DOC) considers that the application does not adequately avoid, remedy or mitigate the adverse effects of the proposed activity. They have suggested that further information and discussions with the applicant, these concerns may be able to be addressed by the imposition of appropriate conditions on any resource consents which may be granted.
- Heritage New Zealand noted the heritage values that will be potentially affected and asked that the consent not be granted until such time as appropriate measures to avoid remedy or mitigate effects on historic heritage values have been identified and adopted by the applicant. It is also asked that the Heritage New Zealand Accidental Discovery Protocol be included as a condition of consent.
- Mr M and Mrs K O'Connell expressed concerns over the ongoing effects from noise and dust. They have asked that a fair decision is made with appropriate conditions.
- Macraes Community Inc raised concerns over road use, noise effects, rehabilitation plan, weed control and water quality. They have asked that appropriate upgrades to roading be made, strict guidelines on rehabilitation plan, hours of work, control of gorse and broom and ensure that the dams are built.

As previously mentioned, dust controls proposed by the applicant will ensure that effects are no more than minor. Recommended consent conditions will ensure that effects on aquatic ecology are adequately avoided, mitigated and remedied. Rehabilitation methods proposed by the applicant are considered to be appropriate. Recommended consent conditions require no adverse effects on downstream lawful

water users. It is recommended that the Accidental Discovery Protocol condition be implemented as a condition of consent.

Issues relating to noise, weed control and roading will be addressed in the WDC/DCC S.42A report.

4.1 Pre-Hearing meeting

A pre-hearing meeting pursuant to Section 99 of the Act was held on 20 September 2016. In attendance of the submitters was DoC, KTKO, Neil Roy, Craig and Erin Howard and David and Jocelyn Kinney. Matters discussed included concerns around roading, noise, dust, water quality/quantity, ecology and cultural values. While no specific issues were agreed upon, all parties agreed to enter into further conversations. All parties have agreed to the applicant contacting them outside of a formal process prior to the hearing to work through the issues contained in their submission. A report on the prehearing meeting is being circulated with this s42A report.

4.2 Post Notification Amendment

Applications RM16.138.01-19 were notified, after notification it became apparent that a water permit to permanently divert water around the Coronation North Waste Rock Stack is also required. Therefore water permit RM16.138.20 has been added to the raft of applications. Given that the activity was implicit within the notified application and, if applied for separately, would likely be processed on a non-notified basis, then these water permit application can be processed as part of the Coronation North project applications, without having to be separately publically notified.

In summary, as the amendment is considered to be minor, will not impact upon the submissions received and effects were described in the original application, there is no need to re-notify this minor amendment.

5. Assessment of Environmental Effects

5.1 Surface Water Quality

5.1.1 Mare Burn Water Quality

As part of the Coronation North Project, a new water quality compliance monitoring point has been proposed downstream from the current environmental monitoring point MB01. This new monitoring point is required to ensure contaminant losses from the entire impacted mining footprint are suitably captured. The new compliance point, MB02 is to be located approximately 1 km downstream of MB01. It is proposed that compliance limits that are currently consented at MB01 site are to be transferred to the MB02 site. Figure 4 above in section 2.2.5 shows the location of these monitoring points.

Existing compliance criteria for the current Coronation Project compliance point MB01 are presented in Table 8 along with the consented Deepdell Creek compliance criteria for comparison. These proposed criteria have been compared to New Zealand Drinking Water Standard NZDWS 2008 and the ANZEC stock water standards.

Table 8: Water quality compliance criteria

Parameter	Exisiting at MB01	*Deepdell Creek at DC07*	*ANZEC 2000 (stock water)*	*NZDWS 2008*
pH (unitless)	6.0-9.5	*6.0-9.5*	-	*7.0-8.5*
Sulphate	1,000	*1,000*	*1,000*	*250*
$Cyanide_{WAD}$	0.1	*0.1*	*N/A*	*0.08*
Arsenic	0.15	*0.15*	*0.5*	*0.01*
$Copper^{(1)}$	0.009	*0.009*	*0.5*	*2*
Iron	1.0	*1.0*	*N/A*	*0.2*
$Lead^{(1)}$	0.0025	*0.0025*	*0.1*	*0.01*
$Zinc^{(1)}$	0.12	*0.12*	*20*	-

Notes: All units in g/m^3 unless otherwise stated.
(1) Copper, lead and zinc standards are hardness related.

a) Copper Limit (g/m^3) = $\frac{0.96.e^{0.8545[\ln(\text{hardness})] - 1.702}}{1000}$

b) Lead Limit (g/m^3) = $\frac{(1.46203 - [\ln(\text{hardness})(0.145712)].e^{1.273[\ln(\text{hardness})] - 4.705}}{1000}$

c) Zinc Limit (g/m^3) = = $\frac{0.986.e^{0.8473[\ln(\text{hardness})] + 0.884}}{1000}$

The applicant has proposed that the same limits be applied to the Coronation North Project.

Based on experience from operating the MGP site, waste rock stack seepage is likely to demonstrate elevated sulphate concentrations in receiving surface water. Without forward planning there is potential to exceed stock water compliance limits in receiving waters over time. The primary water quality issue identified is, therefore, a need to manage sulphate concentrations in receiving surface water bodies, as sulphate is conservatively transported in water. The predicted elevated concentrations of sulphate are shown in Table 9 below.

Table 9: Estimated 95th percentile sulphate concentrations at Mare Burn compliance point MB02

No.	Scenario Name	Estimated 95^{th} Percentile Sulphate Concentration (mg/L)
		Compliance Point
1	Stage 1 (MB01)	601
2	Stage 2	481
3	Stage 3	2293

The primary water quality issue identified is the need to manage sulphate concentrations in receiving surface water bodies. As sulphate is conservatively transported in water, it does not become naturally attenuated except through dilution. Sulphate concentrations within the Mare Burn are predicted to eventually exceed the compliance limit during low flow conditions. Mitigation measures are therefore

considered necessary to ensure water quality within the Mare Burn is within the compliance limits set.

Golder Associates (Golder) was commissioned to undertake an assessment of downstream water quality associated with the Coronation North Project (Golder Associates, 2016, *Coronation North Project Surface Water Modelling*). Golder URS developed a water and sulphate balance model for the Coronation Project to allow prediction of effects on surface water quality and to recommend appropriate water management methods. URS also assessed the formation of a pit lake post closure.

Changes to catchment hydrology resulting from the planned Coronation North Project are minor. These changes would consist primarily of increased baseflows within the Mare Burn. As the consented coronation project would already result in a shift from intermittent to permanent flows in Mare Burn at MB01, there is little change projected for the consistency of base flows in the stream.

NIWA's Assessment

Council engaged National Institute of Water and Atmospheric Research Limited (NIWA) to provide a review of the application. An initial review was provided, which identified 19 issues that required further information; subsequently a Section 92 further information request was issued. The applicant provided a response to the request and NIWA provided further comment on the response. Overall the response was considered inadequate concluding that *"…the responses to the s92 information request is insufficient to address the issues raised in relation to future water quality issues in Mare Burn as a result of the proposed Macraes Mine expansion."*

Further these comments, the applicant requested a without prejudice meeting to discuss the issues and how to address them. This meeting was held on the 10th August 2016. The meeting concluded with agreement between parties on a way forward of how issues could be resolved. The applicant then prepared further comments to address the outstanding concerns; this information was lodged to Council on 28th September 2016. The consultant preparing the assessment from NIWA was unavailable from 23rd of September to the 27th October 2016. As the further comments were unavailable to NIWA at the time of the preparation of the full assessment, the assessment was based on the application lodged 25 May 2016 and further information received 11 July 2016.

The contaminants and stressors of potential concern and their potential effects on freshwater streams are summarised Table 10 below.

Table 10: Overview of contaminants of potential concern (COPCs) for Mare Burn downstream of proposed pit and waste rock discharges

Discharge	Contaminant / stressor of concern	Sources	Potential effects
Waste rock	Heavy metals (copper, zinc, nickel, chromium, silver)	Leaching	Toxicity
	Reduced metals (iron, manganese)	Reduced metals occur under anoxic conditions	Toxicity by smothering
	Metaloids (arsenic, antimony)		Toxicity
	Sulphate/conductivity		Toxicity
	pH	Sulphide oxidation; addition of flocculents (e.g., alum); pH control	
	Sediment / turbidity	Mining operations	Aesthetics / toxicity
Pit operations	As above		
	Chemicals for suspended sediment management	Various chemical potentially used for SS management	Toxicity
	Nutrients (nitrogen and phosphorus)		Aesthetics / periphyton growths
	Cyanide	Gold extraction processing	Toxicity
Reservoir	Low dissolved oxygen	Generated under stratified conditions in hypolimnion	Toxicity
	Hydrogen sulphide	as above	Toxicity
	Ammonia	as above	Toxicity
	Iron & Manganese	as above	Toxicity
	Nutrients	from run-off	Aesthetics / periphyton growths
Other	Residual flows	Abstractions of water	Habitat loss in streams
Roading	Sediment	Roading	Aesthetics / toxicity
	Dust control chemicals		Toxicity
Run-off	Hydrocarbon spillages	Transort activities on site	Toxic and aesthetic effects

The proposed receiving water compliance conditions for these sites are based on stock water quality guidelines (i.e., not ecological protection guidelines) as shown in Table 11.

Table 11: Proposed receiving water compliance conditions (Golder Associates 2016)

Table 21: MB01 and MB02 compliance criteria.

Parameter [1]	Existing at MB01 and proposed for MB02	ANZECC 2000 (stock water)	NZDWS 2008 [2]
pH (unitless)	6.0 – 9.5	-	7.0 – 8.5
Sulfate	1,000	1,000	250
$Cyanide_{WAD}$	0.1	-	0.08
Arsenic	0.15	0.5	0.01
Copper [3]	0.009	0.5	2
Iron	1.0	N/A	0.2
Lead [3]	0.0025	0.1	0.01
Zinc [3]	0.12	20	-

Notes: 1) All units g/m^3 unless stated.
2) Some of these values are maximum acceptable values while others are guideline values for aesthetic determinands.
3) Copper, lead and zinc compliance criteria for MB01 are hardness related.

It was noted in the assessment from NIWA that compliance criteria were not sufficient for the likely effect on aquatic ecology. Guidelines set out in Table 12 were alternatively recommended for the potential ecological protection.

Table 12: Comparison of existing compliance criteria at site MB01 with potential ecologically relevant criteria suitable for MB02

Parameter	Existing compliance criteria at MB01	Potential ecological protection criteria for MB02	Reference for proposed criteria
pH (unitless)	6.0-9.5	6.5-9.0	(ANZECC 2000)
Dissolved copper	0.009	0.0014	ANZECC (2000)
Dissolved zinc	0.12	0.008	ANZECC (2000)
Dissolved nickel		0.011	ANZECC (2000)
Dissolved lead	0.0025	0.0034	ANZECC (2000)
Dissolved silver		0.00005	ANZECC (2000)
Arsenic	0.15	0.013, 0.024	ANZECC (2000)
Iron	1	1	US EPA (1976)
Manganese		0.5	
Cyanide	0.1	0.007	ANZECC (2000)
Sulphate	1000	128	MFE-BC (2013)
Dissolved oxygen	~-	>7.0 (>5.0)	NPS-FM (MfE 2014)
Nitrate		<2.4 (<3.5)	NPS-FM
Ammonia		<0.24 (<0.40)	NPS-FM
Turbidity		30-50% change in clarity	(MfE 1994)
Suspended solids		30-50% change in clarity	MfE (1994)

Notes:
All units g/m^3 (i.e., mg/L) unless stated.
1. pH range from ANZECC. Aluminium becomes markedly more toxic at pH 6 so range should be limited. Ammonia toxicity increases at high pH.
2. Default metal guideline for a hardness of 30 g $CaCO_3$ m^3.
3. Guideline dependent on arsenic speciation (AsIII or AsV)
4. Manganese floc precipitates like iron floc. Estimated guideline value for initial evaluation.
5. Guideline is hardness-dependent. Value is for 'very soft' waters and may be higher in high hardness waters.
6. Values for 7 day mean minimum (1 day minimum) in summer period for 'B' attribute waters.
7. Values for median (95th percentile bracketed) for 'B' attribute waters.
8. Values for median (maximum bracketed) for 'B' attribute waters for total ammoniacal-N at pH 8. Note that pH adjustment for other pH values.
9. Turbidity and SS change relative to background water clarity as aesthetic measure. No values available for ecological protection.

The Canadian province of British Columbia has recently compiled a review of mining-related increases in sulphate concentrations in freshwaters. The toxicological approach taken for this guideline derivation is broadly consistent with the ANZECC derivation approach and establishes a range of sulphate guideline values (GVs) for ecological protection which are related to water hardness – with the GVs increasing as water hardness increases. The recommended sulphate guidelines published in the British Columbia report is summarised in table 13 below.

Table 13: Sulphate water quality guidelines (mg/L) based on water hardness (mg/L) categories.

Water hardness* (mg/L)	Sulphate guideline (mg/L)
Very Soft (0-30)	128
Soft to moderately soft (31-75)	218
Moderately soft/hard to hard (76-180)	309
Very hard (181-250)	429
>250	Need to determine based on site water**

*Water hardness categories adapted from the CCME.

** Toxicity tests on the early stage rainbow trout were only conducted up to a water hardness of 250 mg/L. Natural background concentrations of water hardness in BC are generally much lower than 250 mg/L. It is recommended that additional toxicity testing on several species is required if natural background water hardness is greater than 250 mg/L. Organisms exposed to higher concentrations of water hardness in combination with sulphate may experience osmotic stress.

As one of the proposed mitigation measures the applicant has applied to build a high dam (Coal Creek Freshwater Dam), which would provide additional dilution at sites downstream of the wastewater seepage inputs. Various issues relating to downstream water quality and the dilution flows which are potentially available over summer during low flows are still to be resolved, should this reservoir proposal go ahead.

The presence of the Taieri flathead galaxias populations and their sensitivity to salinisation of their habitat is a major site-specific issue relating to the proposed discharges to the small streams. Because of the proposed marked elevation in receiving water sulphate concentrations, site-specific criteria will need to be developed to provide long-term protection for the Taieri flathead galaxias populations.

Given the information assessed at the time of review, the following consent conditions were recommended by NIWA to avoid, mitigate and remedy adverse effects.

- That the water quality provided in Table 12 should be used to provide receiving water compliance conditions for relevant contaminants.
- That the sulphate water quality guidelines developed by Canadian province of British Columbia (Table 13) should be used as an interim guideline for salinity until appropriate site-specific guidelines can be developed. Assuming the Mare Burn waters are in the ‘very soft’ category the sulphate guideline would be 128 mg/L as a maximum concentration.
- That suitable long-term (i.e., chronic) guidelines for salinity tolerance for flathead galaxiids should be developed and then applied as site-specific compliance standards for these local receiving waters.
- That consideration be given to the implementation of a suitable continuous and discrete monitoring programme to adequately characterise key water quality parameters at the proposed receiving water sites.
- This monitoring programme should be designed to provide the required background water quality data necessary to develop a robust receiving water compliance monitoring design which is suitable for both annual and long-term implementation.

It is recommended that these conditions be implemented as conditions of consent. However it is noted that this recommendation is subject to change dependant on the nature of information provided by the applicant, and further assesment undertaken by NIWA which will be outlined at the hearing. Overall, subject to recommended consent

condition, effects discharges from the proposed waste rock stack are considered less than minor.

Additional informaiton submitted yet to be assessed by NIWA:
Further to the concerns raised by NIWA during the review of the application, the applicant revised their assessment of the effects on water quality and submitted additional supporting information on 27 September 2016.

Aquatic ecology at the Macraes site has been surveyed since the 1990s; during that time there has been no downward trend in species abundance. Although there has been no specific toxicology assessment carried out, field based observations are that mining has had no clearly discernible long-term impact on species abundance. While there appear to be time-bound declines on survey graphs of Deepdell Creek, which have not been directly matched against water chemistry, it is considered they are likely attributed to drought years when the creek dries up.

Golder Associates were commissioned to provide further assessment on water quality (Golder Associates, 2016, *Coronation North Project Water Quality Effects, Management and Mitigation*).

It was noted that water quality in the receiving water bodies would likely to meet the ecological guideline values referenced by NIWA in the further information request for most of the parameters for which data is available. There is no available data for manganese, silver or nickel because these elements have not been identified in previous test work at levels requiring monitoring or management. Downstream turbidity/suspended solids and dissolved oxygen have not previously been monitored but can be and will be in proposed conditions. Cyanide is not an applicable parameter as no cyanide or cyanide bearing wastes are being used or stored in the Mare Burn catchment. Dissolved copper and zinc would meet the suggested guideline values. The parameter that does not meet the British Columbia guideline levels and requires management is sulphate.

As noted in NIWA's assessment, sulphate toxicity is water hardness dependant. Based on modelling the WRS discharges will have a high hardness. Comparing the Deepdell Creek downstream sulphate concentrations with the BC guidelines indicates the in-stream sulphate at lower concentrations is comfortably below the toxicity trend line (figure 5)

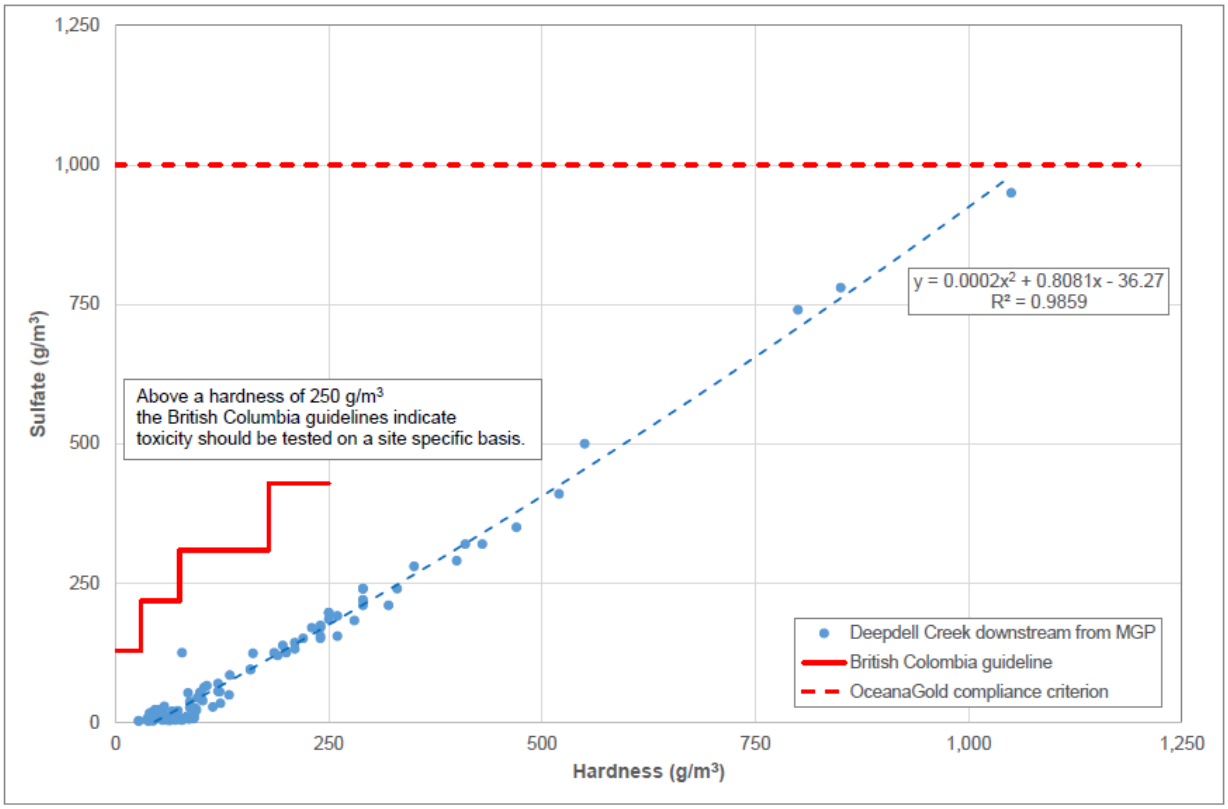

Figure 5: Sulphate to hardness relationship in Deepdell Creek at downstream compliance point, 1990 to 2015

However, note that above a hardness of 250 g/m^3 the British Columbia guidelines recommend that site-specific guidelines be applied. Accordingly rather than adopting the British Columbia guidelines for the Coronation North Project the applicant suggests that a site-specific guideline be developed for the Mare Burn catchment. While this is being developed it is appropriate to utilise existing parameter limes form the Coronation consents as relevant limits within the Coronation North consent conditions.

There is currently no existing toxicity data for Taieri flathead galaxias or any of its close relatives. The applicant noted that the particular species appear to be resilient given the current habitat experiences extreme summer and winter conditions. Given the breeding cycle of the galaxias it is not feasible to consider any specific testing prior to the consent hearing. The applicant will commit to a plan and undertake appropriate toxicity trials after the consent hearing to identify locally appropriate sulphate toxicity thresholds for the galaxias. This will assist to better understand the tolerance of the species, which may enable a targeted management plan to be drawn up if necessary.

The detail of the trial programme would be proposed by a suitably qualified expert, in consultation with the Consent Authority. The applicant provided the following comment on the proposed trial:

- The nature of the trials, whether field or laboratory, remains to be settled although presently preference is for field trials.
- The parameter(s) being tested for is also open to discussion, although it appears sulphate is the only remaining concern.
- It is suggested that testing on larvae would be sufficient to cover juvenile and adults too, since larvae are normally more susceptible.

- Should the results of trials indicate that water quality thresholds ought to be reviewed there is existing provision in the consent conditions for this.

The applicant has added that they would be happy to discuss a proposed consent condition that would provide for the toxicity trials.

Following concerns raised around the lack of information and the requirement for monitoring turbidity and suspended sediments. The applicant noted that over two decades of informal visual monitoring it has indicated that background water clarity is usually good, with no evidence of water clarity declining as a result of mining and no evidence of sediment accumulation. Occasional turbidity can be caused by high rainfall events. Other than two releases from silt ponds in the early 1990s, silt ponds at Macraes have not overflowed.

If required, the applicant noted they are prepared to incorporate visual clarity into the quarterly aquatic biological monitoring programme under taken at the site by Ryder Consulting. There is also the possibility of continuous turbidity monitoring at MB02, however the validity of the data is questionable. The applicant has also noted that if required a suitable control site could be established upstream of MB01 to provide confirmation of any additional sources. Note that all concerns of NIWA's relating the turbidity and suspended sediments are primarily from a water quality aspect, the design of and function of the proposed sediment control plan is further assessed in Section 5.1.4 of this report.

5.1.2 Coal Creek Freshwater Dam

As a form of mitigation to the elevated concentrations of contaminants to the Mare Burn, the applicant proposes to construct a 27 metre high storage dam within the upper most catchment of Coal Creek. The reservoir would hold up to 670 million litres of water with a footprint of 9.3 hectares. The dam would provide a constant water supply downstream of 5 litres per second, to supplement naturally occurring low flows in Coal Creek and the Mare Burn. This residual flow would act as a diluent for water quality purposes. The applicant views the dam as a last resort means of mitigating effects on water quality.

During the review undertaken by NIWA and RSU, concerns were raised about the existence of the dam. NIWA acknowledged concerns around the potential for the dam to stratify and to discharge deoxygenated water into a catchment with elevated sulphate levels causing anoxic conditions. In particular, the water in the lower end of the reservoir could vertically stratify at times of the year and in doing so potentially create a layer of low oxygen water in the deeper part of the reservoir. It was also noted that there is the potential for periphyton growth.

RSU noted that the proposed dam could result in significant adverse effects toward the Taieri flathead galaxias. The dam footprint would result in loss of spawning and refuge habitat in Coal Creek, under and upstream of the dam. The reservoir would also provide an ideal refuge for recreational fish species, and there is potential for such species to be legally or illegally liberated. Recreational fish within the reservoir itself do not pose any immediate threat, however when the fish escape over the barrier the result would be considerable in loss to galaxias. Council's preference is that this dam should been seen as an absolute last resort.

The applicant provided further information on 13th July 2016 which provided a response to all issues raised. However, concerns around the dam still remained with both NIWA and RSU. The applicant provided additional information on the 27th September 2016 to further elaborate on how effects of the proposed dam can be avoided, mitigated and remedied. Golder Associates were commissioned to provide further assessment on concerns around stratification and anoxic conditions (Golder Associates, 2016, *Coronation North Project Water Quality Effects, Management and Mitigation*). In order to address the risk of stratification the applicant proposes to engineer the dam to ensure that the offtake from the reservoir is a surface siphon i.e. to utilise a floating decant structure with a with a discharge point on the downstream tow of the embankment. Further to this, the dam will be engineered to ensure the released water gets as much aeration as possible in the area close to the toe of the dam. The applicant proposes the following consent conditions:

1. *The dam shall be fitted with a floating outlet system with a discharge pipe installed through the base of the embankment to ensure that the water discharged is from the upper surface of the reservoir.*

2. *For the purposes of water quality improvements and oxygenation, the water discharged form the base of the embankment shall flow over a short section of rip rap material before flowing into a small silt pond (this may be the same silt pond as used for the silt control during construction of the embankment) from where it will overflow into the creek bed.*

3. *The consent holder shall conduct continuous dissolved oxygen monitoring at monitoring point CCMP01 (Coal Creek just prior to the confluence with the Mare Burn at approximately NZTM 2000: E1392985 N4980236) for a one month period following filling of the reservoir to its final height and then annual 7-day continuous dissolved oxygen during the period 1 February to 31 May for the term of the consent. Information on flow and metrological conditions shall be collected for the period of monitoring.*

The applicant stated that the above conditions would adequately address concerns around stratification and anoxic conditions. It was further noted that if necessary, a visual assessment for iron could be undertaken as part of the quarterly monitoring survey commissioned by Ryder Consulting.

In regards to periphyton growth the applicant noted that streams in the area get dry and even upstream tributaries, outside the influence of the mine, can show some periphyton growth. While there is potential for periphyton growth in the Coal Creek Freshwater Dam, the applicants' site-wide experience is that silt ponds and pit lakes do not tend to have such growth. As part of the existing aquatic biology monitoring, quarterly visual assessments are made for periphyton and this will continue for Coronation North project.

In addressing concerns around the threat that recreational fish species pose on galaxias, the applicant noted that it does not own the land on which the galaxias habitat upstream of the project area is, and therefore controls in respect of that habitat cannot be introduced in the consenting process. However, should the Coal Creek Freshwater Dam consents be given effect to, the applicant proposes mitigation in the form of

protection and/or enhancement of native fish habitat, likely within other areas of the Mare Burn catchment. This would take the form of trout barrier construction to the value of NZ$30,000, which the applicant notes should provide 3 or 4 barriers. The applicant proposes the following consent conditions:

1. *Prior to the exercise of this consent, the consent holder shall establish a fund of NZ$30,000 for provision of trout exlusion devises to protect native fish habitat, particularly Taieri flathead galaxias (Galaxias depressiceps). Within 6 months the consent holder shall commence consultation with the Department of Conservation to determine suitable locations for the trout exclusion devices, with some preference to be given to locations within the Mare Burn catchment.*

2. *The consent holder shall provide the Consent Authority with details of the determined locations of the trout exclusion devices.*

3. *The trout exclusion devices shall be designed or supplied by a suitably qualified person.*

4. *The trout exclusion devices shall be installed within 24 months of the locations being determined.*

5. *The trout exclusion devices shall be maintained in good working order for the duration of this consent. Records shall be kept of all inspections and maintenance and those records shall be provided to the Consent Authority upon request.*

The applicant noted that any liberation of fish into the dam other than by the land owner or authorised visitors would be illegal as it would involve a trespass onto privately owned land, and would also be difficult due to the inaccessibility of the dam site. A number of more accessible ponds at the MGP site, for instance Deepdell pit and Golden Bar Pit, have not had predatory fish liberated into them, which suggests that potential of it occurring at Coal Creek dam is remote. However, the applicant has acknowledged that there are steps that can be taken to address the issue, although consider it is not necessary to propose consent conditions for that purpose. The applicant noted that there is potential to install a fish screen on the discharge outlet as part of the mine closure plan.

NIWA's Comments

As the additional information submitted 27 September relating to potential for stratification and anoxic conditions was reviewed as part of the assessment provided by NIWA, there is no further comment at this time. However further assessment on the potential effects of stratification and anoxic conditions shall by undertaken by NIWA and presented at the hearing. As the conditions proposed by the applicant mitigate and avoid the stratification it is recommended that the conditions be implemented as conditions of consent, however they are subject to change following further assessment from NIWA.

RSU's Comments

Although the proposed dam will cause more than minor effects on Taieri flathead galaxias population at this site, the applicants proposed consent conditions will adequately avoid, mitigate and remedy adverse effects on the wider populations. It was

noted that average barrier costs vary between $12 and $20 thousand, excluding any additional cost such as relevant consenting requirements. Therefore an estimate of 3 or 4 barriers may be a little optimistic. It is recommended that the conditions proposed by the applicant be implemented as conditions of consent.

5.1.3 Pit Lake Water Quality Modelling

The flooding of the Coronation North Pit on cessation of mining is expected to occur as a function of inflowing water sourced from groundwater, direct rainfall, and runoff from the pit walls. The proposed pit lake will be designed to discharge to the Mare Burn (part of the Taieri River catchment) via a low point on the north eastern rim of the pit.

A lake water balance model was developed to predict the time of lake filling, and potential discharge rates to the Mare Burn catchment as the lakes overflow. A contaminant mass balance model was also developed to predict the water quality at the time of initial discharge to the Mare Burn and 100 years following cessation of mining.

The Coronation pit lake is expected to have a final lake level at 632.5mRL and overflow after 160 years. The Coronation North pit lake is expected to have a final lake level of 580mRL and overflow after 400 years.

The pit lake assessment has found that the pit lake water quality is likely to be similar to Deepdell South and Golden Bar pit lakes. The overflow for the Coronation pit lakes initially and at 160 years from cessation of mining is predicted to remain below stock water quality standards.

Review of the environmental monitoring data from the MGP indicates that the quality of water in operational pit sumps differs substantially from that in lakes that develop in the open cast pits following closure. The quality of water in a pit sump can also vary, depending on where the sump is located in respect to the mineralised zone within the pit. Water quality data from two monitoring sites at the MGP have been identified as having extended recording periods and being representative of the expected pit water quality in the Coronation North Project. Data from the Frasers Pit sump is expected to be representative of operation pit water quality, while data from Golden Bar Pit lake is expected to be representative of the post closure pit lake water quality.

NIWA's Assessment

As noted in the previous section, NIWA provided an assessment based on the lodged application and the first instalment of further information. A number of consent conditions have been recommended to avoid, mitigate and remedy adverse effects associated with water quality. Note that conditions are subject to change dependant on further assessment from NIWA at the hearing.

5.1.4 Erosion and Sediment Control

Engineering Geology Limited (EGL) were commissioned to provide a report detailing the required erosion and sediment control measures for the Coronation North Project (Engineering Geology Limited, 2016, *Coronation North Project Erosion and Sediment Control*).

The new Coronation North Project will require erosion and sediment control throughout the life of the project until it is completed and rehabilitated, estimated to be

about 5 years. An Erosion and Sediment Control Plan (ESCP) will be prepared prior to construction commencing. This ESCP is to be developed for the individual elements of the Coronation North Project following the issue of consent, and will be consistent with the ESCP for the existing MGP.

Watercourses within the Coronation North Project area are bordered by tussock grasslands, shrublands or plantation forest, with only limited areas of exposed soil. The nature of the vegetation reduces the likelihood of sediment run-off. However, when activities are near watercourses, the risk of sediment losses to streams can be further reduced by employing best-practice design and mitigation measures. Specific erosion and sediment control measures will include:

- Cleanwater diversion drains with small dams located in gullies where necessary to divert runoff into the diversion drains. The storage capacity of these dams is anticipated to be less than 20,000 m^3.
- Permanent Silt Ponds downstream of disturbed areas will be designed according to existing criteria as summarised in Table 14 below. These are to be installed prior to the disturbance of the area.
- Shoulders of the Coronation WRS will either be benched about every 20 m vertical height to control runoff or flatter batter slopes adopted to minimise erosion of the rehabilitation layer.
- Perimeter surface water drains located around the WRS will be installed where appropriate, to ensure runoff is conveyed to the base of gullies without erosion. Such drains will be lined where necessary and energy dissipation will be provided at high energy locations; and
- Surface water and groundwater collected in the pit during operations will be pumped out to a water sump adjacent to the pit. Water from the sump will be used for dust control and any surplus water will be discharged via a silt pond.

Table 14: Silt Pond Design Criteria

No.	Criteria
1.	Storage sufficient to contain at least the initial 24 hour rainfall from a 2 year -72hour rainfall event (70mm rainfall)
2.	Service and emergency spillways capable of passing flows from 10year and 100year return period rainfall events respectively
3.	Ponds provided with either pump-back facilities or a constricted flow outlet to decant impounded water. Pump or decant designed to recover the minimum live storage in no more than 5 days
4.	Dam, spillway and associated structures designed, constructed, operated and maintained for the life of the dam in accordance with the general principles of New Zealand Society of Large Dams (NZSOLD) Dam Safety Guidelines (Ref.3)

T&T's Assessment

Tonkin & Taylor Limited (T&T) were asked to provide a peer review of the application. T&T noted that the information provided for review was essentially at conceptual design level and that it was assumed that the detailed design of the erosion and sediment control arrangements will occur later. The applicant has indicated that there have been no recorded instances of the release of sediment-laden water from the

WRS silt ponds operated elsewhere at the MGP site. The design approach for the silt ponds associated with the Coronation North WRS is based on typical industry practice that is modified to take into account site specific considerations. Based on the information reviewed, T&T consider this overall methodology to be reasonable if subject to appropriate conditions.

5.2 Groundwater and Surface Water Allocation

The Coronation North Project is located within the headwaters of the Mare Burn catchment, a left bank tributary of the Taieri River. The Coronation and Coronation North pits, waste rock stacks and other associated mine infrastructure extend across Trimbell's Gully, Maori Hen Creek and Coal Creek, all of which tributaries to the Mare Burn.

Golder Associates (Golder) was commissioned to undertake an assessment of groundwater and surface water allocation associated with the Coronation North Project (Golder Associates, 2016, Coronation North Project Surface Water Modelling).

The Mare Burn catchment does not have a permanent flow recorder and little continuously recorded dataset. A limited amount of continuous data was collected in the 2009/2010 irrigation season by ORC, which identified that the Mare Burn catchment ceases to flow periodically. Peak flows of around 9 cubic metres per second (m^3/s) were also recorded indicating reasonable flood in the catchment occur.
Hydraulic flows in the Mare Burn were estimated using data from Deepdell Creek as a reference given the similarities in climate, geology and elevation. The estimated flows at compliance sites MB01 and MB02 are summarised in table 15 below.

Table 15: Mare Burn derived flow statistics

	Min	L.Q	Median	Average	U.Q.	Maximum
MB01 daily average (L/s)	0	3.6	9.7	36.6	28.8	14,960
MB02 daily average (L/s)	0	7.7	20.6	77.7	61.0	31,760

It is proposed by the applicant that as the pit is being developed, all water collecting in the pit (except for a portion that will be used for dust suppression) will be pumped to a surface water discharge point and will then flow down and contribute to the Mare Burn. This pumped water will not only include the resultant runoff from rainfall but also any groundwater flow that is intercepted by the pit. During the period of pit excavation, the surface runoff in the Mare Burn may be enhanced compared to the present situation.

Modelling was assessed looking at three stages of the mines taking into account pre and post closure. The modelling results of the three stages of mining and closure indicate that median, average and maximum flow rates will not vary significantly from baseline scenarios. The modelling however shows that flows (5^{th} percentile flows) will increase due to the additional storage and buffering represented by the WRS constructed within the catchment. Following closure, the model indicates that these base flows may remain slightly higher than what would be considered normal for a catchment in the area (i.e 3 L/s at 5^{th} percentile flows). The models also indicates that construction of the Coronation WRS within the Mare Burn catchment would result in the flows at MB01 and MB02 becoming permanent rather than intermittent.

T&T's Assessment

Mining will divert groundwater into each mine pit that would otherwise flow into and recharge surface water bodies. Groundwater and rainwater runoff within the confines of each pit will be collected in sumps or ponds. Water present in ponds or sumps will be subject to water loss through evaporation, and water used for dust control will be subject to further evaporation (or evapotranspiration if it falls on vegetated surfaces). These losses are additional to those currently occurring in the catchment. Although some of the water collecting in sumps or ponds will need to be pumped out and discharged as surface water (largely as a result of significant rainfall and soon after rainfall has occurred), mining will generally result in a reduction of groundwater recharge to surface water bodies, and this will be most critical during dry, low flow conditions. The effects of this could be manifest in a reduction in the length of stream/seepage habitat due to dewatering (where these are not directly physically impacted by other mining activities themselves), a reduction in allocable flows, and potentially a reduction in water available for the dilution of contaminants in discharge waters.

The Applicant proposes to use water collected in the pit sumps for dust suppression and is proposing to pump collected water and discharge this to Trimbells Gully and Maori Hen Creek. Up to 1,400 m3/week (200 m3/d) is thought to be required for dust control purposes and that this water will be required year round. The Applicant has provided no information on the likely quantity of water to be pumped to Trimbells Gully, and in Section 5.4.5 of Appendix 4a (Golder Associates, 2016, Coronation North Project Surface Water Modelling) it simply states that it will be pumped out at a rate of 18.5 l/s from time to time, when certain water levels in the pit sumps are reached. The amount of water required for dust control purposes will need to be sourced from groundwater inflows and from rainfall within each pit's catchments. In the absence of quantitative data provided by the Applicant in Appendix 4a, it is likely that pumping out of mine water to discharge to Trimbell's Gully or Maori Creek will only be required after significant or prolonged rainfall.

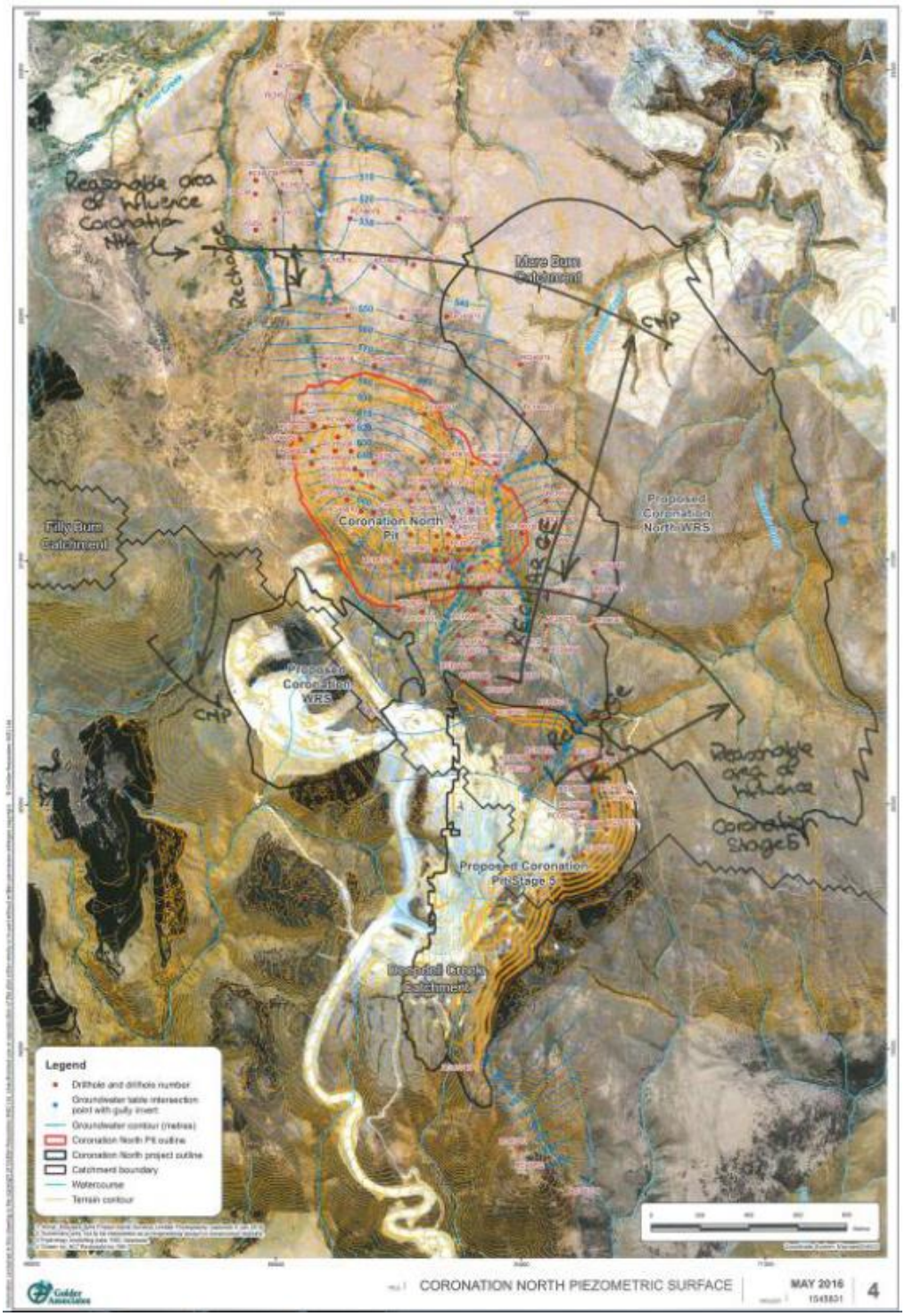

Figure 6: Approximate reasonable extent of area of influence of Coronation Pit Stage 5 and Coronation North Pit and likely effects on shifting the surface water recharge zone downstream.

Figure 6 shows that lowering of the groundwater levels has the potential for recharge zones in each waterway to move further downstream, which in the case of the Coal Creek Catchment may be in the order of a couple of hundred metres, and for Maori Hen Stream may be up to 1000 m. The effects of this could be a reduction in baseflow at or downstream of these locations, a reduction in the length of stream/seepage habitat due to dewatering (where these are not directly physically impacted by other mining

activities themselves), a reduction in allocable flows, and potentially a reduction in water available for the dilution of contaminants.

From this modelling, it appears that the Applicant concluded that the gullies that drain to the catchment are expected to be ephemeral during most if not all summer seasons, and that drawdown is not expected to have a measureable effect on flows in these gullies, and consequently on allocable flows in the Shag River or Taieri Rivers.

The flow duration curves presented by the applicant show that flows following mining are the same or higher than those modelled prior to mining taking place.

While T&T accept that there might be not be a measurable effect on flow in these gullies as a result of mining, there could still be a loss in ecological value as a result of reduction in recharge. We are not convinced that the applicant has been able to demonstrate that the modelling that it has relied on for its conclusions sufficiently recognises all potential water loss pathways and accordingly presents an overly optimistic assessment of the effects of mining on surface water flows during dry and low flow periods. This may also affect the ability of the applicant to manage contaminant discharges as proposed by the applicant.

T&T have recommended the following consent conditions to ensure that the effects on groundwater and surface water allocaiton are no more than minor are no more than minor.

1. The consent holder shall develop a method to continuously monitor low flow at compliance point MB02 and submit the method for approval by the Otago Regional Council acting in a technical certification capacity.

2. The method shall be sufficient to instantaneously measure low flow to 0.6 litres per second.

3. The consent holder shall monitor flow at MB02 in accordance with the methodology approved by the Otago Regional Council.

4. In the event that the average daily 5th percentile low flow at MB02 falls below 0.6L/s the consent holder shall engage a suitably qualified hydrologist to assess the effects of mining on low flow in the Mare Burn Catchment and report to the Otago Regional Council on its conclusions. In the event that the taking of groundwater for mining purposes has resulted in the average daily 5th percentile low flow measured at MB02 falling below 0.6 L/s the report shall include methods proposed by the consent holder to avoid adverse effects on low flow in the Mare Burn Catchment.

5. The results of monitoring shall be submitted to the Otago Regional Council annually.

6. Any report prepared under condition 4 shall be submitted to the Otago Regional Council within three months of the consent holder measuring an average daily low flow of less than 0.6L/s.

It is recommeded that the above consent conditions be implemented as conditions of consent as well as an appropriate review condition to reflect the outcome of reports received under recommended condition 6.

Overall, subject to recommended conditions, effects on groundwater and surface water allocation are consider no more than minor.

Submission from David and Jocelyn Kinney:
As noted in Section 4 of this report, a submission was submitted raising concerns around the potential impact of changes to the ground water regime at the Kinney property as a consequence of the Coronation North project. T&T were asked to comment on the submission and the potential effect towards reduction in water availability at the Kinney's property. T&T noted that The Golder report does contain various limitations. On this basis, and given the basis of our comments, T&T recommend that the Applicant confirm that the potential effect at the Kinney property because of the proposal is not more than minor.

It is recommended that a condition of consent be implemented to require that no lawful water user be affected for activities that may potentially cause such an effect.

Metering
The Resource Management Regulations 2010 (SR 2010/267) require all consented water takes of 5 L/s or more to be measured. Daily records are to be kept and provided to the Council by 31 July each year for the period 1 July to 30 June (or part thereof) of the previous year.

The applicant has proposed that a portion of the groundwater and surface taken for pit dewatering purposes will be used for dust suppression, which is a consumptive activity. The dewatering permits will allow for water to be taken at a rate of more than 5 L/s, and part of this take will be consumptive, so measuring of the take is required under the Regulations. Consent conditions have been recommended that reflect this. The Regulations require that the meter must accurately measure the water taken, be able to provide data in a form suitable for electronic storage, be suited to the qualities of the water it is measuring, be sealed and tamper proof, and be installed at the location from which water is taken.

It is recommended that a water meter with telemetry compatible datalogger is installed, and that the electronic data is sent daily to Council via telemetry. A number of recommended consent conditions relate to achieving required technical specifications for accurate meter and datalogger installation and ongoing operation. The data will need to be consistent with the format and specifications of Council's databases. "Comma separated value" (csv) format is considered the simplest and most widely compatible file type for this purpose.

The Regulations require verification of the meter by a suitably qualified person. The initial verification must be completed before the end of the permits first water year (i.e. before 1 July after the first exercise of the permit) and every five years after this. Consent conditions that reflect this have been recommended.

Any consent granted should be subject to a review in accordance with Sections 128 and 129 of the Act, to allow Council to adjust the amount or rate of abstraction of water allowed by each consent, should monitoring indicate that the allocation is more than required for efficient ongoing use, and to ensure that the consent specifications regarding water take data recording and transmission can be kept up-to-date as required.

5.3 Aquatic Ecology

The applicant commissioned Ryder Consulting Limited (Ryder) to assess ecological values in and around the Coronation Project site (Ryder Consulting Limited, 2016, *OceanaGold (New Zealand) Ltd Coronation North Project Ecological Assessment*). The assessment is based on a review of published and unpublished literature and relevant databases as well as a survey of aquatic communities within the Coronation project area undertaken in 2011 and 2012. For the Coronation North Project, emphasis was placed on lower sections of the tributary catchments. Tributaries were surveyed by walking sections, noting physical characteristics and collecting a photo record. Representative benthic macroinvertebrate samples were collected several times between November 2015 and April 2016. Fish and crayfish were also surveyed using a variety of techniques (electric fishing, minnow traps and visual observations).

The Coronation North Project is situated within the Mare Burn catchment. The Coronation North Project footprint is to lie within the eastern side of the Coal Creek catchment, and the Coal Creek freshwater storage reservoir is proposed for part of the lower catchment. The existing Coronation Project footprint lies within the upper Maori Hen Creek catchment and the headwaters of Trimbells Gully Tributary, which all flow into the Mare Burn.

Many areas near the proposed development have been extensively modified by past and existing farming and mining activities. These activities, together with the fact many catchments are small, ephemeral and provide minimal surface water features, contribute to the limited aquatic values present in most of the areas likely to be affected by mine development. However, the middle and lower reaches of the affected catchments have higher quality aquatic values, with healthier invertebrate and fish communities. The use of silt ponds, other sediment control measures and mitigation to ensure compliance with water quality standards, will minimise any effects of the developments on these lower catchment environments.

Mare Burn Catchment

Although a number of fish species are recorded to be located within the Mare Burn, the area of the Mare Burn that will be directly affected by the Coronation North project only inhabits Freshwater crayfish or Koura and Taieri flathead galaxias. A barrier downstream of the affected area separates other recorded fish species such as Trout and Eels from inhabiting the upper reaches of the catchment.

Freshwater crayfish or Koura, which are classified by the New Zealand Threat Classification System (NZTCS) as 'At Risk – Declining', are widespread and relatively common in Maori Hen Creek, Trimbells Gully tributary and mainstem and Coal Creek within the potentially affected area. Taieri flathead galaxias, which are classified by the NZTCS as 'Threatened – Nationally Vulnerable', are present in the tributaries of the Mare Burn from Coal Creek up to the confluence with Trimbells Gully.

Assessments by Ryder Consulting over recent years have not identified the presence of any suitable salmonid spawning habitat, nor have any salmonids been caught in Mare Burn tributaries. It is likely that this type of habitat is located further downstream in the catchment and well outside of the proposed Project area. Barriers to upstream passage are also likely to restrict the presence of salmonids in the upper Mare Burn catchment.

Eel abundance in the vicinity of the tributaries subject to existing and proposed mining operations is very low to non-existent, with only one eel having been observed (at TC01) since surveying began in 2012. Therefore, significant eel populations are not at risk from existing or proposed mining operations associated with the Coronation North Project.

As noted in the water quality section there is potential effects from the toxicology on Taieri flathead galaxias. There is currently no existing toxicity data for Taieri flathead galaxias or any of its close relatives. The applicant noted that the particular species appear to be resilient given the current habitat experiences extreme summer and winter conditions.

Mitigation

The proposed Coronation Project will result in the loss of aquatic habitat in the headwaters of the Mare Burn and Coal Creek catchments through excavation associated with the Coronation Pit works, deposition associated with the disposal of waste rock within the WRS area, construction of silt ponds and construction of pit infrastructure.

The applicant commissioned ERA Ecology NZ to provide an ecological impact management plan (ERA Ecology NZ, 2016, *Coronation North Project Impact Management Plan)*. Central Otago is also home to a number of indigenous freshwater fauna that are of conservation concern, four of which are known to occur in the Macraes area: the Declining freshwater crayfish *Paranephrops zealandicus*, the Declining long-finned eel *Anguilla dieffenbachii*, and the non-migratory Nationally Endangered roundhead galaxias *Galaxias anomalus* and the Nationally Vulnerable Taieri flathead galaxias *Galaxias depressiceps*. For consideration for the project's impact on these aquatic values a financial compensation is proposed. As there is no commercial purchase figure, instead, a flat sum of $30,000 is offered by the applicant as consideration for this impact.

As noted in Section 5.1 the applicant has proposed a number of conditions to avoid and mitigate the effect of predatory fish species and toxicity towards Taieri flathead galaxias and their habitat.

RSU Assessment

Council's RSU were asked to review the application. RSU has noted that particular emphasis to the safe guarding of the Taieri flathead galaxias is necessary given the species is currently classified as nationally vulnerable; this is the third highest threat ranking given those species facing extinction. In the assessment of aquatic ecology RSU have based the assessment around the effect on Taieri flathead galaxias.

In regards to the Applicant offering a flat sum of $30,000, such a condition is not recommended in this report. Arrangements around such proposal should be managed outside the consenting process between the applicant and DoC.

A condition around the translocation of Taieri flathead galaxias and koura, similar to conditions on the Coronation project consents, is recommended as conditions of consent.

Effects such as predatory risk and toxicity on Taieri flathead galaxias have been identified and discussed in the previous sections. Although localised effects towards the Taieri flathead galaxias will be more than minor, recommended consent conditions will ensure that adverse effects are appropriately avoided, mitigated and remedied for wider populations.

5.4 Wetlands

The wetlands affected by the Coronation North Project are not listed in Schedule 9 of the RPW, are not located in a wetland management area identified in Schedule 9, and are not located more than 800 metres above sea level, therefore they are not regionally significant wetlands. Wetlands affected by the Coronation North Project fall under Dunedin City Council and Waitaki District Council's jurisdiction and as such any effects toward wetlands will be discussed in the District Councils Section 42a report.

5.5 Air Quality

A detailed assessment of the effects of air discharges has been undertaken by Beca Infrastructure Limited (Beca) (Beca Infrastructure Limited, 2016, *Oceana Gold Coronation North – Assessment of Environmental Effects of Air Discharges*).

The applicant currently holds four resource consents for the discharges to air from the MGP site. While the new Coronation North Project activities are of the same nature as those currently authorised, they will be outside the area covered by the existing resource consents. Accordingly, a new resource consent is required for the air discharges that will result from the Coronation North Project. The Coronation North Project activities that have potential to generate discharges to air include:

- Earthworks, including stripping of overburden and topsoil, mining, construction of roads and dam structures and formation of the waste rock stack and stockpiles;
- Blasting;
- Vehicle movements on unpaved surfaces;
- Loading and unloading of materials; and
- Wind generated dust from dry exposed surfaces such as roads and stockpiles.

The Coronation Project site is located some distance from the closest neighbouring houses in the area. The applicant owns two houses within 1 km of the site but the assessment of air discharge effects has focussed on the nearest privately owned houses, considered 'sensitive receptors'. The Howard residence is about 2.5 km to the south of the Coronation Pit and about 1.2 km to the west and southwest of the haul road, and the O'Neill residence is about 3.5 km to the northwest of the proposed Coronation North waste rock stack.

The 2004 National Environmental Standards for Ambient Air Quality (NESAQ) regulations are designed to address the health effects caused by poor air quality. The standard of relevance to the Coronation North Project is the NES for fine particles (PM10). The PM10 standard allows a maximum of one exceedance per year of a PM10 concentration of 50 $\mu g/m^3$ (24 hour average). Regulation 17 restricts the granting of resource consents for discharges of PM10 where that discharge would be likely to increase off-site 24 hour average PM10 concentration in "polluted" airsheds by more than 2.5 $\mu g/m^3$ at any time. There is no meaningful PM10 concentration data available for this airshed in which the Coronation North Project is located and

therefore it does not meet the NESAQ definition of "polluted". Accordingly, there are no restrictions under Regulation 17 to the granting of this resource consent.

It is expected that the air discharges from the Coronation North Project will not have a significant adverse effect on the local air quality or the overall air quality within Air Zone 3. Although the proposal will not enhance ambient air quality neither is it expected to result in any significant degradation of ambient air quality.

Consent conditions for the air discharge permit will include limits set for deposited dust and Total Suspended Particulates (TSP). Monitoring of dust discharges during 26 years of mining at the MGP site has demonstrated that:

- For the majority of the time deposited dust levels beyond the mine boundary have been within the consent limits, and within the mine boundary have also remained below the limit of $3g/m^2/30$ days. Some exceedances have been attributed to extreme wind events and factors beyond the applicant's control (such as the proximity of busy unpaved roads and agricultural activities).
- Deposited dust levels have increased in comparison to background values, however at the majority of locations levels have not increased more than the existing resource consent allows, and levels at locations near to where people live are consistently below the consent limit.
- TSP concentrations are generally below the consent limits. On occasion high concentrations have been recorded but the high results are not always attributable to mining activity (agricultural activities like cultivation and spreading of fertiliser have been implicated).
- PM10 and respirable quartz concentrations are low and likely to be typical of rural areas.
- There have not been any reported incidences of adverse effects on vegetation or human health.
- The number of complaints reported to the Otago Regional Council is relatively low (5 since 2009 - all related to dust from the Mixed Tailings Impoundment at the MGP site, which has since been mitigated with implementation of additional dust control measures).

Overall, discharges to air from the existing MGP activities results in effects on the environment that are no more than minor.

Consent conditions will require the applicant to provide the consent authority with a comprehensive Dust Management Plan that will be updated to incorporate the Coronation North Project activities. The mitigation methods prescribed in the Dust Management Plan have been effective at controlling dust generated at the MGP site and should also be an effective management tool for controlling dust emissions at the Coronation Project.

The quantity and frequency of dust discharges from the site are directly related to the amount of material that is moved and processed, the area of open ground, the dust control measures employed and local weather conditions. The effects of the discharges are also directly proportional to the quantity of the dust emissions. In comparison to the current mining activity at the MGP site the expansion to the existing Coronation Project will be relatively small and will take place over a short period of time. The activities are similar in nature but on a smaller scale.

The results of monitoring, complaints and audit records demonstrate that the existing dust effects of the mine are no more than minor and within the limits set by the current resource consents. The applicant intends to continue to operate within the current consent limits and continue to use the dust mitigation techniques that have been used successfully to date. Provided these measures are diligently carried out any cumulative dust effects arising from the combination of dust from the Coronation North Project with discharges to air from the MGP site should be minimised and adequately mitigated. Given the relatively small scale of the mining activities associated with the Coronation North Project any increase in the nature and scale of effects of dust emissions from the project is expected to be minimal. Provided particular care is taken with the construction of the WRS and topsoil stockpile the discharge of dust from the Coronation Project will be adequately mitigated and any adverse effects downwind of the site are expected to be no more than minor.

RSU Comment
RSU reviewed the application and note that the proposed activities are quite similar to existing activities. The applicant has stated that it will continue to monitor for dust and Total Suspended Particulate (TSP) and proposes moving one dust gauge to a new location. Providing the Dust Management Plan is updated to include this area, and existing mitigation measures are continued to be performed, the effect of the proposed activity will be no more than minor.

5.6 Waste Rock Stack stability

The Coronation North WRS will have a static factor of safety against instability exceeding 1.5 for the expected water levels. The WRS has been designed for an Operating Basis Earthquake with a recurrence interval of 150 years and a Maximum Design Earthquake with a recurrence interval of 2,500 years. Accordingly, the stability of the Coronation WRS in static and earthquake conditions is considered acceptable and in line with what is typical for WRSs of this type.

Tonkin & Taylor Assessment
Tonkin & Taylor Limited (T&T) were asked to provide a peer review of the application. T&T note that the shape and extent of the WRS is designed using geometric and geotechnical criteria adopted and tested on previous waste rock stacks at the site, with the absence of slope instability issues reinforcing the appropriateness of the adopted design parameters. The final landform requirements appear to be the governing factor in waste rock shapes and slopes, as is commonly the case on large scale mine waste fills. The design shapes and level of analysis undertaken appear acceptable for the project.

An offset of 100 m from the crest of the open to the toe of the WRS is prosed by the applicant to allow for long term slope performance and the potential for some modification (enlargement) of the pit without re-handling of waste rock. Based on the information that we have reviewed this is considered appropriate.

The applicant does not make any specific assessment of the risk adverse impact on the receiving environment due to slope instability of the WRS. Such a specific assessment is, in our view not necessary based of the WRS materials, proposed gentle design slope angles and observed performance of existing WRS on the mine site. Potential for 'more than minor' impact on the receiving environment may occur from rainfall runoff

and infiltration on the WRS and resulting water quality, erosion and sedimentation issues.

In conclusion of their review of the application, T&T note that the investigations are generally suitable, the assessments provided generally appear accurate and that the assumptions and conclusions are considered to be valid.

5.7 Coronation North Pit Design

The Coronation North WRS is located to the northeast of the pit but at its closest point (during Stage 4 of mining) it is approximately 200m away and this separation is wide enough for the stack not to adversely impact on pit wall stability.

A simple slope design is recommended and will be implemented. It is also recommended that there is ongoing development of the Coronation North geological model, in particular to better understand the north-south trending fault inferred from the steep gorge at the eastern end of the proposed pit, and the basalt and underlying sediments.

Due to the degree to which the rock mass is fractured it would be impossible to mine the Hyde- Macraes Shear Zone without any pit slope failure, and at stage 4 of development the pit will be proximate to the Footwall Fault. However the report acknowledges that OceanaGold has successfully managed mining 10 other open pits at Macraes Mine which have experienced numerous batter and multiple-batter scale failures. Movement of the south western pit wall in response to mining and, as the pit deepens, in response to rainfall can be managed as it has been in other pits, for instance by monitoring and stop/start mining.

Tonkin & Taylor Assessment

The pit design reports and pit shell drawings provided for our review appear to follow the form of previous design studies at Macraes Mine. Open pit batter and berm configurations appear to have been optimised over the years of continual development and observation at the site. The assessments provided for Coronation North recognise the pit specific geology (basalt cap, faulting at the SE end) and the risk to pit wall stability.

Staged pit development, observation of performance and modification of the wall designs is proposed. This is an acceptable approach that has been applied on the site in the past. It is also very important that the Applicant's design process take appropriate account of the necessary safety in design considerations, the details of which are beyond T&T's scope. The Applicant has assessed a moderate to low likelihood of slope instability during mining of the pit. The assessment is on a pit wall sector by sector basis, considering the potential failure mechanisms and uncertainty in the ground model.

Our review of the pit design information including the location, size and shape of the proposed pit, and the 100 m standoff to the WRS suggest a negligible risk to the receiving environment. Any post mining slope instability appears likely to be constrained to the pit void. In our view the potential for 'more than minor' effects on the receiving environment may occur from the interaction of the pit void with surrounding groundwater and the quality of water that accumulates in the post mining

pit void. Groundwater is discussed in previous sections above, and T&T understand that water quality issues are being reviewed by NIWA.

In conclusion of their review of the application, T&T note that the investigations are generally suitable, the assessments provided generally appear accurate and that the assumptions and conclusions are considered to be valid.

5.8 Coal Creek Freshwater dam Design

If construction of the dam proceeds a detailed hypothetical dam breach study will be undertaken and the final dam design will be documented in a later design report that is used to support an application for a building consent.

For the purposes of the report a conservative approach has been adopted and a Medium Potential Impact Classification (PIC), rather than Low PIC, has been applied.

The geological conditions at the proposed dam site are expected to be similar to those elsewhere at the MGP where existing water retention dams, silt ponds and tailings storage facilities have been constructed and have performed successfully for years. The MGP site is located in an area of relatively low historic seismic activity, however there are some nearby faults which are capable of generating large earthquakes. The dam would be located east of the Footwall Fault and the major east trending fault closest to the dam would be the northern segment of the Taieri Ridge Fault that runs along the foothills 11 km east of the dam site.

To ensure stability the dam will be designed and constructed in accordance with the New Zealand Society of Large Dams (NZSOLD) Dam Safety Guidelines. Embankment stability will be analysed during detailed design and will apply conventional factors of safety of F>1.5 and F>1.2, and an Operating Basis Earthquake based on a 150 year return period and, for a Medium PIC dam, a Safety Evaluation Earthquake based on a 2,500 year return period. Construction of the dam embankment will be under applicants direct supervision, assisted by surveyors and the dam designer, drawing from experience gained during the successful construction of the existing facilities at MGP, for example the recently constructed Tipperary Freshwater Dam. An Operation, Maintenance and Surveillance Manual will be prepared to ensure the ongoing safety of the dam, with regular monitoring and inspections.

Further to the resource consent requirement for the construction of the proposed dam, the applicant will also require building consent to construct the embankment and appurtenant structures. The building consent process will assess the structural integrity of the designed embankment, whilst taking into account geology, seismic effect and all other relevant parameters. As ORC is the delegated authority to process building consents for large dams within Otago, further assessment on the design of the structure will be undertaken on submission of the building consent application. As the building act currently does not address dam safety over time, it is recommended that dam safety consent conditions, consistent with New Zealand Society for Large Dams (NZSOLD) guidelines 2015, be applied as conditions of consent.

5.9 Cultural Values

The maintenance of natural landscapes, protection of waahi tapu and waahi taonga, for taonga species and impacts on the mauri of the land, water and air are all of cultural importance. A Cultural Impact Assessment (CIA) is being undertaken by KTKO and

the applicant has volunteered a review condition to take into account the findings of the CIA.

Previous consultation and assessments undertaken in the vicinity of the MGP site have not identified any culturally important landscape features. Some aspects of the Coronation Project will have an impact on skylines and ridgelines. The applicant will be undertaking mitigation to minimise any potential effects even though it is unlikely there will be adverse effects on culturally important landscape features.

Taonga species are native birds, plants and animals of special significance and importance to iwi and it is important that these resources are treated with care. A number of taoka species, as identified in the NRMP, are present at the Coronation North Project site.

The applicant has commissioned extensive archaeological surveys of its entire project area since commencement of exploration and mining in the area. An assessment of Iwi archaeology has been completed for the Coronation North Project area. No features of significance to iwi have been identified within the footprint of the Coronation North Pit. Within the footprint of the Coronation North WRS there were sites identified that may be rock shelters, a possible umu pit, and a possible urupa (burial site). The latter site may be able to be avoided by redesigning the rock stack, and if that is not practicable further site examination is recommended. Within the Coal Creek Dam footprint there are further potential rock shelter sites. It is possible that an unrecorded or unknown site may exist within the area and to that end the applicant has an established procedure communicated to all staff on dealing with such accidental discoveries.

Dust effects will continue to be regulated by the applicant's discharge to air consent requirements, with standard dust suppression requirements. Therefore, it is envisaged that the Coronation North Project will not have any adverse air quality effects that are more than minor.

In order to take into account the findings of the CIA, the following consent condition will be included on all Coronation North Pit consents to ensure that a review can be initiated based on the findings of the final CIA, if required:

> *"The Consent Authority may, within 6 months of receipt of the Cultural Impact Assessment; serve notice of its intention to review the conditions of this consent for the purpose of amending or adding conditions to address mitigation of the effect of the Coronation North Project on cultural values and associations. All costs associated with any such review shall be borne by the consent holder."*

5.10 Heritage Values

Five historic sites fall within the Coronation North Project area and will be destroyed during the works:

- The upper Mare Burn race which is located in Trimbells Gully and Maori Hen Creek,
- Two sites associated with the NZ Gold and Tungsten Mine. This area consists of stone revetting, a tramline, stone platforms, races and other discrete features,
- Alluvial workings within Coal Creek, and

- The potential remains of a miner's house associated with alluvial workings.

Five other sites exist within the Project Area but should not be impacted by minim activity.

The five impacted sites are considered to be in a condition ranging from fair (features of the site remain visible but there has been modification resulting in some of these being destroyed) to good (original features and fabric associated with the site remain and are clearly visible; there is some evidence of disturbance or modification.) There is evidence of natural, and possibly stock induced, erosion processes at all sites and several of the sites appear to have been impacted on by past farming activities.

An application will be made to HNZ form all work within the Coronation North Project Area. It will cover the five sites that will be adversely affected, as well as any sites that might be uncovered as work proceeds.

The five sites that are present within the Project Area but will not be affected by works will be clearly identified in project documentation and, where practicable, identified in the field so that they will not be physically impacted during the works.

Before any work that might impact on archaeological features commences a plan and photographic record of the sites will be completed.

An archaeological procedure will be developed that outlines the steps that will be taken for the management of any underground archaeological features that may be revealed during work.

The applicant states that they are currently discussing with HNZ potential mitigation options that could be adopted at a later time, should the Coal Creek Freshwater Dam be constructed.

Six other sites exist within the project area, but should not be impacted by the proposed mining activity.

An application will be made to Heritage New Zealand (HNZ) for all work within the Coronation North Project area. It will cover the two sites that will be destroyed, as well as any sites that might be uncovered as work proceeds.

The six sites that are present within the project area but will not be affected by works will be clearly identified in project documentation and, where practicable, identified in the field so that they will not be physically impacted during the works.

Before any work that might impact on archaeological features commences a plan and photographic record of the sites will be completed. An archaeological procedure will be developed that outlines the steps that will be taken for the management of any underground archaeological features that may be revealed during work. Sites that are subject to destruction will be surveyed and investigated in detail in accordance with any Authority that may be issued by HNZ.

It is recommended that the Accidental Discovery Protocol condition be implemented as a condition of consent.

5.11 Monitoring

The applicant has an extensive environmental monitoring programme that includes compliance monitoring as required by resource consents and additional in-house monitoring. The monitoring undertaken by the applicant has resulted in a large amount of environmental data which has informed the technical assessments supporting these applications. In some cases, records extend over 20 years. Over this period, the applicant has reported a small number of exceedances of consent limits. These have generally been of a minor nature or related to a technical non-compliance. Examples of this are where duplicate compliance limits exist for the same site or where compliance limits have been set for sites that have historically been above the limit for certain parameters. No enforcement or abatement action has ever been taken in relation to the MGP. There has been no material offsite environmental impact.

Monitoring proposed as part of the Coronation North Project is consistent with monitoring already undertaken at the MGP. However, further the recommendation from NIWA it is recommended that surface water quality thresholds be set as shown in Table 16. The parameters shall be assessed at compliance sites MB02.

Table 16: Comparison of existing compliance criteria at site MB01 with potential ecologically relevant criteria suitable for MB02

Parameter	Existing compliance criteria at MB01	Potential ecological protection criteria for MB02	Reference for proposed criteria
pH (unitless)	6.0-9.5	6.5-9.0	(ANZECC 2000)
Dissolved copper	0.009	0.0014	ANZECC (2000)
Dissolved zinc	0.12	0.008	ANZECC (2000)
Dissolved nickel		0.011	ANZECC (2000)
Dissolved lead	0.0025	0.0034	ANZECC (2000)
Dissolved silver		0.00005	ANZECC (2000)
Arsenic	0.15	0.013, 0.024	ANZECC (2000)
Iron	1	1	US EPA (1976)
Manganese		0.5	
Cyanide	0.1	0.007	ANZECC (2000)
Sulphate	1000	128	MFE-BC (2013)
Dissolved oxygen	~-	>7.0 (>5.0)	NPS-FM (MfE 2014)
Nitrate		<2.4 (<3.5)	NPS-FM
Ammonia		<0.24 (<0.40)	NPS-FM
Turbidity		30-50% change in clarity	(MfE 1994)
Suspended solids		30-50% change in clarity	MfE (1994)

Notes:
All units g/m^3 (i.e., mg/L) unless stated.
1. pH range from ANZECC. Aluminium becomes markedly more toxic at pH 6 so range should be limited. Ammonia toxicity increases at high pH.
2. Default metal guideline for a hardness of 30 g $CaCO_3$ m^3.
3. Guideline dependent on arsenic speciation (AsIII or AsV)
4. Manganese floc precipitates like iron floc. Estimated guideline value for initial evaluation.
5. Guideline is hardness-dependent. Value is for 'very soft' waters and may be higher in high hardness waters.
6. Values for 7 day mean minimum (1 day minimum) in summer period for 'B' attribute waters.
7. Values for median (95th percentile bracketed) for 'B' attribute waters.
8. Values for median (maximum bracketed) for 'B' attribute waters for total ammoniacal-N at pH 8. Note that pH adjustment for other pH values.
9. Turbidity and SS change relative to background water clarity as aesthetic measure. No values available for ecological protection.

In addition to this is the air quality monitoring discussed in Section 5.5 above.

5.12 Assessment of Alternatives

There are no alternative locations for the mining operation as it is dependent on the location of the gold resource. There are also no practical alternative methods of discharge as the applicant is proposing to use all of the relevant best practice techniques to control dust from the proposed Coronation North Project.

The plans for the Coronation North Project have been modified to improve the environmental outcomes of the project as the project has developed.

The applicant does not considered viable to store waste rock from the Coronation North Pit in alternative waste rock stacks at the MGP site, by expanding those stacks. Proximity to the Coronation North Pit produces economic efficiencies, haul costs are reduced, and greenhouse gas emissions associated with haulage are minimised. Similarly, the additional haul road is located in the most direct and therefore efficient route.

Use of existing infrastructure at the MGP processing plant, and utilisation of existing vehicle fleets, mining equipment and personnel from the MGP is an efficient use of resources.

It was not possible to contain the Coronation North Project to a location within the Macraes Mining Project Mineral Zone, or to avoid the Rural Scenic Zone in Waitaki District or the High Country OLA in Dunedin City, because the mineral resource is located within those areas. There is a functional necessity to locate operations in the proposed locations.

The location of the Coal Creek Freshwater Dam has been chosen in preference to other locations (for instance Trimbells Gully) because it provides the following advantages:

- It is located on land owned by the applicant so that it is readily accessible for construction, monitoring and maintenance
- It is upstream of the Project area and provides natural drainage of water through the catchment where it is needed
- Coal Creek has an upstream catchment yield sufficient to provide the volume of water required for storage
- The dam will have negligible visual impact on neighbouring properties or public places because it is situated within a gully
- The ‘borrow areas’ that are needed for sourcing the fill material can be contained within the dam footprint
- The natural topography has a natural constriction point that allows for a 27 metre embankment which provides good storage capacity and makes an efficient impoundment/embankment ratio, thereby reducing potential for greater land disturbance.

In further information sought 1 July 2016, it was suggested that all other alternatives should be reassessed. As mentioned in Section 5.1.2 of this report, Council’s preference is that the proposed Coal Creek Freshwater dam should be seen as a last resort, therefore all other methods of mitigation should be assessed. It was noted that Council’s preference, pursuant with Policy 6.5.5 of the Regional Policy Statement for Otago, is to promote discharges to land where practical rather than to water bodies. Capturing waste rock seepage and applying land based discharge would mitigate concentrations to the receiving surface water bodies. It was also queried whether it is

possible for leachate from the WRS to be diverted downstream through a water race or other means so as to avoid the need for a reservoir.

The applicant acknowledged that they are committed to investigating alternative measures to mitigate water quality effects from the WRS seepage so that those mitigation measures can be used together with or instead of the dam. The goal is to either reduce the scale of the dam to be constructed or eliminate the need for it to be constructed. Advice given to the applicant from O'Kane Consultants identified measures to investigate further. The applicant intends to investigate options and commission a formal best practice options report, to be shared with the Consent Authority, which will inform and guide final management and mitigation response.

In regards to the land based application, the applicant has acknowledged that there is a possibility for it to be achieved, however the applicant is constrained in the fact that there are no downstream areas that are owned by the applicant that are large enough to serve the purpose of land based disposal. Pumping to upstream areas could be considered during operations but management post-closure raises challenges which is why passive mitigation is preferred. The applicant notes that they have not excluded the possibility that land based disposal could be included in the suite of management and mitigation options, particularly during the drier summer period. In regards to the possibility of leachate from the WRS to be diverted via a water race or other means, the applicant acknowledged that it is unlikely to be feasible on a scale that is practical but would not be ruled out in any future review options.

5.13 Bonds

Recommended conditions of consent will require the consent holder to provide and maintain bonds comprising:

(i) A performance bond to secure the completion of rehabilitation in accordance with the conditions of the consents; and
(ii) A monitoring bond to ensure the performance of the monitoring obligations of the consent holder of the consents.

The performance and monitoring bonds shall be in a form approved by the consent authority and shall be on the terms and conditions required by the Consent Authority.

The performance bond shall provide that the consent holder remains liable under the Act for any breach of the conditions of the consents that occurs before the expiry of the consent, and for any adverse effect on the environment which becomes apparent during or after the expiry of the consent. Similarly, the monitoring bond shall provide that the consent holder remains liable under the Act for any breach of the monitoring conditions of the consents that occurs before the expiry of the consent, and for the monitoring for and of any adverse effect on the environment which becomes apparent during or after the expiry of the consents.

Recommended consent conditions shall require that the performance by the consent holder of all the conditions of each bond shall be guaranteed by a guarantor acceptable to the Consent Authority. The guarantor shall, in each bond, bind itself to pay for the carrying out and completion of any conditions in the consents which are the subject of the bond, in the event of any default of the consent holder, or any occurrence of any adverse environmental effect requiring remedy.

Recommended consent conditions shall require that the amount of each bond shall be fixed annually by the Consent Authority which shall take into account any calculations and other matters submitted by the consent holder relevant to the determination of the amount in the Project Overview and Annual Work and Rehabilitation Plan, or otherwise.

The amount of the performance bond shall include the estimated costs of complete rehabilitation in accordance with the conditions of the consents, on completion of the mining operations proposed for the next year and described in the Project Overview and Annual Work And Rehabilitation Plan, and any further sum which the Consent Authority considers necessary to allow for remedying any adverse effect on the environment that may arise from the exercise of the consents.

The amount of the monitoring bond shall include the estimated costs of monitoring, in accordance with the monitoring conditions of the consents until the consents expire, and any further sum which the Consent Authority considers necessary for monitoring any adverse effect on the environment that may arise from the exercise of the consents including monitoring anything which is done to remedy or mitigate an adverse effect.

If, on review, the amount of a bond to be provided by the consent holder is greater than the sum secured by the current bond, the consent holder and guarantor shall execute and lodge with the Consent Authority, a new bond for the amount fixed on review by the Consent Authority, within one month of the consent holder being given notice of the new amount to be secured by the bond. The consent holder shall not exercise this consent, if the new bond is not provided in accordance with this condition.

Any bond may be varied, cancelled or renewed at any time by agreement between the consent holder, guarantor and Consent Authority.

The costs of providing any bond shall be paid by the consent holder.

Recommended conditions of consent shall require that before the expiry or surrender of the consents, the consent holder shall provide in favour of the Consent Authority, performance and monitoring bonds for a period of 20 years from the expiry or surrender of the consent.

Recommended conditions of consent shall require that the consents are not exercised until performance and monitoring bonds have been executed by the consent holder and any guarantor and lodged with the Consent Authority.

6. Statutory Considerations

Section 104 of the Act sets out the matters to be considered when assessing an application for a resource consent. Those matters which should be considered for these applications are:

6.14 Part 2 of the Act

The applications are subject to Part 2, the purpose and principles, which are set out in Sections 5 to 8 of the Act. Those matters that should be considered for these applications are as follows.

The proposal is consistent with the purpose and principles of the Act, as outlined in Section 5. Section 5 states that the purpose of the Act is to "to promote the sustainable management of natural and physical resources". Sustainable management has two facets. The first aspect is "managing the use, development and protection of natural and physical resources in a way, or at a rate which enables people and communities to provide for their social, economic and cultural well-being and for their health and safety". In this respect, the concept of sustainable management is permissive. The purpose of the Act is achieved by allowing activities that benefit people. In this case the applicant is proposing to undertake the Coronation Project in order to extend the life of the mine, enabling further exploration and recovery of a valuable resource whilst ensuring employment and economic gain for people within the region. Careful planning and appropriate conditions of consent will ensure that potential adverse effects from the Coronation Project expansion are avoided, mitigated or controlled.

However, there is another aspect to sustainable management. The use, development and protection of resources are only allowed while:

(a) "sustaining the potential of natural and physical resources, (excluding minerals) to meet the reasonably foreseeable needs of future generations; and
(b) safeguarding the life-supporting capacity of air, water, soil and ecosystems; and
(c) avoiding, remedying, or mitigating any adverse effects of activities on the environment."

The granting of these applications with the conditions imposed, and including the requirement for monitoring to ensure adverse effects are avoided, is consistent with the ethic of sustainable management of resources.

Section 6 of the Act requires that in assessing the applications, the following matters of national importance are recognised and provided for:
a) The preservation of the natural character of the coastal marine area, wetlands, and lakes and rivers and from inappropriate subdivision, use, and development:
b) The protection of outstanding natural features and use, and development:
c) The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:
d) The maintenance and enhancement of public access lakes, and rivers:
e) The relationship of Maori and their culture and traditions sites, waahi tapu, and other taonga.
f) The protection of historic heritage from inappropriate subdivision, use and development.
g) The protection of recognised customary activities.

Section 6 of the Act sets out those matters of national importance that are to be recognised and provided for in achieving the purpose of the Act.

The applications are not contrary to Section 6(a) of the Act, in that the applicant has adequately assessed the potential effects of the proposed activities. Where there are shortcomings in this assessment, recommended conditions of consent will provide for

further assessment, with review conditions allowing the findings of any further assessment to be taken in account and provided for. The MGP site is a highly modified mine site with little natural character. Although some of the sites to be developed as part of the Coronation Project have not yet been impacted upon by mining activities, these sites are associated with limited natural values. Consequently, subject to recommended consent conditions, the effects on remaining natural character will be no more than minor.

Section 7 of the Act sets out those matters that have particular regard attributed to them in achieving the purpose of the Act. Matters relevant to the proposal under consideration are as follows:
(a) kaitiakitanga and the ethic of stewardship;
(b) the efficient use and development of natural and physical resources;
(c) maintenance and enhancement of amenity values;
(d) intrinsic values of ecosystems;
(f) maintenance and enhancement of the quality of the environment; and
(g) any finite characteristics of natural and physical resources;

In contrast to section 6, the matters set out in section 7 are not declared to be matters of national importance.

The proposed activities will affect ecosystems located in and around the MGP site. However, these effects have been assessed and appropriate mitigation is proposed. Furthermore, due to proposed consent conditions, the effects on ecosystems will be avoided where possible.

In respect of Kaitiakitanga, Iwi authorities were provided with the opportunity to exercise guardianship in regard to the natural and physical resources in the area. This resulted in a CIA being proposed to cover these issues.

Section 8 requires all persons acting under the Act to take into account the principles of the Treaty of Waitangi. Recommended conditions of consent will allow for consent conditions to be reviewed as required based on the findings of the CIA. Consequently, the principals of the Treaty of Waitangi (te Tiriti o Waitangi) have been taken into account.

Overall, these applications are consistent with Part 2 of the Act.

6.15 Section 104(1) of the Act

The remaining matters of Section 104(1) to be considered when assessing an application for a resource consent are as follows:

(a) any actual and potential effects on the environment of allowing the activity; and
(b) any relevant provisions of
- *(i) a national environmental standard;*
- *(ii) other regulations;*
- *(iii) a national Policy statement;*
- *(iv) a New Zealand coastal Policy statement;*
- *(v) a regional Policy statement or proposed regional Policy statement;*
- *(vi) a plan or proposed plan; and*

(c) any other matter the consent authority considers relevant and reasonably necessary to determine the application.

These matters are discussed in the following sections.

6.15.1 Environmental Effects

The actual and potential environmental effects of the proposed activity were considered in Section 5 of this report. Recommended conditions of consent will ensure that any adverse effects are avoided, remedied or mitigated.

6.15.2 National Policy Statement Freshwater Management

The NPS for Freshwater Management 2011 was superseded by the NPS for Freshwater Management 2014 on 1 August 2014. The NPS supports improved freshwater management in New Zealand. It does this by directing regional councils to establish objectives and set limits for fresh water in their regional plans. It requires regional councils to recognise the national significance of fresh water for all New Zealanders and Te Mana o te Wai (the mana of the water). It directs regional councils to:

- safeguard fresh water's life supporting capacity, ecosystem processes, and indigenous species including their associated ecosystems
- manage freshwater bodies so people's health is safeguarded
- maintain or improve the overall quality of fresh water within a region
- protect the significant values of wetlands and outstanding freshwater bodies
- require more efficient use of fresh water by end users
- avoid the over allocation of water takes and inputs of contaminants, and to phase out existing over allocation
- set freshwater objectives according to a specified process (the national objectives framework) to meet community and tāngata whenua values which include the compulsory values of ecosystem health and human health for recreation
- use a specified set of water quality measures (attributes) to set the freshwater objectives (an objective can only be set below national bottom lines in specified circumstances)
- set limits which allow freshwater objectives to be met
- put in place measures to account for water takes and sources of contaminants, and monitor achievement towards meeting objectives
- take a more integrated approach to managing fresh water and coastal water
- fully implement the National Policy Statement by 2025

The Council considers that the current and proposed policies in the RPS and RPW meet the requirements of the NPS. Consideration of these documents in light of the activities proposed is given below.

6.15.3 National Environmental Standard for Sources of Human Drinking Water

Regulations 7 and 8 of the National Environmental Standard for Sources of Human Drinking Water (NES) need to be considered when assessing water permits that have the potential to affect registered drinking water supplies that provide 501 or more people with drinking water for 60 or more calendar days each year.

There are two community drinking water supplies that serve a population of 501 or more people with drinking water for 60 or more calendar days each year that could

potentially be affected by the proposed activities (the Outram and Palmerston supplies).

In terms of identifying, mitigating and monitoring contaminants of human health or aesthetic significance entering these water supplies, the applicant has set out a systematic approach that would make a breach of the NES unlikely. The most problematic determinant is sulphate. Consent conditions require sulphate levels in the receiving water bodies to be below NES guidelines.

6.15.4 Resource Management (Measurement and Reporting of Water Takes) Regulations 2010

The Regulations have been given consideration to in Section 5 of this report.

6.15.5 Regional Policy Statement

The Regional Policy Statement for Otago (RPS) provides an overview of Otago's resource management issues, and ways of achieving integrated management of natural and physical resources. The provisions of Chapter 5 (Land), Chapter 6 (Water), Chapter 7 (Air), Chapter 9 (Built Environment), Chapter 10 (Biota), Chapter 11 (Natural Hazards), Chapter 13 (Wastes and Hazardous Substances) and Chapter 14 (Monitoring and Review) are relevant to this application.

Policy 5.5.1 *To recognise and provide for the relationship Kai Tahu have with Otago's land resource.*

Policy 6.5.1 *To recognise and provide for the relationship Kai Tahu have with the water resource on Otago.*

Policy 7.5.1 *To recognise and provide for the relationship Kai Tahu have with the air resource in Otago.*

Policy 9.5.1 *To recognise and provide for the relationship Kai Tahu have with the built environment of Otago.*

Policy 10.5.1 *To recognise and provide for the relationship Kai Tahu have with mahika kai in Otago.*

Policy 11.5.1 *To recognise and provide for Kai Tahu values in natural hazard planning and mitigation.*

Policy 13.5.1 *To recognise and provide for the relationship Kai Tahu have with natural and physical resources when managing Otago's waste stream.*

Te Rūnanga o Moeraki and Kāti Huirapa ki Puketeraki are currently undertaking a CIA to determine potential effects of the Coronation North Project. A review clause included on all consents will allow for a review of consent conditions as necessary to address any potential adverse effects identified by the CIA.

Policy 5.5.3 *To maintain and enhance Otago's land resource through avoiding, remedying or mitigating the adverse effects of activities.*

Policy 5.5.5 *To minimise the adverse effects of landuse activities on the quality and quantity of Otago's water resource.*

Policy 5.5.6 *To recognise and provide for the protection of Otago's outstanding natural features and landscapes which represent area of cultural or historic significance in Otago, or have characteristics of cultural, historical and spiritual value.*

Policy 5.5.8 To recognise known mineral deposits and to consider the potential for access to those mineral resources to be compromised or removed by other alternative land development.

Provided that recommended conditions of consent are adhered to, adverse effects from the proposed activities should be avoided, remedied and/or mitigated. Modelling has indicated that the Coronation North Project will impact on water quality but provided that adequate mitigation is imposed, water quality should remain within guideline limits for the likely use. Further assessment is being undertaken, and will be undertaken, to identify cultural and historical values in the area so that adequate management of these effects can be implemented. The proposed activities will allow for known mineral deposits to be accessed.

Overall, the applications are considered to be consistent with the purpose and principles of Chapter 5 of the RPS.

Policy 6.5.3 To promote efficient consumptive water use.

Policy 6.5.5 To promote a reduction in the adverse effects of contaminant discharges into Otago's water bodies.

The applicant recycles water around the MGP site both to reduce the impact on water resources in terms of the volume of water that is taken, and to reduce the volume of contaminated water that is discharged, directly or indirectly, into surrounding water bodies and groundwater.

Overall, the applications are considered to be consistent with the purpose and principles of Chapter 6 of the RPS.

Policy 7.5.2 To avoid, remedy or mitigate any discharges which have adverse effects on the air resource.

Policy 9.5.5 To maintain and, where practicable, enhance the quality of life for people and communities through:
(a) Promoting the identification and provision of a level of amenity which is acceptable to the community; and
(b) Avoiding, remedying or mitigating adverse effects on community health; and
(c) Avoiding, remedying or mitigating adverse effects of land use on landscape values.

Policy 9.5.6 To recognise and protect Otago's regionally significant heritage sites.

Policy 10.5.2 To maintain and where practicable enhance the diversity of Otago's significant indigenous vegetation and the significant habitat of indigenous fauna, trout and salmon.

Potential adverse effects in air quality have been assessed and a suitable control and monitoring regime proposed. Potential effects on human health in terms of air and water quality have been taken into account and mitigation measures proposed

accordingly. Further assessment is being undertaken, and will be undertaken, to identify historical values in the area so that adequate management of these effects can be implemented. Effects on indigenous fauna have been assessed and appropriate mitigation measures are to be devised. There are not expected to be any significant effects on trout populations.

Overall, the applications are considered to be consistent with the purpose and principles of Chapters 7, 9 and 10 of the RPS.

Policy 11.5.2 To take action necessary to avoid or mitigate the unacceptable adverse effect of natural hazards.

Policy 11.5.3 To restrict development on sites or areas recognised as being prone to significant hazards, unless adequate mitigation can be provided.

Policy 11.5.4 To avoid or mitigate the adverse effects of natural hazards within Otago through analysing Otago's natural hazards and identifying their location and potential risk, and promoting and encouraging means to avoid or mitigate natural hazards.

Policy 11.5.5 To provide a response, recovery and restoration capability to natural hazard events.

Policy 11.5.6 To establish the level of natural hazard risk that threatened communities are willing to accept, through a consultative process.

Policy 11.5.7 To encourage and where practicable support community-based responses to natural hazard situations.

It has been identified that several fault lines run through the MGP site, resulting in a risk of failure of certain structures due to seismic activity. Furthermore, it has been identified that fault movement can be reactivated by mining and other works if adequate control is not exercised. The effects of movement within the WRS have been assessed and the effects are considered to be no more than minor.

Overall, the applications are considered to be consistent with the purpose and principles of Chapter 11 of the RPS, despite the scale of proposed development in potentially seismic areas.

Policy 13.5.2 To avoid, remedy or mitigate the adverse effects resulting from the disposal of solid wastes in Otago.

Policy 13.5.3 To avoid, remedy or mitigate the adverse effects resulting from the discharge of liquid wastes in Otago.

Policy 13.5.4 To avoid, remedy or mitigate the adverse effects resulting from hazardous substances within Otago.

Policy 13.5.7 To address the adverse effects of past waste disposal practices.

Policy 13.5.9 To minimise the amount of waste generated at source in Otago and to maximise the opportunities for the reuse, recycling and recovery of materials from the waste stream.

The potential adverse effects from the disposal of waste rock have been assessed and mitigation measures proposed as appropriate. The assessment of effects on the receiving environment took into account the cumulative effect of discharges from existing tailings storage facilities and WRSs. Waste rock will be used as back fill in the pit where possible to reduce the volume of waste rock that requires disposal in the Coronation North WRS.

Overall, the applications are considered to be consistent with the purpose and principles of Chapter 13 of the RPS.

Policy 14.5.1 To identify the region's monitoring needs and to prioritise the monitoring that is necessary to meet those needs.

Policy 14.5.2 To increase the knowledge and understanding of Otago's resources through supporting and encouraging research and monitoring programmes.

Policy 14.5.3 To identify and systematically collect and analyse information to identify significant environmental issues.

Policy 14.5.5 To monitor the effects associated with the exercise of resource consents to provide for the review of the appropriateness of the issue, terms and conditions of resource consents.

Monitoring of the potential effects of the proposed activities requires the collection of data over a large area, with specific attention required to detect the effects of individual sources of contaminants on potential receptors. The applicant has undertaken monitoring of the effects of activities at MGP over the past 20 years. These monitoring programmes shall be revised and extended to take into account those additional areas that may be affected by the Coronation North Project activities.

Overall, the applications are considered to be consistent with the purpose and principles of Chapter 14 of the RPS.

6.15.5.1 Proposed Regional Policy Statement

The proposed Regional Policy Statement (pRPS) was notified on 23 May 2015. Submissions have been heard and a decision is to be released shortly. The pRPS needs to be given consideration and weighting principles apply. The relevant provisions of the pRPS include:

- Taking the principles of Te Tiriti o Waitangi into account (Policy 1.1.2)
- Managing the natural environment to support Kai Tahu wellbeing (Policy 1.2.1)
- Recognising important sites of cultural significance to Kai Tahu (Policy 1.2.2)
- managing for freshwater values including
    - support healthy ecosystems in all Otago's rivers, lakes, wetlands, and their margins
    - retain the range and extent of habitats provided by freshwater

    - protect outstanding water bodies and wetlands
    - protect migratory patterns of freshwater species, unless detrimental to indigenous biodiversity
    - maintain good water quality or enhance it where it has been degraded
    - maintain or enhance the natural functioning of rivers, lakes, and wetlands and their riparian margins
    - retain the quality and reliability of existing drinking water supplies
    - protect Kāi Tahu values
    - provide for other cultural values
    - protect important recreational values
    - maintain the aesthetic and landscape values of rivers, lakes and wetlands
    - avoid the adverse effects of pest species, prevent their introduction and reduce their spread
    - mitigate the adverse effects of natural hazards, including flooding and erosion
    - maintain the ability of existing infrastructure to operate within their design parameters (Policy 2.1.1)
- Managing for air quality values (Policy 2.1.4)
- Managing for soil values (Policy 2.1.5)
- Managing for ecosystem and indigenous biodiversity values (Policy 2.1.6)
- Recognising the values of natural features, landscapes and seascapes (Policy 2.1.7)
- Managing significant indigenous vegetation and significant habitats of indigenous fauna (Policy 2.2.2)
- Identifying outstanding natural features, landscapes and seascapes (Policy 2.2.3)
- Managing special amenity landscapes and highly valued natural features (Policy 2.2.6)
- Applying an integrated management approach among resource (Policy 2.3.1)
- Applying an integrated management approach within a resource (Policy 2.3.2)
- Applying an integrated management approach for freshwater catchments (Policy 2.3.3)
- Applying an integrated management approach for airsheds (Policy 2.3.5)
- Identifying natural hazards (Policy 3.2.1)
- Assessing natural hazard likelihood (Policy 3.2.2)
- Assessing natural hazard consequence (Policy 3.2.3)
- Managing natural hazard risk (Policy 3.2.4)
- Assessing activities for natural hazard risk (Policy 3.2.5)
- Avoiding increased natural hazard risk (Policy 3.2.6)
- Reducing existing natural hazard risk (Policy 3.2.7)
- Integrating management of hazardous substances and waste (Policy 3.9.1)
- Managing the use, storage and disposal of hazardous substance, and the storage and disposal of waste materials (Policy 3.9.2)
- Identifying contaminated land (Policy 3.9.3)
- Recognising heritage themes (Policy 4.2.1)
- Identifying historic heritage (Policy 4.2.2)
- Managing historic heritage values (Policy 4.2.3)
- Ensuring efficient water allocation and use (Policy 4.4.1)
- Encouraging environmental enhancement (Policy 4.4.3)
- Avoiding objectionable discharges (Policy 4.5.1)
- Applying an adaptive management approach to address adverse effects that might arise (Policy 4.5.2)
- Minimising soil erosion (Policy 4.5.4)

- Managing adverse effects from mineral and gas exploration, extraction and processing (Policy 4.5.6)
- Offsetting of indigenous biodiversity (Policy 4.5.7)
- Offsetting for air quality (Policy 4.5.9)

Overall, the applications are considered to be not inconsistent with the Operative or pRPS.

6.15.6 Regional Plan: Water for Otago

The following policies from Chapter 5 (Water Values), Chapter 6 (Water Quantity), Chapter 7 (Water Quality), Chapter 8 (Beds and Margins), Chapter 9 (Groundwater) and Chapter 10 (Wetlands) of the RPW are relevant to these applications.

Policy 5.4.1 *To identify areas of significant habitats of indigenous fanua, significant habitats for trout, ecosystem values, water supply values, registered historic places and spiritual and cultural beliefs, values and uses of significance to Kai Tahu.*

Policy 5.4.2 *In the management of any activity involving surface water, groundwater of the bed or margin of any river, to give priority to avoiding, in preference to remedying or mitigating, adverse effects on natural values, water supplies, registered historic places, spiritual and cultural beliefs, values and uses of significance to Kai Tahu, the natural character of any river, amenity values and causing or exacerbating flooding, erosion, land instability, sedimentation or property damage.*

Policy 5.4.3 *To give priority to avoiding adverse effects on existing lawful users and existing lawful priorities for the use.*

Policy 5.4.4 *To recognise Kai Tahu's interest in Otago's lakes and rivers by promoting opportunities for their involvement in resource consent processing.*

Policy 5.4.8 *To have particular regard to the following features of lake and rivers, and their margins, when considering adverse effects on their natural character:*

(a) The topography, including the setting and bed form of the lake or river;
(b) The natural flow characteristics of the river;
(c) The natural water level of the lake and its fluctuation;
(d) The natural water colour and clarity in the lake or river;
(e) The ecology of the lake or river and its margins; and
(f) The extent of use or development within the catchment, including the extent to which that use and development has influenced matters (a) to (e) above.

Policy 5.4.9 *To have particular regard to the following qualities or characteristics of lakes and rivers, and their margins, when considering adverse effects on amenity values:*

(a) Aesthetic values associated with the lake or river; and

(b) Recreational opportunities provided by the lake or river, or its margins.

Policy 5.4.10 In the management of any activity involving surface water or the bed or margin of any lake or river, particular regard will be given to the heritage value of any site, building, place or area.

Te Rūnanga o Moeraki, Kāti Huirapa ki Puketeraki and Te Rūnanga o Ōtākou are currently undertaking a CIA of the site to determine potential effects of the Coronation North Project on water values and uses of significance to Kai Tahu. Further assessment is being undertaken, and will be undertaken, to identify historical values in the area so that adequate management of these effects can be implemented. Effects on indigenous fauna have been assessed and appropriate mitigation measures are to be devised. Significant adverse effects on trout populations are not expected. The majority of the watercourses that are likely to be affected have little natural, aesthetic or recreational values. Changes on the flow regime of water courses in and around the site have been assessed. Modelling has indicated that the proposed activities will impact on water quality but provided that adequate mitigation is imposed, water quality should remain within guideline limits for the likely use.

Overall, the applications are considered to be consistent with Chapter 5 of the RPW. The proposed activities will have an effect on surface and groundwater values, but recommended conditions of consent shall ensure that these are avoided and mitigated as far as practicably possible.

Policy 6.4.0 To recognise the hydrological characteristics of Otago's water resources, including behaviour and trends in
(a) The levels and flows of surface water bodies; and
(b) The levels and volumes of groundwater; and
(c) Any interrelationships between adjoining bodies of water,
When managing the taking of water.

Policy 6.4.0A To ensure that the quantity of water granted to take is no more than that required for the purpose of use.

Policy 6.4.0C To promote and give preference, as between alternative sources, to the take and use of water from the nearest practicable source.

Policy 6.4.1 To enable the taking of surface water, by:
(a) Defined allocation quantities; and
(b) Provision for water body levels and flows.

Policy 6.4.1A A groundwater take is allocated as :
(b) Surface water, subject to a minimum flow, if the take is within 100 meters of any connected surface water body.

Policy 6.4.7 The need to maintain a residual flow at the point of take will be considered with respect to any take of water, in order to provide for the aquatic ecosystem and natural character of the source water body.

Policy 6.4.9 *To provide for supplementary allocation for the taking of water, in blocks of allocation where that is appropriate:*

(b) On an alternative basis provided:

(i) The take has no measurable effect on the flow at any Schedule 2 monitoring site, or any site established in terms of Policy 6.4.4, at flows at or below any minimum flow applying to primary allocation; and

(ii) Any adverse effect on any aquatic ecosystem value or natural character of the source water body is no more than minor; and

(iii) There is no adverse effect on any lawful existing take of water.

Policy 6.4.16 *In granting resource consents to take water, or in any review of the conditions of a resource consent to take water, to require the volume and rate of take to be measured in a manner satisfactory to the Council unless it is impractical or unnecessary to do so.*

Policy 6.4.19 *When setting the duration of a resource consent to take and use water, to consider:*

(a) The duration and the purpose of use:

(b) The presence of a catchment minimum flow or aquifer restriction level;

(c) Climatic variability and consequent changes on local demand for water;

(d) The extent to which the risk of potentially significant, adverse effects arising from the activity may be adequately managed through review conditions;

(e) Conditions that allow for adaptive management of the take and use of water;

(f) The value of the investment in infrastructure;

(g) Use of industry best practice.

Policy 6.5.5 *In considering resource consents for flow augmentation proposals involving any transfer of water between catchments that was not lawfully established before 28 February 1998, regard will be had to avoiding:*

(a) The introduction of flora or fauna which are not already present;

(b) The reduction of water quality in the receiving catchment; and

(c) Adverse effects on Kai Tahu cultural and spiritual beliefs, values and uses.

Policy 6.5.6 *Financial contributions, or works or services may be required to offset, remedy or mitigate any unavoidable adverse effect of the diversion of water on:*

(a) Any natural or human use value identified in Schedule 1;

(b) The natural character of the water body;

(c) Any amenity value supported by the water body; or

(d) Any heritage value associated with any affected water body.

Te Rūnanga o Moeraki, Kāti Huirapa ki Puketeraki and Te Rūnanga o Ōtākou are currently undertaking a CIA of the site to determine potential effects of the proposed activities on Kai Tahu cultural and spiritual beliefs, values and uses associated with water. The proposed water takes are required for the management of water that collects in the open pit, as opposed to takes that are directly from water courses. Subject recommended consent conditions, there are no instream values that will be affected by the takes, and the taking water when dewatering will have no impact on stream flows during the irrigation season, therefore the takes should be considered as supplementary allocation under Policy 6.4.9 (b) of the RPW. Minimum flow restrictions will not, therefore, apply. In this instance, no residual flow is considered necessary. The volume of water taken may only be measured by the rate at which the pit is dewatered. The duration of consents to take water will be determined based on the expected lifetime of the mine. The applicant will be required to provide bonds to secure the performance and completion of rehabilitation obligations, and the performance of monitoring obligations.

Overall, the applications are considered to be largely consistent with the purpose and principles of Chapter 6 of the RPW.

Policy 7.B.1: To promote the discharge of contaminants to land in preference to water.

Policy 7.B.4 When considering the discharge of any contaminant to land, to have regard to:

(a) The ability of the land to assimilate the contaminant;
(b) Any potential for soil contamination; and
(c) Any potential for land instability.

Policy 7.B.6 Where a mixing zone is required for the discharge of contaminants to water, to ensure that it is limited to the extent necessary to take account of:

(a) The sensitivity of the receiving environment;
(b) The natural and human use values identified in Schedule 1;
(c) The natural character of the water body;
(d) The amenity values supported by the water body;
(e) The physical processes acting on the area of discharge; and
(f) The particular discharge, including contaminant type, concentration, and volume.

Policy 7.B.8 Encourage adaptive management and innovation that reduces the level of contaminants in discharges.

Policy 7.C.2 When considering applications for resource consents to discharge contaminants to water, or onto or into land in circumstances which may result in any contaminant entering water, to have regard to:

(a) The nature of the discharge and the sensitivity of the receiving environment to adverse effects;
(b) The financial implications, and the effects on the environment of the proposed method of discharge when compared with alternative means; and
(c) The current state of technical knowledge and the likelihood that the proposed method of discharge can be successfully applied.

Policy 7.C.3 *When considering any resource consent to discharge a contaminant to water, to have regard to any relevant standards and guidelines in imposing conditions on the discharge consent.*

Policy 7.C.4 *The duration of any new resource consent for an existing discharge of contaminants will take account of the anticipated adverse effects of the discharge on any natural and human use value supported by an affected water body, and:*

(a) Will be up to 35 years where the discharge will meet the water quality standard required to support that value for the duration of the resource consent;

(b) Will be no more than 15 years where the discharge does not meet the water quality standard required to support that value but will progressively meet that standard within the duration of the resource consent;

(c) Will be no more than 5 years where the discharge does not meet the water quality standard required to support that value; and

(d) No resource consent, subsequent to one issued under (c), will be issued if the discharge still does not meet the water quality standard required to support that value.

Policy 7.C.11 *To require the holder of any consent for a dam constructed for the storage of contaminants to completely remedy any adverse effect of the failure or overtopping of the dam structure, either during or after its construction.*

The applicant undertook modelling to determine the likely extent of adverse effects of the proposed activities in and around the site. This modelling did not provide for attenuation of most of the contaminants modelled, and so the results are considered to be conservative. The cumulative effects of existing discharges around the MGP site were taken into account in the site-wide modelling. Compliance limits for contaminants in water have been selected based on national standards/guidelines for the intended use of that water. A consent term of 35 years may be granted where the discharge(s) will meet consent water quality standards. A review clause incorporated into each discharge consent will enable a review of consent conditions where adverse effects result from the exercise of the consent, or to ensure the consent is consistent with any NES. The applicant will be required to provide bonds to secure the performance and completion of rehabilitation obligations, and the performance of monitoring obligations. It is proposed that the run-off of silt and sediment from the proposed activities will be managed under Erosion and Sediment Control Plans.

Overall, the applications are considered to be consistent with the purpose and principles of Chapter 7 of the RPW.

Policy 8.5.1 *To require, where necessary, desirable and practicable, any structure in or on the bed of any lake or river to provide for fish migration through or past it, or alternative remedial measures where fish migration is not practicable.*

Policy 8.5.3 *To require the holder of any resource consent for a dam on the bed of a lake or river to remedy any adverse effect attributable to the failure or overtopping of the dam structure, either during or after its construction.*

Policy 8.6.1 *In managing the disturbance of the bed or margin of any lake or river, to have regard to any adverse effect on:*

(a) The spawning requirements of indigenous fauna, and trout or salmon;
(b) Bed and bank stability;
(c) Water quality;
(d) Amenity values caused by any reduction in water clarity; and
(e) Downstream users.

Policy 8.6.2 *To promote best management practices for activities that occur within or adjacent to the bed of lakes and rivers in order to avoid, remedy or mitigate any adverse effect.*

Policy 8.8.1 *To consider practical alternatives to:*

(a) The reclamation of the bed of any lake or river; and
(b) The deposition of any substance in, on or under, the bed or margin of any lake or river.

Policy 8.8.2 *To require only cleanfill be used to create any reclamation of the bed of a lake or river.*

The applicant has assessed the potential effects on fish passage from the proposed in-stream structures. Where populations are likely to be affected, appropriate mitigation is to be devised. Recommended conditions of consent will require the consent holder to provide adequate bond(s) to with remedy any adverse effects of the failure or overtopping of the instream structures. Erosion and Sediment Control Plans will ensure the effects of activities adjacent to watercourses are controlled. Waste rock, rather than cleanfill, will be used in the reclamation.

Other than the reclamation of watercourses with waste rock, the applications are considered overall to be largely consistent with Chapter 8 of the RPW.

Policy 9.4.18 *To identify land of high risk in terms of the vulnerability of underlying groundwater to leachate contamination and to manage, with respect to this land:*

(a) Change in land use to activities which have the potential to result in leachate discharges, so that the activities are, where practicable, located elsewhere, or contaminants are contained;
(b) Existing land use activities so that any potential for groundwater contamination is monitored and, where necessary, corrective action is taken;
(c) Point source discharges of water or contaminants to land or groundwater;
(d) Excavation, so that any protective soil mantle or impervious stratum is retained, replaced, or alternative groundwater protection is provided.

Policy 9.4.19 To identify land which protects underlying aquifers from leachate contamination and to manage excavation, with respect to this land, so that any protective soil mantle or impervious stratum is retained or replaced, or alternative groundwater protection is provided.

Policy 9.4.21 To support appropriate codes of practice and management guidelines for land use activities which may result in contaminants entering groundwater.

The land at the site of the proposed activities is not considered to be at high risk in terms of the vulnerability of underlying groundwater to leachate contamination**.** Local geological conditions mean that infiltration of contaminants into unexposed groundwater resources and migration of contaminated groundwater through the subsurface is relatively limited. Whereas there are generally no direct discharges to surface water from activities at MGP, there is little control over leachate into groundwater. Natural attenuation is the treatment method replied upon to ensure groundwater quality compliance limits are not exceeded at downstream compliance monitoring bores.

The applications are considered overall to be generally consistent with Chapter 9 of the RPW.

Policy 10.4.1 Otago's regionally significant wetland values are:

- *A1 Habitat for nationally or internationally rare or threatened species or communities;*
- *A2 Critical habitat for the life cycles of indigenous fauna which are dependent on wetlands;*
- *A3 High diversity of wetland habitat types;*
- *A4 High degree of wetland naturalness;*
- *A5 Wetland scarce in Otago in terms of its ecological or physical character;*
- *A6 Wetland which is highly valued by Kai Tahu for cultural and spiritual beliefs, values and uses, including waahi taoka and mahika kai;*
- *A7 High diversity of indigenous wetland flora and fauna;*
- *A8 Regionally significant wetland habitat for waterfowl; and*
- *A9 Significant hydrological values including maintaining water quality or low flows, or reducing flood flows.*

There are no Regionally Significant Wetlands located within the Coronation North Project site.

6.15.7 Regional Plan: Waste for Otago (RPWa)

The following policies from Chapter 5 (Contaminated Sites) and Chapter 6 (Hazardous Substances and Waste) of the RPWa are relevant to these applications:

Policies 5.4.1 & 6.4.12 To recognise and provide for the relationship Kai Tahu have with Otago's natural and physical resources.

Policy 5.4.3 To contain contaminated sites and rehabilitate them to the extent that is practicable having regard to the use to which the land is to be put.

Policy 5.4.5 To prepare and maintain a register outlining details of sites which are contaminated.

Policy 6.4.1 To promote the safe disposal of hazardous substances and hazardous wastes in such a manner that avoids adverse environmental effects.

Policy 6.4.4 To encourage and facilitate the reuse, recycling and recovery of hazardous substances.

MGP is a highly modified mine site. Contaminated sites are created through the deposition of waste rock and tailings. Once fully remediated though, these sites will be suitable for the proposed end land use, being pasture. Council staff are in the process of identifying potentially contaminated areas of the MGP site and adding those contaminated areas to Council's register of contaminated sites. The submission of Project Overview and Annual Work and Rehabilitation Plans should enable the Council to become aware of how the extents of contaminated sites at MGP are changing. The potential effects from waste rock have been identified and control measures have been devised as a result. Waste rock will be used as backfill in the open pit where possible to minimise the volume of rock that needs to be disposed of in the WRS.

Overall, the applications are considered to be consistent with Chapters 5 and 6 of the RPWa.

6.15.8 Regional Plan: Air for Otago (RPA)

The following policies from the RPA are relevant to these applications:

Policy 7.1.1 To recognise and provide for the relationship Kai Tahu have with the air resource.

Policy 8.2.3 In the consideration of any application to discharge contaminants to air, Council will have:

- *(a) Particular regard to avoiding adverse effects including cumulative effects on:*
  - *(i) Values of significance to Kai Tahu;*
  - *(ii) The health and functioning of ecosystems, plants and animals;*
  - *(iii) Cultural, heritage and amenity values;*
  - *(iv) Human health; and*
  - *(v) Ambient air quality of any airshed; and*
- *(b) Regard to any existing discharge from the site, into air, and it's effects.*

Policy 8.2.4 The duration of any permit issued to discharge contaminants to air will be determined having regard to:

- *(a) The mass and nature of the discharge;*
- *(b) The nature and sensitivity of the receiving environment; and*
- *(c) Any existing discharge from the site, into air and its effects.*

Policy 8.2.5 *To require, as appropriate, that provision be made for review of the conditions of any resource consent to discharge contaminants into air.*

Policy 10.1.1 *The Otago Regional Council will encourage:*

(a) *People undertaking land use activities to adopt management practices to avoid, remedy or mitigate any adverse effects of dust beyond the boundary of the property; and*

(b) *City and district councils to use land use planning mechanisms and other land management techniques to manage land use activities which have the potential to result in dust beyond the boundary of the property.*

Te Rūnanga o Moeraki and Kāti Huirapa ki Puketeraki are currently undertaking a CIA of the MGP site with particular attention to the potential effects of the Coronation Project activities on the air resource. The potential effects on human health from the proposed discharge of dust to air are considered to be low risk due to the size of the particulate matter discharged and the control measures to be implemented. A real-time monitor is to be installed in the Macraes Township as part of an upgrade of the dust monitoring regime across the site. Real-time monitoring will enable for potential effects to be detected and remedied sooner.

Overall, the applications are considered to be consistent with the principles and policies of the RPA.

6.15.9 Other Matters

The Kai Tahu ki Otago Natural Resource Management Plan 2005 (NRMP) contains several policies of relevance to this application:

- To require an assessment of instream values for all activities affecting water.
- To oppose any further cross mixing of waters.
- To encourage identification of non-point source pollution and mitigate, avoid or remedy adverse effects on Kai Tahu ki Otago.
- To encourage Kai Tahu ki Otago input into the development of monitoring programmes.
- To require monitoring of all discharge to be undertaken on a regular basis and all information, including an independent analysis, be made available to Kai Tahu ki Otago.
- To encourage management plans for all discharge activities.
- To require all discharge systems be well maintained and regularly serviced.
- To require re-vegetation with locally sourced indigenous plants for all disturbed areas.
- To require groundwater monitoring for all discharges to land.
- To require a CIA for all proposals to land.
- To oppose the granting of water take consents for 35 years.
- To provide that fish passage is provided for at all times.
- To require that any visual impacts are minimal.
- To require that sedimentation or discharge of sediment is minimised.
- To minimise the risk of contamination to the waterway.
- To require that work is done when flows are naturally low.
- To require that machinery enters the bed of the waterway only to the extent necessary.

- To discourage machinery operating in flowing water.
- To require that machinery is clean and well maintained before entering the site of the instream works.
- To require that a Kai Tahu ki Otago mandated archaeologist survey an area before any earth disturbance work commences.
- To promote the use of Accidental Discovery Protocols.
- To require consultation with Kai Tahu ki Otago for activities that have the potential to affect wahi tapu.
- To identify and protect the full range of landscape features of significance to Kai Tahu ki Otago.
- To discourage mining in activities within landscapes of cultural significance.
- To require all applications for mining or quarrying to include site remediation plans, prevention of dust and prevention of contamination of soil and water.
- To require all earthworks to avoid adverse effects on significant natural landforms, to avoid, remedy or mitigate soil instability and accelerate erosion, and to mititgate all adverse effects of earthworks.
- To require earthworks and discharges to air to consider the impact of dust.
- To require CIAs for any discharges to air.

An assessment on cultural values is provided in Section 5 of this report. Other policies of the NRMP may also be applicable to the applications, but the CIA will be able to identify which polices are applicable. The CIA that is currently being undertaken will identify any effects on cultural values. Recommended conditions of consent will allow for a review of consent conditions accordingly. In this sense, Kai Tahu ki Otago will have the opportunity to provide input into the management of the Coronation Project.

Overall, the applications are considered to be generally consistent with the policies of the NRMP.

6.15.10 Other Matters

There are no other matters that are relevant and reasonably necessary to determine the application.

6.16 Section 105 of the Act

Section 105(1) states for a discharge permit that the Consent Authority shall have regard to:

(a) the nature of the discharge, the sensitivity of the receiving environment, and the applicant's reasons for the proposed choice; and

(b) any possible alternative methods of discharge including discharge into any other receiving environment.

These matters were considered in Sections 2 and 5 of this report.

6.17 Section 107 of the Act

Section 107(1) of the Act states that a discharge permit shall not be granted if, after reasonable mixing, the contaminant or water discharged is likely to give rise to all or any of the following effects in the receiving waters:

- The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended material; or
- Any conspicuous change in the colour or visual clarity; or

- Any emission of objectionable odour; or
- The rendering of fresh water unsuitable for consumption by farm animals; or
- Any significant adverse effects on aquatic life.

The applicant has undertaken site-wide modelling to determine the likely effects of discharges associated with the Coronation North Project along with existing discharges. The assessment indicated that provided that proposed mitigation measures are implemented, the discharges should not give rise to any of the effects listed above at or beyond the compliance points.

7. Recommendations

In summary, the Coronation North Project will provide for the continuation of a range of major benefits relating to employment and socio-economic well-being. The extended life of MGP will continue to support the infrastructure and activities of local communities through rating and other direct and indirect contributions. At a national level, royalty payments on gold recovered will provide a return to the government on the Crown-owned mineral resource.

Thorough assessments of potential environmental effects have been undertaken and where there are shortfalls in these assessment, recommended conditions of consent will require that further investigation is undertaken prior to the exercise of the applicable consents.

Comprehensive modelling and monitoring combined with operational management and careful post-mining planning should result in significant adverse environmental impacts being avoided, remedied or mitigated appropriately.

It is recommended that Applications RM16.138.01 – RM16.138.20 are granted, subject to the recommended conditions of consent.

7.1 Consent Terms

A consent term of 10 years is recommended for the following permits:

RM16.138.01: *to disturb, deposit and reclaim watercourses for constructing the WRS*
RM16.138.03: *to discharge silt and sediment to water for constructing the WRS*
RM16.138.09: *to discharge waste rock to land for constructing the WRS*
RM16.138.10: *to discharge waste rock to land in Coronation North Pit*
RM16.138.11: *to take surface water for the purpose of dewatering Coronation North Pit*
RM16.138.13: *to take groundwater for the purpose of dewatering Coronation North Pit*

These activities are associated with the operational phase of the Coronation North Pit only. The applicant has stated that they expect the life of the pit to be around two years. If the above permits are not exercised within 5 years they will lapse. A consent term of 10 years is considered to be appropriate to allow for the commencement and completion of the authorised works. If the works extend beyond this timeframe then that is in excess of what the applicant has applied for.

A consent term of 35 years is recommended for the following permits:

RM16.138.02: *to place a structure and disturb the bed of a watercourse for the purpose of constructing a dam embankment*
RM16.138.04: *to discharge water from WRS silt ponds*
RM16.138.05: *to discharge contaminants to water from the base and toe of the WRS*
RM16.138.06: *to discharge water from the Coronation North Pit Lake directly to water*
RM16.138.07: *to discharge silt and sediment to water for constructing the Coal Creek dam*
RM16.138.08: *to discharge water from the Coal Creek dam for the purpose of operating and providing supplementing flows*
RM16.138.12: *to take surface water to create the Coronation North Pit Lake*
RM16.138.14: *to take groundwater to create the Coronation North Pit Lake*
RM16.138.15: *to divert water around Coronation North Pit*
RM16.138.16: *to divert water for the purpose of constructing the Coal Creek dam*
RM16.138.17: *to dam water in Coronation North Pit to create the Coronation North Pit Lake*
RM16.138.18: *to dam water in the Coal Creek dam*
RM16.138.20: *To permanently divert water around the Coronation North WRS*

These activities will continue past the operational phase of the Coronation North Pit.

A consent term expiring on 31 August 2032 is recommended for the following permit:

RM16.138.19: *to discharge contaminants to air from Coronation North Pit, Coronation Pit and Coronation North WRS during operations and post mine closure*

The proposed expiry date will result in this air discharge permit expiring on the same date as the other air permits for MGP. It has been agreed with the applicant that all air permits expire for MGP should expire at the same time so that a site-wide air permit can be applied for in the future.

PP.

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Manager Consents