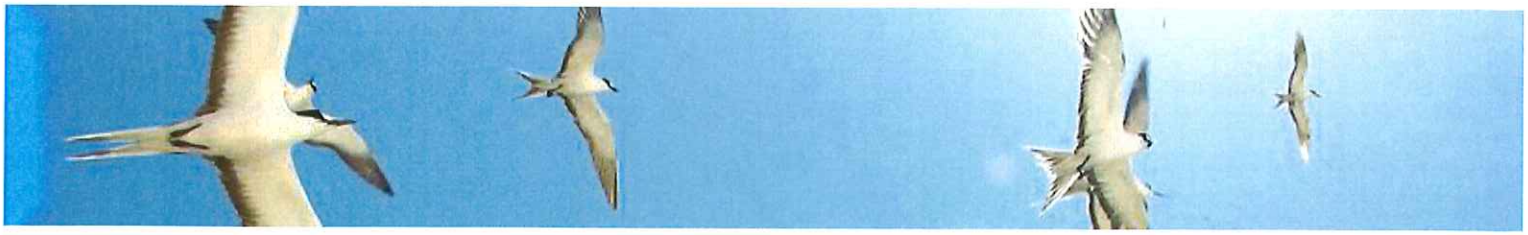


ERA ECOLOGY NZ LTD

Reference:

17 January 2019

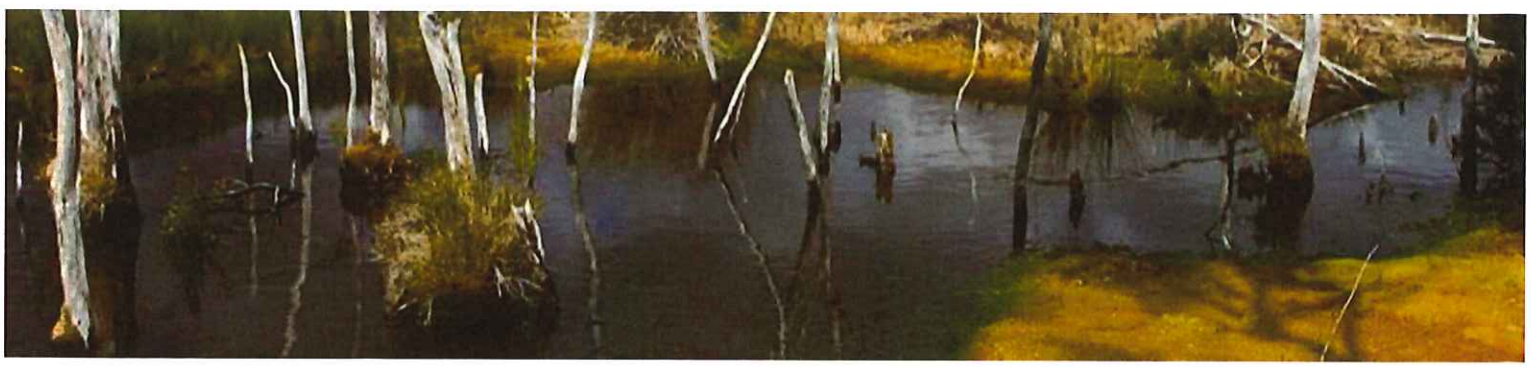
Gavin Lee
OceanaGold

Dear Gavin,

Re: *Terrestrial biodiversity of Coronation North Pit Extension, Trimbells WRS and impact of Extension and WRS*

While much of the Coronation North Pit Extension (CNE) and Trimbells WRS areas are covered by the existing Coronation and Coronation North consents, and the ecological Impact Assessment for Coronation North also included consideration of impact to 100 m beyond the consent boundary, I recommended that the terrestrial biodiversity of the CNE area be reinspected as a matter of due diligence to capture information that might not have been obtained during the Coronation and Coronation North assessment, and to cover areas that had not been inspected during the previous assessments. The CNE reinspection was conducted by myself on 13 July 2018 and an inspection of the unconsented portion of Trimbells WRS on 23 November 2018. This file note is based on the information obtained during these field visits, the Ecological Impact Assessment (EcIA) submitted in support of the Coronation North project, and the extent of the pit extension and buffer as provided as a GIS shapefile on 18 December 2018.

On the basis of this inspection I believe the EcIA submitted in support of the Coronation North project is sufficient to encompass this area in general. This file note is to provide additional detail specific to the CNE and the Trimbells WRS.



1. Terrestrial biodiversity features within CNE

Flora

The vegetation communities of the 42.81 ha of the unconsented parts of the CNE (Map 1) are of those described in the Coronation North EcIA, mainly narrow-leaved tussock grassland (24 ha, 56%) and short tussock grassland (12.42 ha, 29%), with limited shrubland (1.66 ha, 4%), basalt contact seepage wetlands (1.48 ha, 3.5%), bluff vegetation (1.33 ha, 3%) associated with rock tors and outcrops, and riparian herbfield and sedgeland (0.64 ha, 1.5%) (Table 1). The balance of 1.28 ha is pf unclassified land types, mainly those associated with mine activities. The vegetation communities in the CNE are of varying quality, but are mostly highly degraded following recent burning of the area, invasion by exotic plants, and earthworks associated with exploration drilling. A photograph of the site is presented at the end of this document.

The plant species recorded and an estimate of their abundance during the site visit is provided in the spreadsheet included with this document, and the Species of Interest recorded in the CNE area during the site visit are listed in Table 2, and discussed below. Note: since the EcIA, the Threat Classification of NZ Plants has been updated (de Lange et al. 2018). This file note follows the new (2017) classifications.

Map 1. Vegetation types in the CNE.

Vegetation Type	Area within CNE (ha)
Narrow-leaved tussock grassland	24

Short tussock grassland	12.42
Shrubland	1.66
Basalt contact seepage wetlands	1.48
Bluff vegetation	1.33
Riparian herbfield & sedgeland	0.64

Table 1. Areas of vegetation types within the CNE area

Current Name + Authority	Common name	Group 1	Family (Tribe)	Threat Category (2017)	Threat ranking (2017)	Threat ranking (2017) Qualifiers
Aciphylla subflabellata W.R.B.Oliv.	Spaniard	DICOTYLEDONOUS HERBS	Apiaceae	At Risk	Declining	DP, Sp
Anthosachne falcis (Connor) Barkworth & S.W.L.Jacobs	wheat grass	MONOCOTYLEDONOUS HERBS	Poaceae	At Risk	Declining	DP, Sp
Carmichaelia petriei Kirk	desert broom	DICOTYLEDONOUS TREES AND SHRUBS	Fabaceae	At Risk	Declining	DP, RF
Deyeuxia quadriseta (Labill.) Benth.		MONOCOTYLEDONOUS HERBS	Poaceae	At Risk	Declining	DP, EF, SO
Discaria toumatou Raoul	matagouri, wild Irishman	DICOTYLEDONOUS TREES AND SHRUBS	Rhamnaceae	At Risk	Declining	
Epilobium insulare Hausskn.	willowherb	DICOTYLEDONOUS HERBS	Onagraceae	At Risk	Declining	DP, RR, Sp
Leptinella pusilla Hook.f.		DICOTYLEDONOUS HERBS	Asteraceae	At Risk	Declining	
Olearia bullata H.D.Wilson & Garn.-Jones		DICOTYLEDONOUS TREES AND SHRUBS	Asteraceae	Not Threatened	DCC Threatened Plant	

Table 2. Species of Interest recorded from within the CNE area.

Several plants of the speargrass *Aciphylla subflabellata* are present in the unconsented area of the CNE. This plant has a localised distribution in the Macraes E.D. and is known as a host of at least two rare moth species.

Plants of the wheatgrass *Anthosachne falcis* are scattered in the CNE, including in parts of the unconsented area. This species is present as scattered plants in most open areas of natural and semi-natural vegetation in the surrounding area.

Desert broom *Carmichaelia petriei* is a new addition to the Threat list. There were several plants present in the CNE outside of the unconsented area. This species is widespread in natural vegetation areas of the Macraes E.D., however regeneration appears to be poor and the species is sometimes sprayed with herbicide when mistaken for exotic broom.

The inconspicuous grass *Deyeuxia quadriseta* was noted at one locality in the CNE outside of the unconsented area. This species is a new addition to the Threat list. It has been noted at a few localities in the Macraes E.D., but its status in the area (and nationally) is poorly known due to its inconspicuous nature.

Matagouri *Discaria toumatou* is a new addition to the Threat list. It is very common throughout the CNE, including inside the unconsented area. It is common throughout most of the natural vegetation areas of the Macraes E.D. Most losses of this species appear to have been from the North Island, Canterbury, the Mackenzie Country, and intermontane basins of Central Otago which probably led to the inclusion of this species on the Threat list.

The small button daisy *Leptinella pusilla* is a new addition to the Threat list. It was recorded at one site in the CNE outside of the unconsented area. It is known from at least 11 sites in the Macraes E.D. It appears to need sparsely vegetated shaded herbfield such as which occurs at the base of tors where stock have been grazing heavily.

The willowherb *Epilobium insulare* was noted as scattered plants in one wetland in the unconsented part of the CNE. This species is sparsely distributed in wetlands in the Macraes E.D.

The small-leaved shrub daisy *Olearia bullata* is included as it is listed as a 'Threatened Plant' in Appendix 16A of the DCC District Plan. In the Macraes E.D. this species is widespread, with small groves occurring in the heads of most gullies. A few plants were present at one site in the gully of the CNE outside of the unconsented area.

In addition two plants were recorded that could not be confidently identified, but that could be Species of Interest.

A St Johns Wort was noted in crevices of one schist tor outside of the unconsented area. The most likely identity of these plants is the Not Threatened *Hypericum pusillum.*

Young plants of a species of indigenous *Ranunculus* was recorded at two sites outside of the unconsented area. They appear similar to the Not Threatened *Ranunculus foliosus.*

Material of these two plants are in cultivation for confirming their identity.

It should be noted that the survey time was not ideal for identification of plants.

Avifauna
The composition of the avifauna is likely to be the same as that described in the EclA. No area was thought to be habitat of consequence for indigenous birds. Pipit *Anthus novaeseelandiae* are the only species of interest that might have used this area, but, if present, would have been displaced by the existing mine workings.

Herpetofauna
The composition of the herpetofauna is likely to be the same as that described in the EclA. No area was thought to be habitat of consequence above that described in the EclA for indigenous lizards, though there is small amount of rock tor habitat of the Declining korero gecko *Woodworthia* "Otago/Southland large". The habitat appears of limited suitability for the southern grass skink *Oligosoma polychroma* (clade 5 genotype) which has a classification of Declining in the NZ Threat Classification System. It is likely the CNE, including the unconsented area, harbours a population of the Not Threatened McCann's skink (clade 4 genotype), but the winter timing of this survey makes an estimate of population size impossible. The area appears to offer moderate quality habitat for this species.

Invertebrates
The Coronation North EclA did not include a consideration of invertebrates. It is not possible to assess invertebrate communities in winter.

2. Terrestrial biodiversity features within unconsented area of Trimbells WRS.

The 17.51 ha area of the unconsented area of Trimbells WRS (Map 2) is comprised entirely of narrow-leaved tussock grassland of moderate stature of c. 50% ground cover that is recovering from recent burning. The area is likely providing habitat for a small population of the Not Threatened McCann's skink (clade 4 genotype) and is likely to be visited by some of the bird species noted in the EclA. No Pipit *Anthus novaeseelandiae* have been recorded from this area. The only plant species of interest recorded from this area are scattered plants of the Declining matagouri.

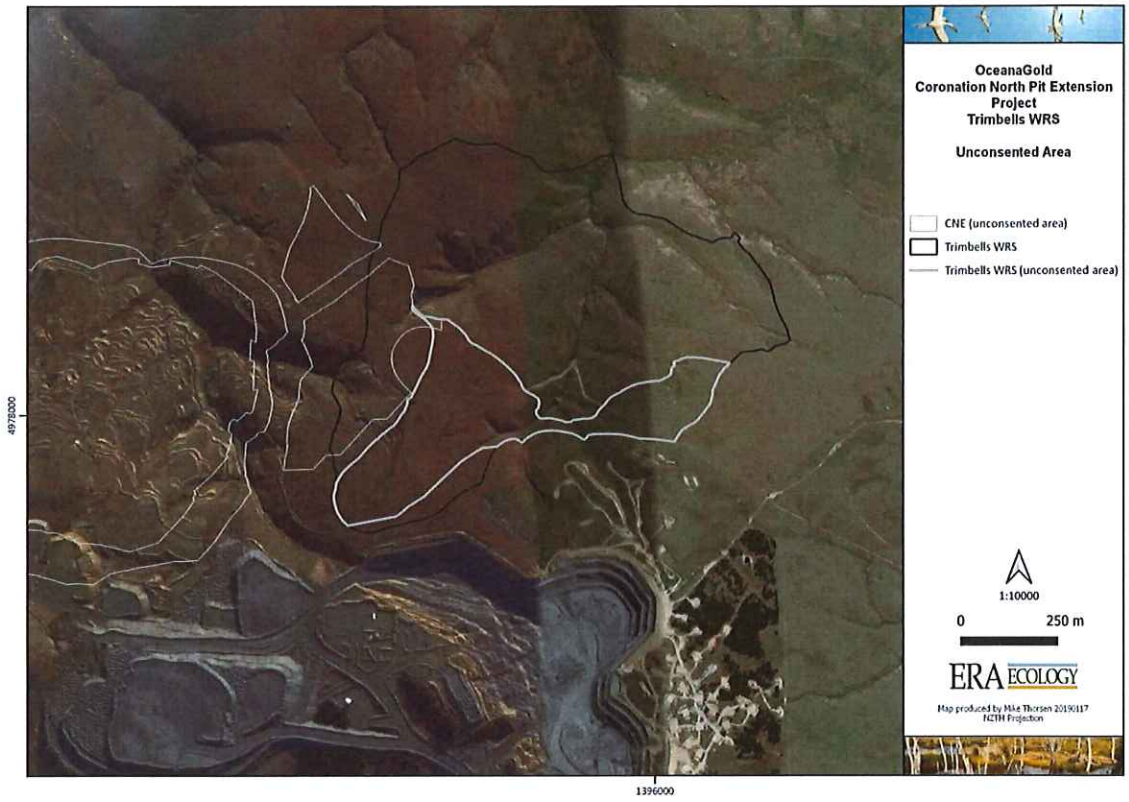
3. Impact of CNE and Trimbells WRS on terrestrial biodiversity features

Construction of the CNE pit will result in the loss of all the biodiversity features described above. The loss attributable to the unconsented portion of the CNE and Trimbells WRS consists of:

- The loss of 41.51 ha of narrow-leaved tussock grassland, 12.42 ha of short tussock grassland, 1.66 ha of shrubland, 1.48 ha of basalt contact seepage wetlands, 1.33 ha of bluff vegetation and 0.64 ha of riparian herbfield and sedgeland, all of mostly moderate quality.
- The loss of the flora and fauna that inhabits these communities.
- Loss of some plants of six plant species, and the loss of many plants of matagouri, classified as Declining in the NZ Threat Classification System.
- The loss of some plants of *Olearia bullata,* a plant listed as threatened by the Dunedin City Council.

- Probable loss of some individuals of the korero gecko classified as Declining in the NZ Threat Classification System.
- Probable loss of some individuals of the Not Threatened McCann's skink.
- Loss of c. 36 ha of moderate quality habitat for pipit, but which is not currently likely to be used due to disturbance from existing mine activities.

I do not consider this loss to materially alter the stated impact of the Coronation North project described in the EcIA, but the area of natural vegetation loss increases by c. 59.04 ha (27% above the 216.5 ha in the original Coronation North footprint) and this will also reduce the populations or habitats of the plants, lizards, birds, insects that occur in the unconsented area.



Map 2. Location of the unconsented area of Trimbells WRS.

This vegetation at this site is categorised as **significant** under the proposed ORC Regional Plan and DCC District Plans as it is inhabited by some rare species.

Overall, the vegetation present within the unconsented area is assessed as being of **moderate** ecological importance. The narrow-leaved tussock grassland and short tussock grassland is of moderate size, fragmented by consented land clearance, of moderate species diversity and moderate integrity. Neither of these grasslands is considered a rare vegetation community, and the tussock grasslands at Coronation North are probably anthropogenic, being created following early Maori burning of eastern South Island dryland forest. It is well represented on lower-elevation hillslopes of Central Otago, though its extent is being reduced by conversion to pasture, invasion by exotic shrubs (particularly broom) and, in places, repeated burning. However, of greater concern is the increased loss of basalt contact wetlands, which is a rare vegetation community in the Macraes E.D.

Therefore, the impact of this project is assessed as having an **adverse, direct, permanent, irreversible, local impact** on the vegetation communities, with a **higher impact** on the rarer vegetation communities.

The magnitude of the project's impact on the area's vegetation communities at a local scale is assessed as **moderate**, and at a national level as **moderate**.

The overall degree of the project's effect on the biodiversity features is **moderate**.

Yours sincerely,

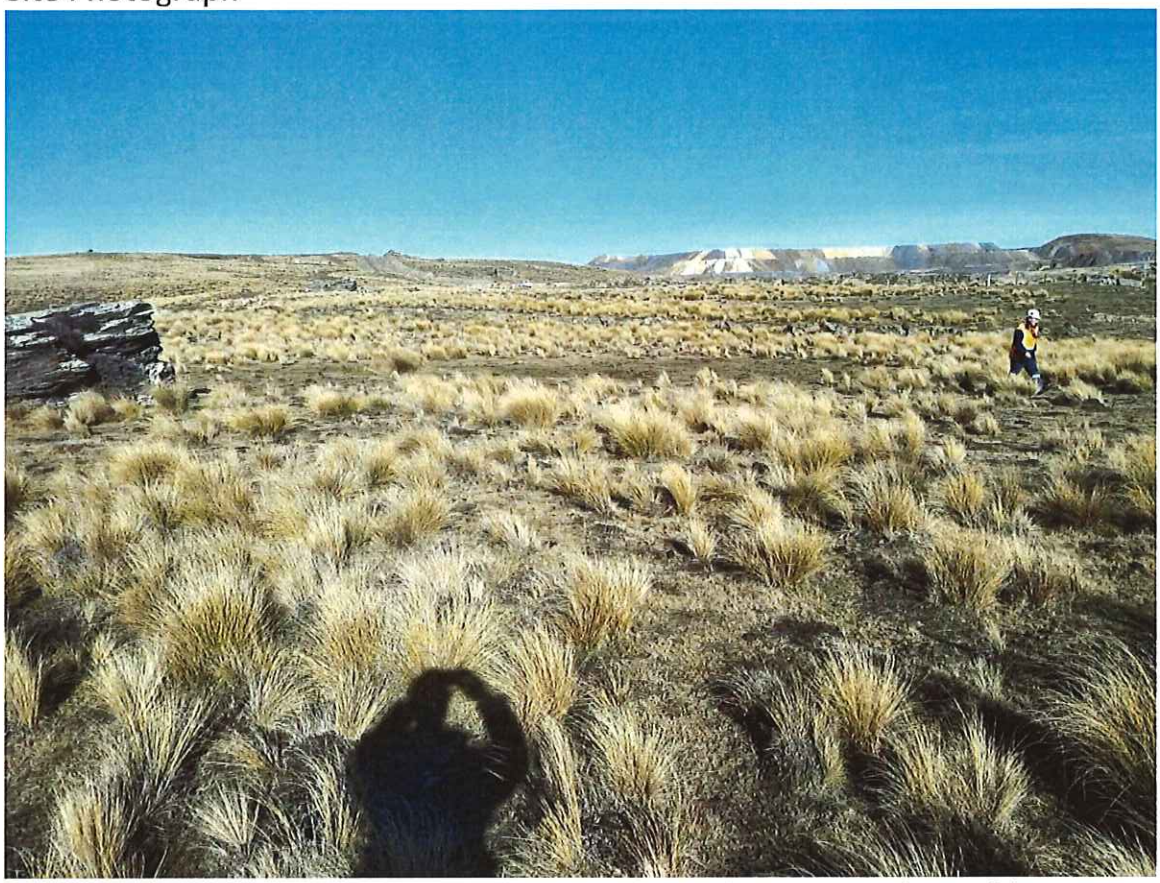
Dr Michael J. Thorsen
Director & Principal Ecologist
ERA Ecology NZ Ltd

Cited literature:

de Lange, P.J.; Rolfe, J.R.; Barkla, J.W.; Courtney, S.P.; Champion, P.D.; Perrie, L.R.; Beadel, S.M.; Ford, K.A.; Breitwieser, I.; Schonberger, I.; Hindmarsh-Walls, R.; Heenan, P.B.; Ladley, K. 2018: Conservation status of New Zealand indigenous vascular plants, 2017. *New Zealand Threat Classification Series 22*. Department of Conservation, Wellington. 82 p.

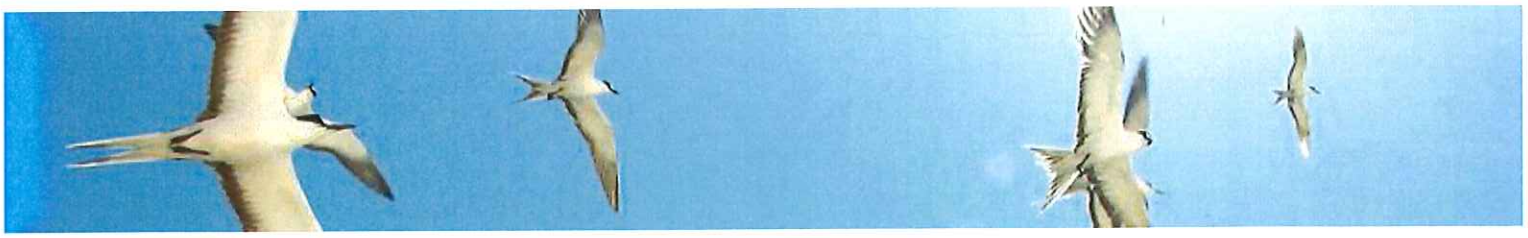
Inclusions:
Plant species recorded from CNE: file: CoronationNorthExtension_PlantList.xlsx

Site Photograph



Narrow-leaved tussock grassland vegetation and part of tor in the unconsented area of the CNE, from point 1395135.089 4978505.490, looking to South, 13 July 2018.

APPENDIX B *TERRESTRIAL BIODIVERSITY OF CORONATION NORTH WRS GIVE-UP AREA – CORONATION NORTH PIT EXTENSION PROJECT* – ERA ECOLOGY, DECEMBER 2018



ERA ECOLOGY NZ LTD

Reference:

17 December 2018

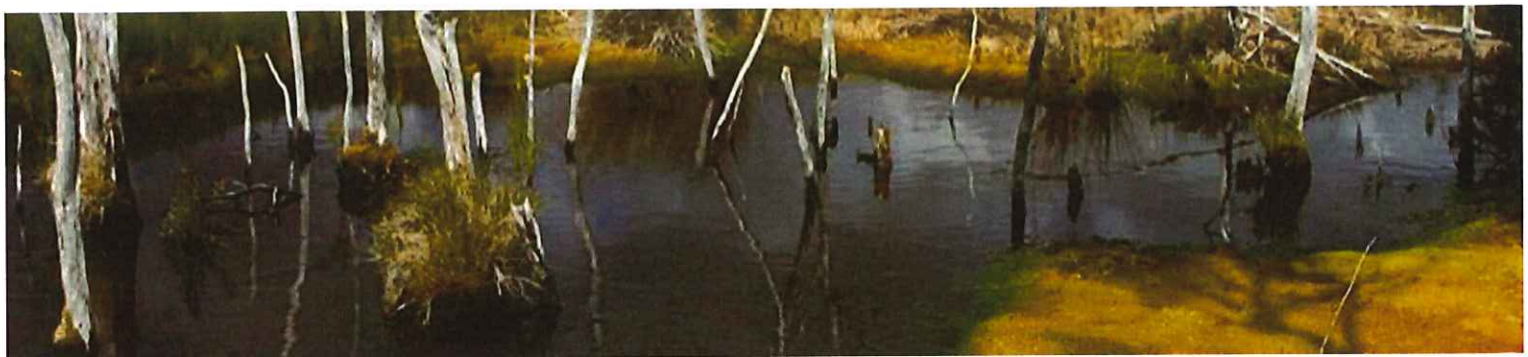
Gavin Lee
OceanaGold

Dear Gavin and Scott,

Re: *Terrestrial biodiversity of Coronation North WRS give-up area – Coronation North Pit Extension Project*

At your request on 23 November and 14 December 2018 I visited the area in the Coronation North WRS consent area identified as a potential 'give-up area' (Figure 1) to further document its biodiversity values. The results of this visit are provided here together with information obtained during previous visits to this general locality and in comparison with the known biodiversity features of the proposed new impact site to be created by the Coronation North Pit Extension. The biodiversity of the give-up area has previously been documented in the Ecological Impact Assessment (EcIA) of the Coronation North Project, and this file note builds on the information contained there-in.

The 52.55 ha give-up area is as described in the EcIA; predominantly moderate-stature previously-burnt narrow-leaved tussock grassland with tussock plants usually about 50 cm to 1 m tall and covering 50 to 80% of land area over 50.13 ha. Within this grassland there are areas of herbfield dominated by the exotic hawkweed *Pilosella officinarum* and 1.99 ha of bluff communities on the schist outcrops which are present mainly along gully edges with a few examples on the gully slopes. Low diversity riparian herbfield and sedgeland occupies 0.43 ha of the lower elevation beds of the gullies and the upper elevations of these gullies are occupied by exotic grasses and rushes with rare scattered shrubs of *Olearia bullata* and *Carmichaelia petriei*. Scattered patches and individual plants of low-stature matagouri shrubs are present throughout.



Many individuals of the Not Threatened McCann's skink (clade 4 genotype) were seen at it is considered that a moderately large population occurs in the give-up area.

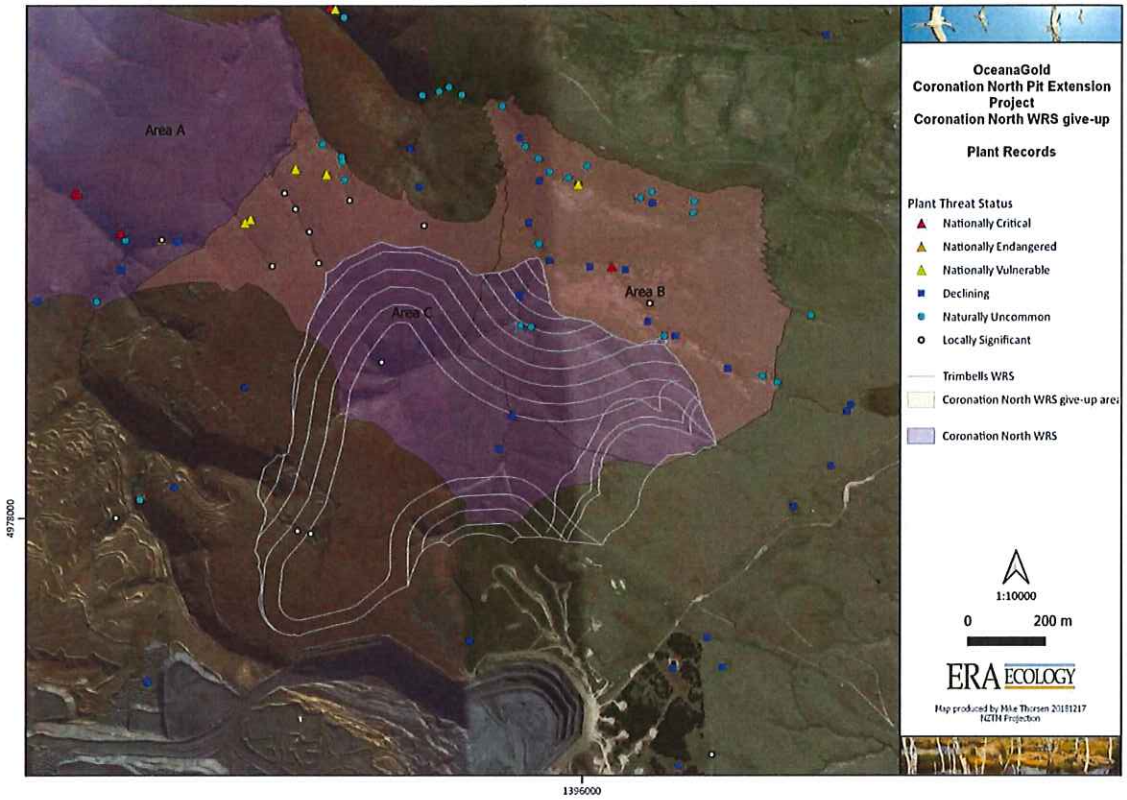


Figure 1. Location of plant species of interest in the vicinity of the Coronation North WRS give-up area.

Within the vegetation communities are 22 plant, 3 reptile and 1 bird species of interest (Figure 1). These are described further here.

1. *Anthus novaeseelandiae* Gmelin subsp. *novaeseelandiae* (pipit, Motacillidae): At Risk - Declining.

Three individuals were recorded in the give-up area during this inspection at the sites where pairs of pipit had been recorded in the EcIA. It is likely that 1-3 pairs of pipit are breeding in the give-up area.

2. *Oligosoma polychroma* (Patterson & Daugherty 1990) (clade 5 genotype) (southern grass skink, Scincidae): At Risk - Declining.

This species was noted in the EcIA as occurring in areas of suitable habitat. Some areas of suitable habitat were noted during this inspection, mainly in the lower parts of the gullies and around the larger schist outcrops. It is likely that the give-up area hosts a small breeding population of this species.

3. *Woodworthia* "Otago large" (korero gecko, Gekkonidae): At Risk - Declining.

This species was noted in the EcIA as occurring in areas of suitable habitat. Some areas of suitable habitat were noted during this inspection in the schist outcrops and droppings, probably from this species, were seen at three locations. It is likely that the give-up area hosts a moderately-sized breeding population of this species.

4. *Oligosoma inconspicuum* (Patterson & Daugherty 1990) (cryptic skink, Scincidae): At Risk - Declining.

This species was noted in the EcIA as possibly occurring in low numbers and one individual was seen in a gully bottom during this inspection. It is likely that the give-up area hosts a very small breeding population of this species.

5. *Lagenophora montana* Hook.f. (papataniwha, Asteraceae): Threatened – Nationally Critical.

One patch of this species was found during this visit on the bank of a stream. Plants were not in flower so this identification is provisional. This species is poorly known in New Zealand, and Macraes, together with Kuratau Clearing in the central North Island are the only localities where this species is currently known. In the Macraes area it has been recorded from about 5 sites.

6. *Hypericum rubicundulum* Heenan (a native wort, Hypericaceae): Threatened – Nationally Endangered.

A few plants tentatively identified as this species were recorded at two sites in the give-up area. The identity of these plants is tentative as they share some characters with *Hypericum rubicundulum*, but occur in anomalous shaded habitats and have not yet been found flowering. Similar plants have been recorded from several sites in the Macraes area.

7. *Carmichaelia corrugata* Colenso (common dwarf broom, Fabaceae): Threatened – Nationally Vulnerable.

Approximately 100 plants of this species were found at five sites in the give-up area. This species was first discovered in the Macraes E.D. in the EcIA and this site brings the total number of known natural occurrences in the E.D. to five. It is included in the Coronation Plant rescue package and has been transferred to one site in the nearby Deepdell Covenant with high over-winter survival of plants.

8. *Acaena buchananii* Hook.f. (a bidibid, Rosaceae): At Risk: Declining.

A patch of this species was recorded at one site in the give-up area. There are very few records of this species in the Macraes E.D.

9. *Aciphylla subflabellata* W.R.B. Oliver (needle-leaved speargrass, Apiaceae): At Risk: Declining.

One plant of this species was recorded from the give-up area in the EcIA. This species is patchily distributed in the Macraes E.D.

10. *Anthosachne falcis* (Connor) Barkworth & S.W.L.Jacobs (dryland wheatgrass, Poaceae): At Risk: Declining.

This grass was recorded at two sites in the give-up area. This species was first discovered in the Macraes E.D. in the EcIA, and is now known to occur at multiple sites in the E.D.

11. *Carex kaloides* Petrie (a wetland sedge, Cyperaceae): At Risk: Declining.

A small patch of this species was recorded in the give-up area in the EcIA. This species is now known from several sites in the Macraes E.D. with most of the populations occurring in the vicinity of the Coronation North project.

12. *Carmichaelia petriei* Kirk (desert broom, Fabaceae): At Risk: Declining.

This species was recorded at several sites in the give-up area during this assessment and in the EcIA. It is widespread in natural areas of the Macraes E.D., but it is mostly recorded as a few mature plants. Regeneration appears lacking in this area.

13. *Discaria toumatou* Kirk (matagouri, Rhamnaceae): At Risk: Declining.

This species is common in the give-up area and is widespread and usually abundant throughout natural areas of the Macraes E.D.

14. *Deyeuxia* aff. *quadriseta* (AK 252511; Volcanic Plateau) (a grass, Poaceae): At Risk: Declining.

This species was recorded from one site in the give-up area. The distribution of this species in the Macraes E.D. is poorly known and it has only been definitively recorded from a further 2 sites. Its distribution nationally is very poorly known.

15. *Leptinella pusilla* Hook.f. (a button daisy, Asteraceae): At Risk: Declining.

This species was recorded at one site in the give-up area. This species is widely but sparsely distributed in the Macraes E.D., particularly in grazed, shrubby areas.

16. *Mentha cunninghamii* Benth. (native mint, Lamiaceae): At Risk: Declining.

This species was recorded at two sites at the bases of schist outcrops in the give-up area. This species is known from scattered sites in the Macraes E.D.

17. *Pterostylis tristis* Colenso (a dwarf greenhood orchid, Orchidaceae): At Risk: Declining.

Six plants of this species were recorded from *Pilosella* herbfield at one site in the give-up area. This species is widely distributed in low numbers throughout natural low stature vegetation areas of the Macraes E.D.

18. *Brachyscome longiscapa* G.Simpson & J.S.Thomson (a daisy, Asteraceae): At Risk: Naturally Uncommon.

This species was recorded at two sites in the give-up area, both with 20-30 plants present. One was on a steep bank, the other in *Pilosella* herbfield. This species can be common at sites in the Macraes E.D., but sites are often widely spaced.

19. *Celmisia hookeri* Cockayne (Hooker's mountain daisy, Asteraceae): At Risk: Naturally Uncommon.

This species has been recorded from ten sites on schist outcrops in the give-up area with up to 200 plants at each site. The total population in the give-up area exceeds 1,500 plants and most populations were noted to have some recruitment occurring. This species is found on most of the larger schist outcrops in this area, particularly those with a shaded southerly aspect.

20. *Euchiton polylepis* (D.G.Drury) Breitw. & J.M.Ward (A small daisy, Asteraceae): At Risk: Naturally Uncommon.

One plant of this species was seen at the base of a schist outcrop in the give-up area. This is the fourth locality known for this species in the Macraes E.D.

21. *Juncus distegus* Edgar (Two-storey rush, Juncaceae): At Risk: Naturally Uncommon.

This rush was seen at three sites in shallow damp gullies where it is present over a combined area of 44 m x 16 m. This species is patchily distributed in the Macraes E.D.

22. *Lagenophora barkeri* Kirk (a wetland daisy, Asteraceae): At Risk: Naturally Uncommon.

This species was noted in the EcIA as being widespread in the Coronation North area and one site was recorded from a stream margin and at one site in a seepage in the give-up area. This species has scattered populations along natural streamsides in the Macraes E.D.

23. *Celmisia densiflora* Hook.f. (a mountain daisy, Asteraceae): Locally Significant.

This species was record at three sites on schist outcrops in the give-up area in association with *Celmisia hookeri*. This species is considered Locally Significant as these localities are at an unusually low altitude for this species which is common on Central Otago mountains. There is only one other known occurrence of this species in the Macraes E.D.

24. *Oxalis rubens* Haw. (native oxalis, Oxalidaceae): Locally Significant.

This species was recorded at one site in the give-up area where it occupies approximately 1 m x 50 cm around the margin of a schist flake. This is apparently the first record of this species in the Macraes E.D.

25. *Poa pusilla* Berggr. (a grass, Poaceae): Locally Significant.

This grass was recorded from one schist outcrop in the give-up area. This species is considered Locally Significant as it is rare in the Macraes E.D. where it is known from a total of five localities.

26. *Olearia bullata* H.D.Wilson & Garn.-Jones (a small-leaved shrub daisy, Asteraceae): Dunedin City Council Threatened Species.

Several plants and small groves of this species were recorded in the upper gullies of the give-up area. *Olearia bullata* is listed as a 'Threatened Plant' in Appendix 16A of the DCC District Plan. In the Macraes E.D. this species is widespread, with small groves occurring in the heads of most gullies.

A further value associated with the give-up area is that avoiding impact in the give-up area will reduce fragmentation of the Trimbells Gully RAP by restricting the area of impact to a portion of the western side of this RAP (Figure 2).

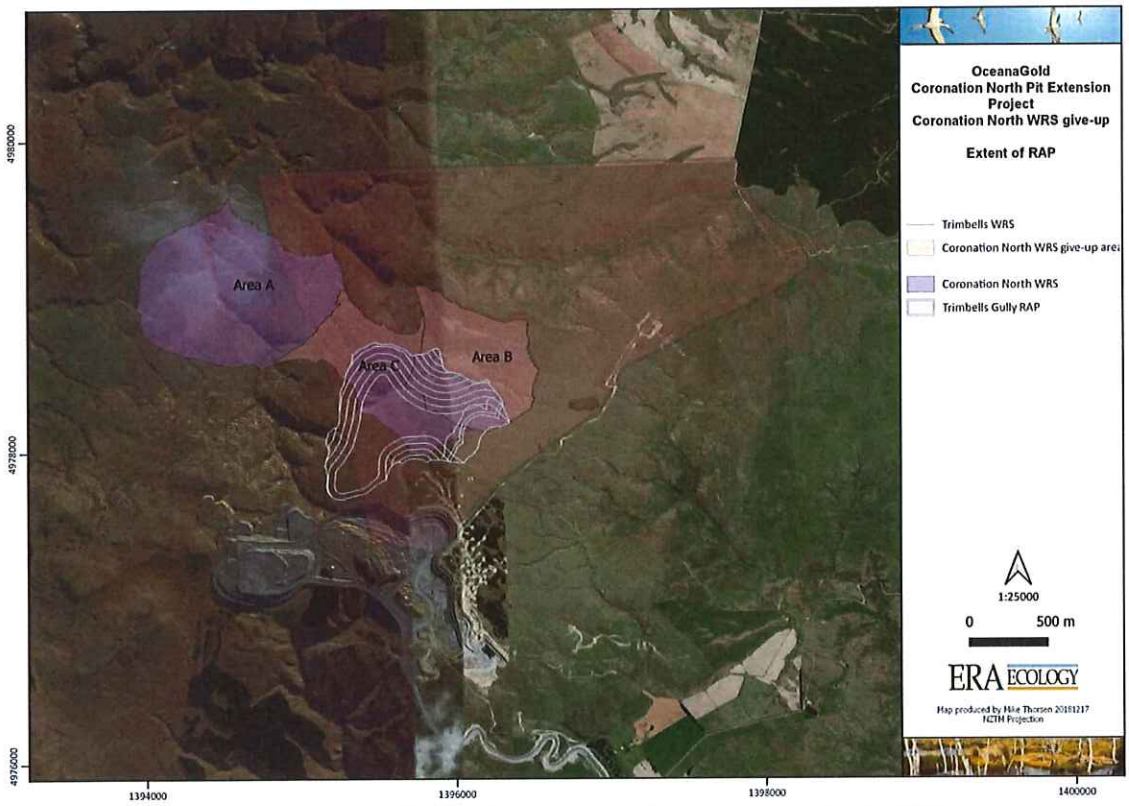


Figure 2. Extent of the Trimbells Gully RAP in relation to the Coronation North WRS give-up area.

In comparing the biodiversity values of the Coronation North WRS give-up area with those within the unconsented area of the proposed Coronation North pit extension and Trimbells WRS (letter 17 January 2019), there are more ecological features within the give-up area and these ecological features are mostly of better quality, contains species of higher importance or with greater extent or numbers, and fragmentation of a RAP will be reduced. Table 1 compares the biodiversity features of the two areas.

I consider that the biodiversity values within the give-up area together are ecologically more important than those within the unconsented portion of the CNE, and that adopting the give-up would address the effects of the CNE in an ecologically meaningful way so that there is a net gain to biodiversity. However, the CNE contains vegetation types that are not present in the give-up area, and there are unaddressed effects on the rare basalt contact seepage wetlands which should be considered, possibly by undertaking some restoration of this vegetation community in the nearby Highlay Hill Covenant.

Yours sincerely,

Dr Michael J. Thorsen
Director & Principal Ecologist
ERA Ecology NZ Ltd

Biodiversity feature	Unconsented part of CNE & Trimbells WRS	Give-up area
Total area	59.04 ha	52.55 ha
Narrow-leaved tussock grassland	41.51 ha	50.13 ha
Short tussock grassland	12.42 ha	
Shrubland	1.66 ha	
Basalt contact seepage wetlands	1.48 ha	
Bluff vegetation	1.33 ha	
Riparian herbfield & sedgeland	0.64 ha	0.43 ha
Habitat quality	Moderate to low and impacted by mine activities	Moderate and mostly intact, though recovering from a fire
Plant species of interest	7 At Risk species, 1 DCC Threatened Plant	3 Threatened species, 15 At Risk species, 3 Locally Significant species, 1 DCC Threatened Plant
Reptile species of interest	Small populations of 2 At Risk species and 1 Not Threatened species	Very small to moderate populations of 3 At Risk species and a moderately-large population of a Not Threatened species
Bird species of interest	None recorded	A few breeding pairs of an At Risk species

Table 1. Biodiversity values recorded from the CNE and Trimbells WRS and the give-up area.

APPENDIX C *CORONATION NORTH PROJECT CONSENT VARIATION – MINING FOOTPRINT AMENDMENT* – RYDER, AUGUST 2018

195 Rattray Street
PO Box 1023
Dunedin, 9054

T 03 477 2119
C 021 177 4291
b.ludgate@ryderenv.nz

Memorandum

To: Scott Mossman, Environmental Supervisor, **Oceana Gold (NZ) Limited**

From: Ben Ludgate, Environmental Scientist, **Ryder Environmental Limited**

Date: 23 August 2018

Subject: **Coronation North Project Consent Variation – Mining Footprint Amendment**

Dear Scott,

Oceana Gold (NZ) Limited are proposing to apply for a variation to resource consents for the Coronation North Project, to move a section of the footprint of the pit boundary and haul road corridor to outside the consented footprint. You have requested an assessment of any potential effects of this proposal on the aquatic ecology of the affected area.

The areas to be affected by the proposed footprint amendment include the upper reaches of a small tributary of 'Trimbells Gully tributary' and the upper reaches of a small tributary of Maori Hen Creek (Figure 1). However, the affected area in the tributary of 'Trimbells Gully tributary' is located within consented waste rock stacks and stockpile areas for the Coronation North Project, and therefore any potential effects of mining activity in this area have been assessed and mitigated as part of the consenting process. As the footprint amendment would not constitute additional disturbance in this area, the assessment below only considers the Maori Hen Creek tributary.

The area to be affected by the proposed footprint amendment in the upper reaches of a small tributary of Maori Hen Creek is approximately 500 m long (Figures 1 and 2). Aquatic ecology assessments completed during the consenting process for the Coronation North Project (Ryder 2016[1]) described the physical habitat and biological communities of Maori Hen Creek, and assessed the effects of the loss of habitat in the whole catchment, including the section of the Maori Hen Creek tributary that will be affected by the proposed amendment. Consequently, recommended measures for mitigating aquatic ecology effects of the mining projects (e.g., translocations of fish and crayfish/kōura) have already taken account of the loss of habitat in this upper section of the tributary. Despite this, a description of values and assessment of effects for this area is provided below.

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[1] Ryder, G. 2016. Oceana Gold (New Zealand Ltd) Coronation North Project. Aquatic Ecology Assessment. Report prepared for Oceana Gold (New Zealand Limited) by Ryder Consulting Limited.

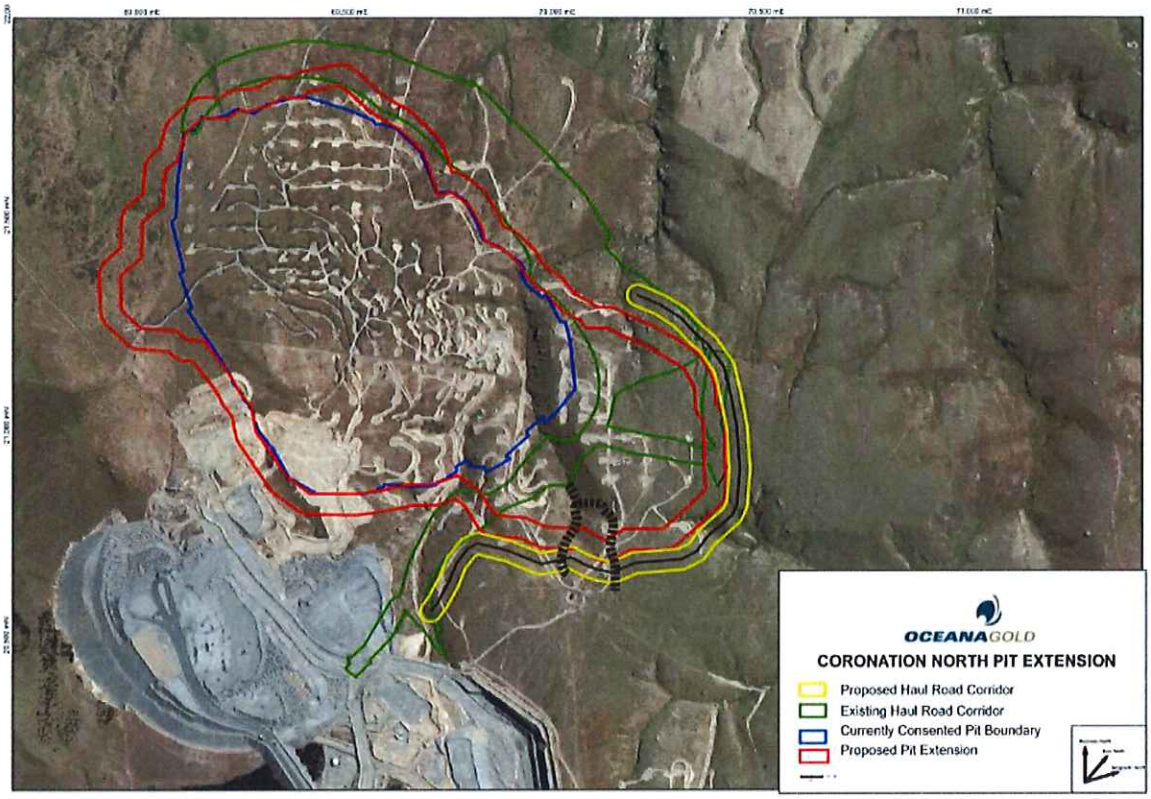

Figure 1 *Aerial photo of Maori Hen Creek indicating proposed amendments to the pit boundary (red lines) and haul road corridor (yellow lines). Photo and mining boundaries provided by Oceana Gold (NZ) Ltd. Black dashed lines represent Maori Hen Creek tributary areas affected by proposed amendments.*

Figure 2 *Photograph looking upstream at the confluence of Maori Hen Creek and the affected tributary, May 2017. Maori Hen Creek flows from the top right to the bottom of the photo. The affected tributary area is in the top left of the photo.*

Physical habitat

Physical habitat in Maori Hen Creek was described in the Coronation North Project aquatic ecology assessment (Ryder 2016) as:

> Maori Hen Creek lies within a relatively narrow gully with steeply-sided faces throughout most of its length (about 1.6 km from the current boundary of the Coronation project to the confluence with Trimbells Gully). Its catchment is approximately 152 ha in size, representing about 2.4% of the total Mare Burn catchment. The Coal Creek catchment lies to the west of it and the Trimbells Gully Tributary catchment lies to the east.
>
> The wetted channel is narrow throughout most of its length, typically varying from about 50 to 20 cm wide. While the creek typically carries a small flow through summer (a few litres per second), some sections have reasonable water depth due to the confined nature of the channel, brought about by the steep sided gully faces often coupled with underlying bedrock. There are some areas where the flow spreads out and the channel becomes unconfined, resulting in little obvious surface flow, and more akin to wetland habitat as opposed to stream

habitat. In these places, the bed is typically comprised of damp mud covered with plants capable of tolerating wet feet.

Prior to mining, the upper reaches of Maori Hen Creek were comprised of a tussock and pasture filled basin with low gradient, wetland habitats. Flowing water was not observed in this area, with habitat dominated mainly by boggy ground. These areas had low stream ecosystem values, with wetland areas drying out following periods of low rainfall. This section of the catchment has now been mined.

Further downstream, the creek flows through a gully dominated by tussocks and pasture grasses, grazed by cattle and sheep. Instream habitat through the gully is comprised of shallow riffles, runs and small drops and pools. Bed substrate is dominated by gravels and cobbles, with some areas of boulders and bedrock. There is evidence of stock damage to the channel particularly in the lower reaches.

The above description of Maori Hen Creek does not describe the habitat in the affected tributary area, which is located downstream of the low gradient basins previously found in the upper catchment, but upstream of the creek sections within gullies. The tributary has tussock and pasture throughout its catchment, but during previous surveys surface water has not been observed at the downstream end of the tributary (at the confluence with Maori Hen Creek – see Figure 2). The tributary drains a very small catchment area, and therefore the upper reaches of the tributary would have less surface water, and subsequently support less aquatic habitat, than in Maori Hen Creek.

Stream communities

The Coronation North Project aquatic ecology assessment (Ryder 2016) included information regarding the New Zealand River Environment Classification (REC) data for the Mare Burn catchment. The REC groups streams based on variables derived from geology, climate, source of flow and position in the river network. Headwater streams are assigned a stream order of 1. The total length of the Mare Burn stream network for stream orders greater than 1 (i.e., stream orders 2 – 4) is 50.7 km, and if order 1 streams are included in this analysis, 102 km of stream network is present in the Mare Burn catchment.

Surveys of order 1 streams in Mare Burn sub-catchments have found many do not support galaxiid populations, typically because they have no surface flow. But surveys have found that some order 1 streams that do carry surface flow also support galaxiid populations, including Maori Hen Creek. According to the REC classification system, the whole length of Maori Hen Creek is identified as an order 1 stream, but small tributaries of Maori Hen Creek are not identified as order 1 streams. This indicates that, based on the variables defined above that are used to identify the stream order, the smaller tributaries of Maori Hen Creek contribute little towards flows in Maori Hen Creek. This is supported by observations during surveys of stream communities in Maori Hen Creek, with many gullies draining into Maori Hen Creek, including the affected tributary, being dry.

Surveys and translocation operations undertaken in 2015 and 2017 within Maori Hen Creek used nets and electric fishing to capture and remove flathead galaxias (*Galaxias depressiceps*) and crayfish/kōura (*Paranephrops zealandicus*). The surveys were undertaken throughout Maori Hen

Creek, and covered habitat deemed to be suitable to support fish and/or crayfish/kōura (i.e., flowing water or areas of deeper water). Based on the results of these surveys, the upstream extent of fish and crayfish/kōura in Maori Hen Creek was determined (Figure 3). The upstream limit for galaxiids was approximately 800 m downstream of the affected tributary area, and the upstream limit for crayfish/kōura was approximately 250 m downstream of the affected tributary area (Figure 3).

At the time of each translocation/survey, the lower reaches of the affected tributary (i.e., immediately upstream of the confluence with Maori Hen Creek) were not surveyed as this area did not have any visible surface water and therefore did not provide habitat suitable for fish or crayfish/kōura. Further upstream, the upper reaches of the tributary would also have been devoid of surface water and suitable habitat.

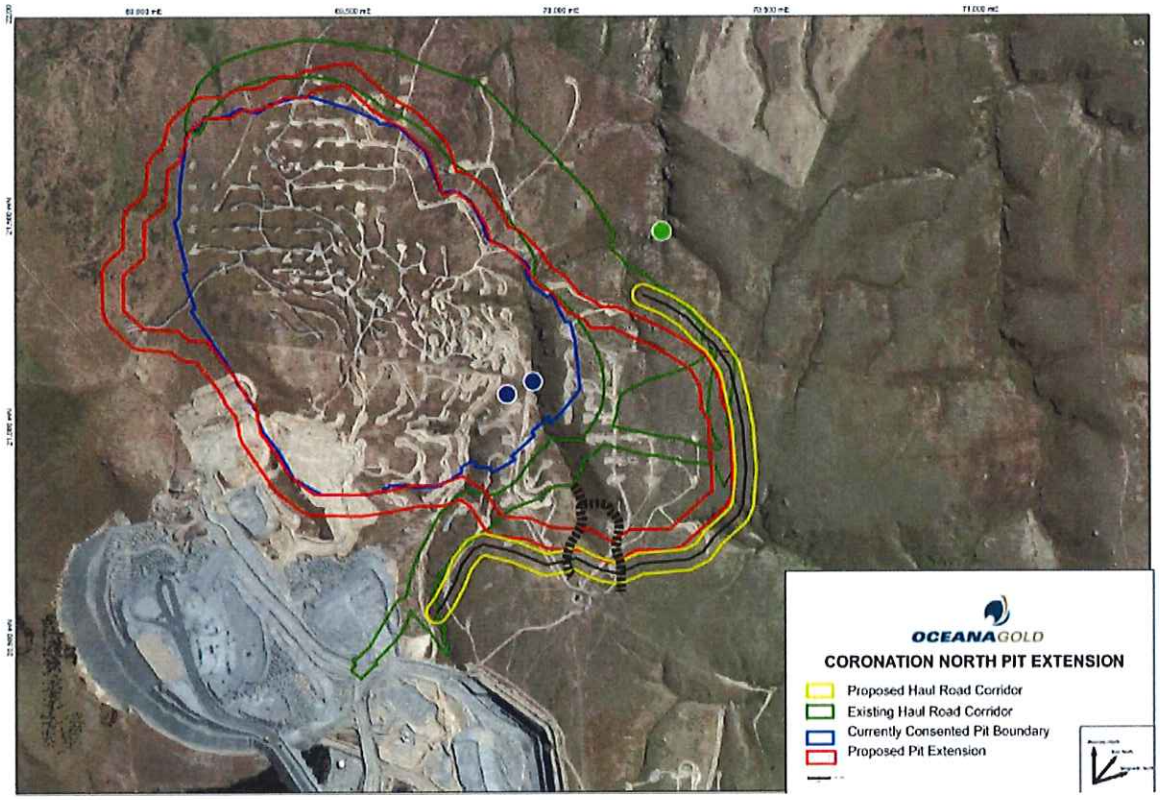

Figure 3 *Aerial photo of Maori Hen Creek indicating proposed amendments to the pit boundary (red lines) and haul road corridor (yellow lines). Photo and mining boundaries provided by Oceana Gold (NZ) Ltd. Black dashed lines represent tributary areas affected by proposed amendments. Blue dots represent the upstream extent of surface water suitable for fish and/or crayfish/kōura, and the most upstream sites where crayfish/kōura have been found (November 2015 and May 2017). The green dot represents the most upstream site where galaxiids have been found (November 2015 and May 2017).*

Assessment of effects

Approximately 500 m of the Maori Hen Creek tributary will be affected by the proposed mining footprint amendment. The tributary drains a very small catchment area, and based on previous assessments it does not provide the permanent habitat needed to support fish and crayfish/kōura communities. Indeed, the affected tributary area is well upstream of the most upstream sites where galaxiids and crayfish/kōura have been caught. Also, the affected area of the tributary is isolated from other areas of the Maori Hen Creek catchment by consented mining activity (e.g., pit, waste rock stack); mitigation for effects of these activities have already been provided.

Of the 102 km of stream network (stream orders 1-4) in the Mare Burn catchment, the Coronation North Project resulted in an approximately 11% loss of 'stream' network, although the actual proportional loss of galaxiid habitat would be less than this (Ryder 2016). As indicated above, many of the order 1 streams in the Mare Burn catchment are typically dry, and therefore do not support fish and/or crayfish/kōura populations. The loss of the 500 m of 'stream' network in the affected tributary, that does not support stable stream communities, was not included in the 11% as the tributary area was identified as smaller than an order 1 stream and therefore does not contribute to the overall stream network. Regardless, the short length of the tributary area comprises a very small proportion of the overall stream network in the Mare Burn catchment.

These results and observations reveal that the affected tributary area would not support stable aquatic habitat, and contribute only a very small proportion of flow and associated aquatic habitat in downstream reaches of Maori Hen Creek and the Mare Burn. As such, the effects of the loss of this length of the tributary can be regarded as less than minor.

Do not hesitate to contact me should you require any further information or clarification of the above.

Kind regards,

Ben Ludgate
Environmental Scientist and Director
Ryder Environmental Limited

APPENDIX D *GEOTECHNICAL REPORTS* - PELLS SULLIVAN MEYNINK

Coronation North Changes in Geotechnical Risk Profile of V7 Pit Design, August 2018

Trimbles Waste Rock Stack, November 2018

Pells Sullivan Meynink
Engineering Consultants
Rock-Soil-Water

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Our Ref: PSM71-227L

22nd August 2018

OceanaGold Corporation
Golden Point Road
RD3, Macraes Flat 9483
East Otago
NEW ZEALAND

ATTENTION: ANDY WINNEKE

Dear Andy,

RE: CORONATION NORTH
CHANGES IN GEOTECHNICAL RISK PROFILE OF V7 PIT DESIGN

1 INTRODUCTION

OceanaGold Corporation is evaluating its Coronation North pit and has prepared a revised design, called the V7 Pit, largely in response to the behaviour of the rock mass as encountered. This letter outlines the changes in the geotechnical risk-profile of the walls arising from this revised pit design.

Figure 1 presents a plan view comparing the V7 pit design with the Life-of-Mine (LOM) design developed in 2017. The 2017 LOM pit design was geotechnically assessed in a previous report [(1)]. By inspection of Figure 1, the changes between the two pit designs comprise the following.

- A 250 m length of the west wall, between 21350 and 21600 mN, is pushed 50 m further to the west.
- A 200 m length of the west wall north of 21600 mN is brought in 50 m.
- A 250 m length of the south wall, between 69850 and 70100 mE, is pushed out approximately 50 m further to the south.
- A 600 m length of the east wall north of 20850 mN is brought in by 20 to 50 m.
- The pit depths remain essentially the same.

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(1) PSM71-223R *Geotechnical review of Macraes LOM Design 2017*, 25th January 2018.

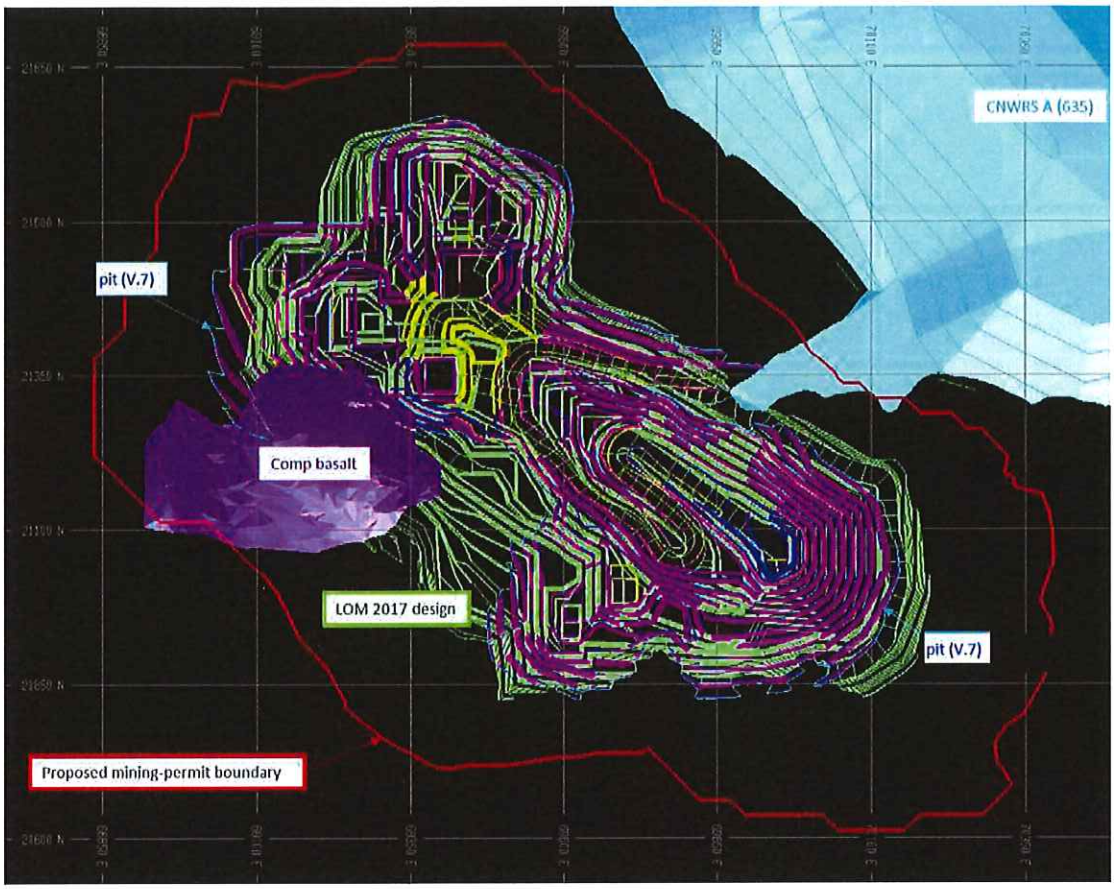

Figure 1 Plan view comparing the Coronation North pit plans from the 2017 LOM design which is drawn in green lines and the recently updated V7 pit which is drawn in blue lines. This plan also shows the location of the basalt (purple mass on the mid-left) and the waste rock stack (light blue in top-right). The red line shows the extent of the proposed mining permit boundary.

The differences are relatively small changes in the position of the pit crest. Considering the understanding gained from mining and the existing pit exposures, it is not credible that the two areas that are proposed to be pushed back (sections of the western and southern walls) will encounter new geotechnical conditions or domains.

It is considered therefore that there is no change in the geotechnical risk-profile of the walls arising from V7 Pit design.

2 WASTE ROCK STACK

The physical distance between the V7 pit and the Coronation North Waste Rock Stack (CNWRS) is approximately 180 to 250 m and has not materially changed from the 2017 LOM design as evidence in Figure 1. The proposed mining permit boundary is also more than 50 m from the CNWRS.

There is negligible interaction between the pit and the CNWRS as reported previously [(2)].

For and on behalf of
PELLS SULLIVAN MEYNINK

ROBERT BERTUZZI
Principal

[(2)] PSM71-204L *Impact of the Coronation and Coronation North Waste Rock Stack on open pits*, 12 April 2016

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Our Ref: PSM71-230L

28 November 2018

Oceana Gold Corporation
via email: Andy.Winneke@oceanagold.com

Attention: Andy Winneke

Dear Andy,

RE: TRIMBLES WASTE ROCK STACK

1 INTRODUCTION

This letter provides our geotechnical review of the proposed Trimbles Waste Rock Stack in response to the request from Oceana Gold Corporation [1].

The Trimbles Waste Rock Stack is proposed to occupy the ground between and east of the Coronation and Coronation North pits. It is shown in a plan view in Figure 1 and in three sections in Figure 2.

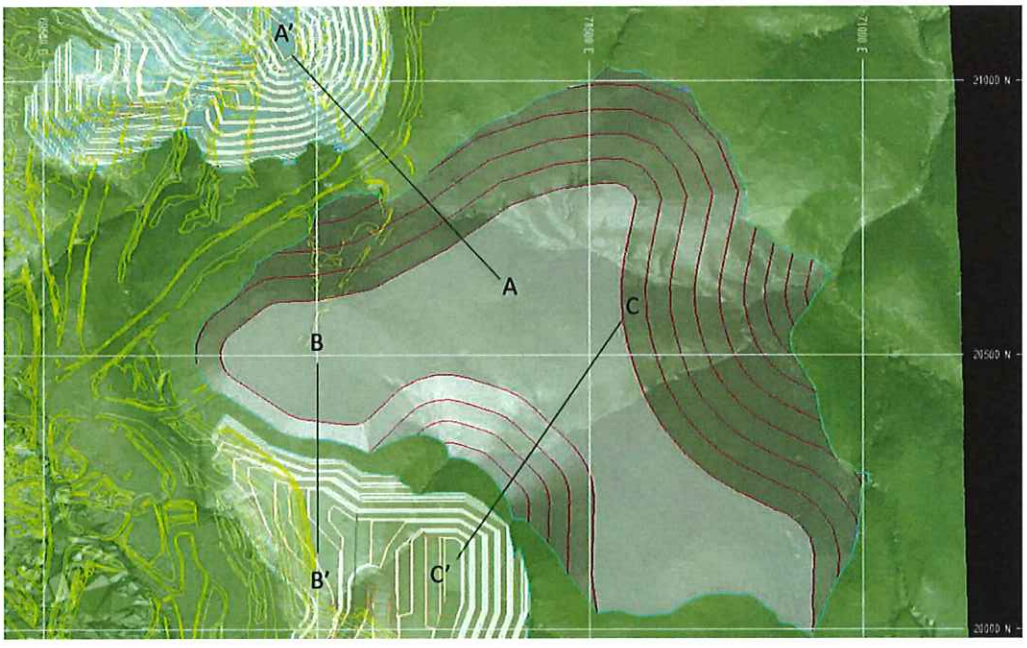

Figure 1: Plan location of the proposed Trimbles Waste Rock Stack, which lies between Coronation (south) and Coronation North (north) pits. Section lines are drawn.

[1] Email from Andy Winneke dated 16 November 2018

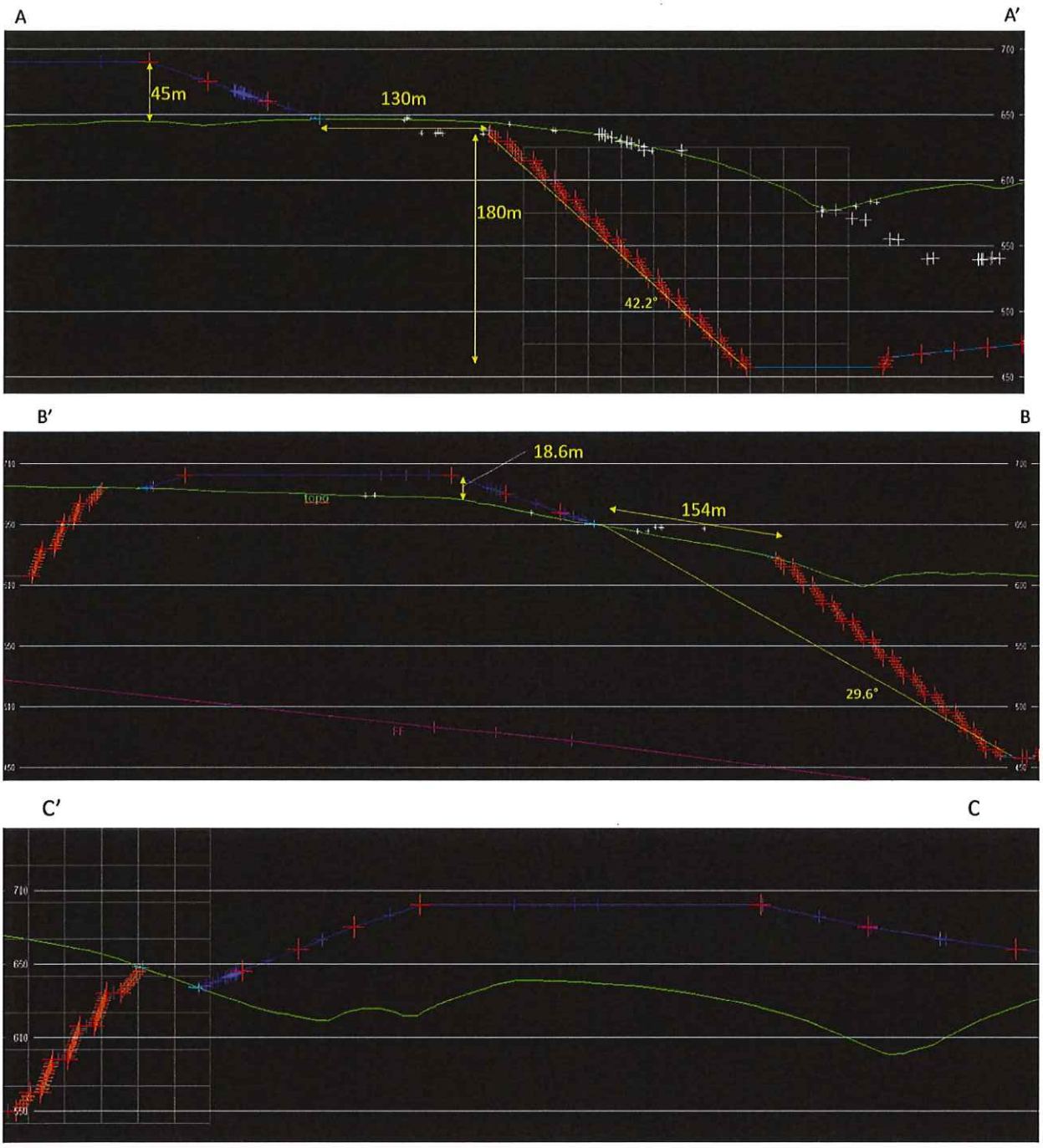

Figure 2: Three sections through the proposed Trimbles Waste Rock Stack.

The sections are selected to represent the most critical geometry in terms of proximity to the pit walls and height of the waste rock stack. The overall slopes of the final waste rock stack are approximately 18°.

- Section A. The waste rock stack is 45 m high. Its base is 130 m from the crest of the Coronation North pit. At this location the pit wall is 180 m high at an overall angle of 42°.
- Section B. Adjacent to the Coronation pit, the waste rock stack is less than 12 m high and 36 m from the pit's crest. Here the Coronation pit wall is 65 m high at an overall angle of 51°.

- Section B. Adjacent to the Coronation North pit, the waste rock stack is less than 20 m high and is 154 m from the pit's crest. The Coronation North pit wall is approximately 165 m high at an overall angle of 43°.
- Section C. The waste rock stack is 50 m from the crest of the Coronation pit and abuts against the existing topography. The waste rock stack is up to 75 m high in this area. The Coronation pit wall here is approximately 100 m high at an overall angle of 49°.

By inspection, the most critical geometry is Section C. This section was used to assess slope stability.

2 LIMIT EQUILIBRIUM ANALYSIS

2.1 General

Limit equilibrium analysis using RocScience's Slide software was used by OceanaGold to assess the impact of the proposed Trimbles Waste Rock Stack on the overall pit wall stability based on the Factor of Safety (FoS) concept. Typically, for mining applications an acceptable static FoS is one greater than 1.2. For earthquake cases, the target FoS is greater than 1.0.

The GLE Morgenstern Price method was selected for the analysis as it better suited to capture the potential failure mechanisms at Macraes, i.e. sliding along crushed rock/gouge infill associated with first and second order geological structures.

2.2 Material Properties

This study has adopted established rock mass shear strength properties used in a suite of previous studies. The equivalent Mohr-Coulomb strength parameters are presented in Table 1.

Table 1 – Strength parameters

Lithology	Unit Weight [kN/m^3]	Cohesion [kPa]	Friction Angle [°]
Waste Rock	20	1	35
Weathered Schist	25	120	35
Inter-shear Pelite	25	180	43
Faults	20	0	15
Footwall Fault	25	0	9

The groundwater level is assumed to be towards the base of the waste rock stack and drawn down to the base of the open pit.

2.3 Seismic Loading

The potential effects of an equivalent 150-year return period earthquake on the stability of the dump and pit walls is considered by including a horizontal acceleration of 0.13g into the stability analysis (Table 2).

Table 2 - Macraes PGA for different return periods (Litchfield et al., 2005)

Return Period (years)	150	475	1000	2500	10000
PGA (g)	0.13	0.25	0.38	0.65	1.1

2.4 Results

The results, which are shown in Figures 3 to 6 and summarised in Table 3, show a FoS greater than 1.7 and greater than 1.4 under earthquake event.

Table 3 – Summary of limit equilibrium analyses

Run	Seismic Loading (g)	Minimum FoS
No Groundwater	0	1.75
	0.13	1.46
Groundwater	0	1.73
	0.13	1.46

3 CONCLUSION

Our geotechnical review of the proposed Trimbles Waste Rock Stack presented in the letter confirms that the proposed location and design of the Trimbles Waste Rock stack is suitable. The waste rock stack does not adversely impact on the stability of the adjacent Coronation and Coronation North open pits.

For and on behalf of
PELLS SULLIVAN MEYNINK

ROBERT BERTUZZI
PRINCIPAL

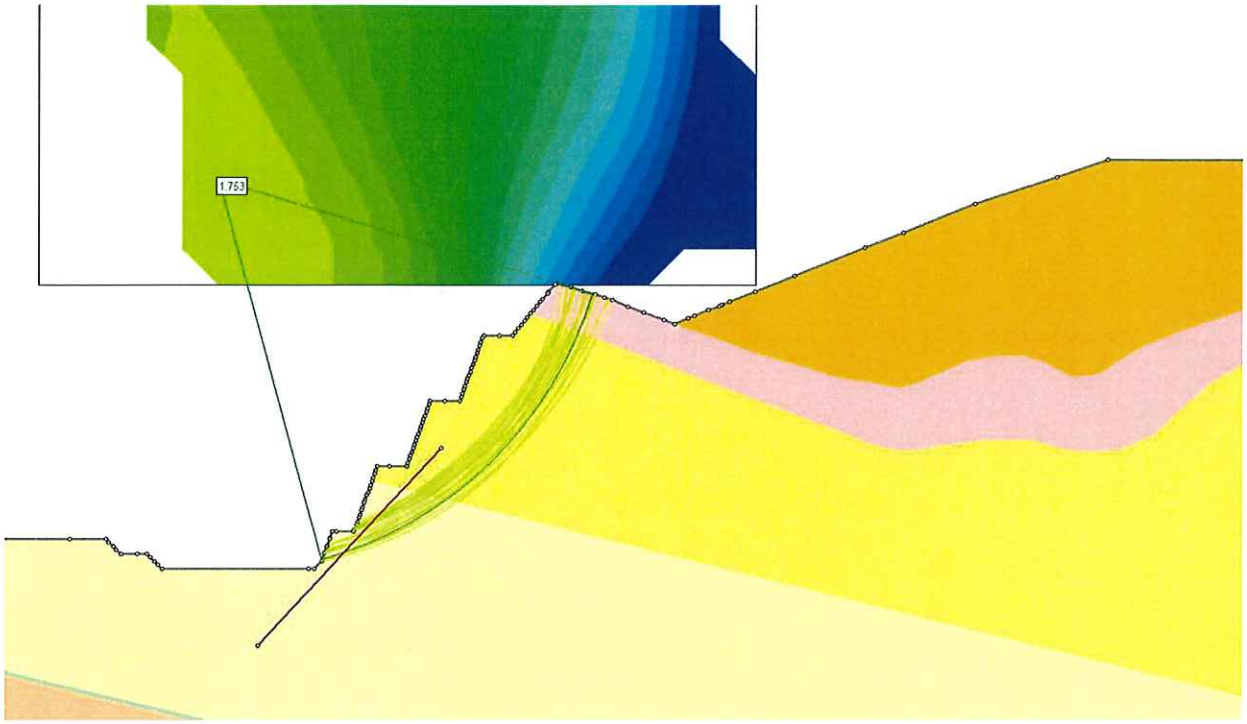

Figure 3: FoS result for Section C – no groundwater. Minimum FoS = 1.75

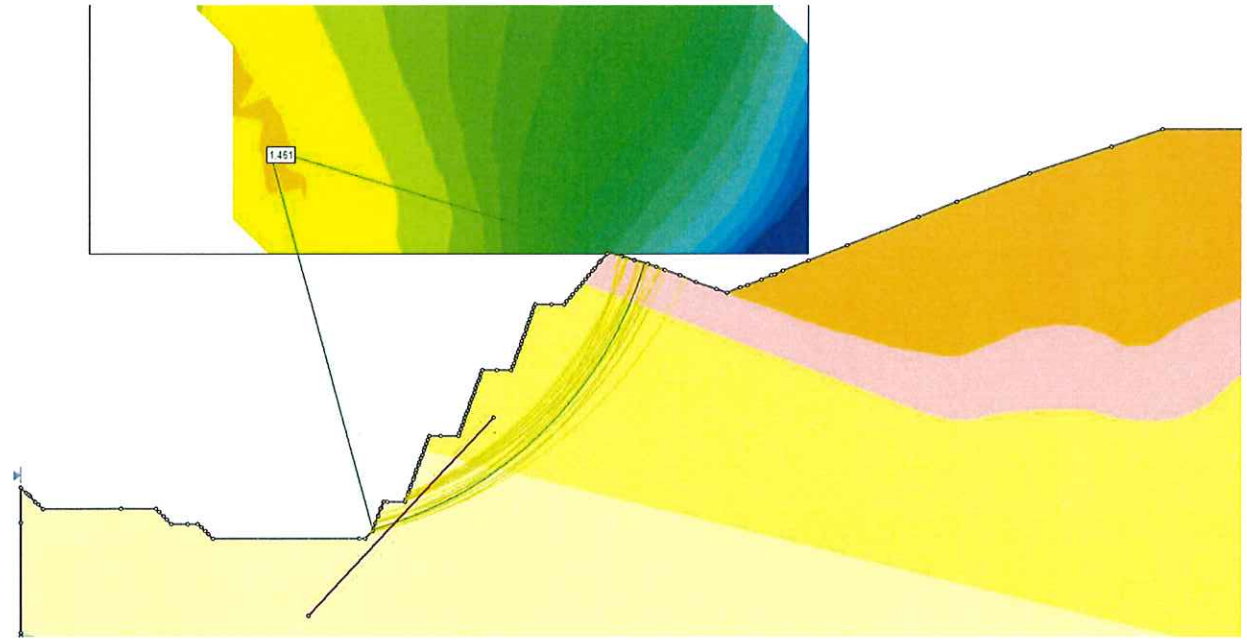

Figure 4: FoS result for Section C – no groundwater, 0.13g seismic. Minimum FoS = 1.46

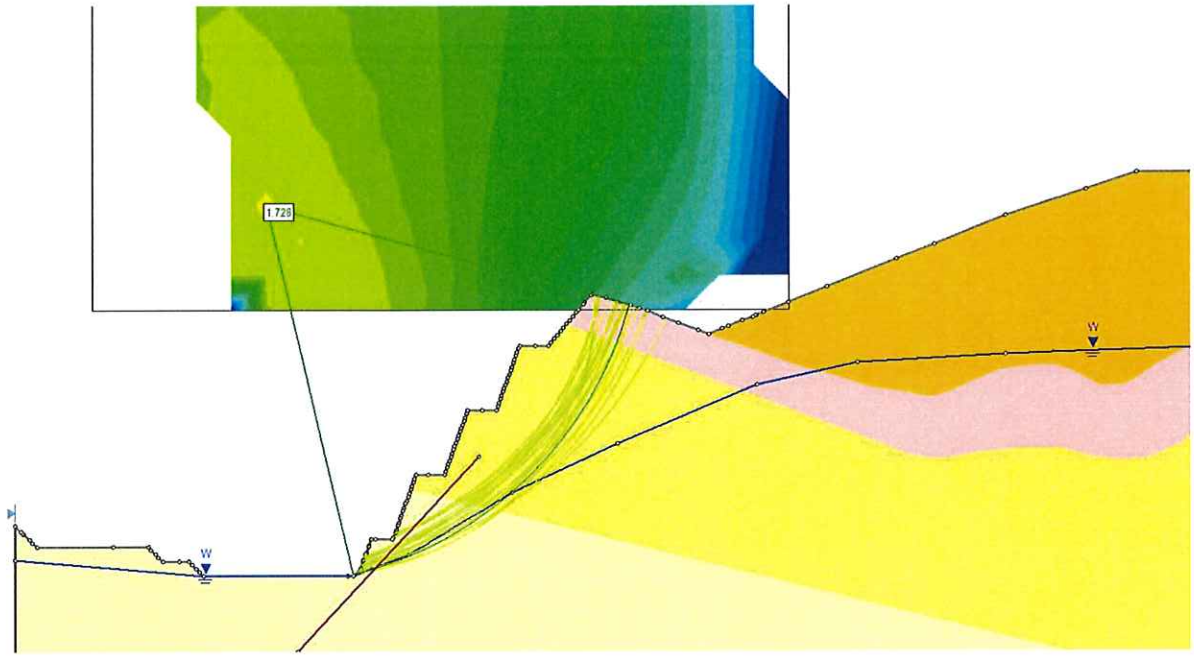

Figure 5: FoS result for Section C – groundwater. Minimum FoS = 1.73

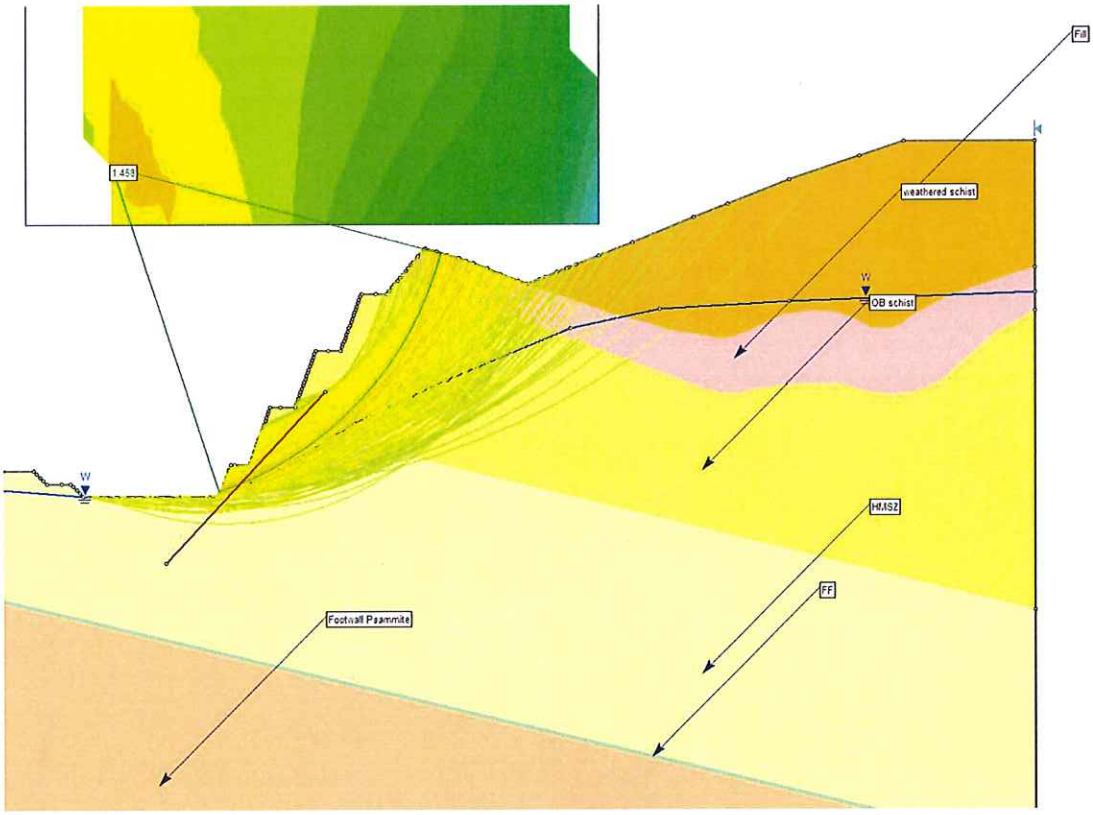

Figure 6: FoS result for Section C – groundwater, 0.13g seismic. Minimum FoS = 1.46

APPENDIX E *CORONATION NORTH EXTENSION PROJECT - LANDSCAPE AND VISUAL EFFECTS* – WSP OPUS, JANUARY 2019

29 January 2019

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Gavin Lee
Environmental and Community Manager
Oceana Gold (NZ) Ltd
Golden Point Road
RD3, Macraes Flat 9483

Ref: 3-C1680.05

OceanaGold: Coronation North Extension Project - Landscape and Visual Effects

Dear Gavin

As requested, the following is my assessment of the potential landscape and visual effects of the proposed extension of the consented Coronation North Mine, Macraes Operation, Macraes Flat.

My assessment is based on the Coronation North Extension Project Description and the supporting plans that you provided earlier this month; refer **Appendix 1.** This information notes four succinct areas where it is proposed to change aspects or components of the mine relative to what was consented as part of the Coronation North development in 2016. These components are:

- **Pit Cutback** – A south eastward[1] extension of the open cut pit, which is to be excavated to access ore-bearing rock and will result in a near-vertical high wall that will have the same configuration as the rest of the consented pit;
- **Pit Wall Stability Layback** – An extension of the western 'corner' of the open cut pit, which is to be excavated to address geotechnical concerns as this area of high wall is not standing up as well as had been expected and needs to be battered back further;
- **Pit Backfill** – The waste rock excavated from eastward extension of the pit will be backfilled into the northwest aspect of the pit rising up above natural ground level in the western 'corner. The latter will be shaped to tie-in with the existing and pre-existing landform of the adjoining Sisters Peaks; and
- **Trimbells Waste Rock Stack** – A new waste rock stack (WRS) in the upper southeast extent and slightly beyond of the consented mine area that will be separate from the consented Coronation North WRS. In relinquishing the area between the proposed and consented WRSs, various ecological values will now be retained untouched.

Where the proposed changes relate to extending aspects of a consented activity that has already changed the landform and landuse of the immediate area, the landscape effect and associated effect on natural character of this change will be minimal. This is due the scale and extent of these potential changes are very small relative to that which is already consented. However, the proposed changes may have a visual effect as they have the potential to increase the extent of the open cut pit that is visible. The Trimbells WRS in its more elevated position has the potential to increase the visibility of the extent of waste rock stack in the immediate area.

[1] Compass orientation is based on Macraes North/Macraes Grid

I have compared these proposed changes to the 'footprint' of the consented open cut pit that I addressed in the Coronation North Project Landscape and Visual Assessment (LVA) that I prepared in April 2016. The LVA was supported by several photo simulations of which the 'Viewpoint 12 - Longdale cattleyards, Longdale Road' (Vpt 12) images are relevant to this current assessment; refer **Appendix 2**.

I have attached section 6.3.12 from the April 2016 LVA that addressed the effects on the view from Longdale Road; refer **Appendix 3**. This northern viewpoint represents the broad view from a relative short section of Longdale Road from which the Coronation North Project is visible. It also represents the one public road with Dunedin City district from which the mine is visible.

Attached also to this assessment is a set of new Vpt 12 photo-simulations[2] based on photographs I took on Thursday, 17 January 2019; refer **Appendix 4**. This set of images has the four components of proposed extension named and these components have been outlined and 'coloured' in the Vpt 12 False Colour – January 2019 image. These components have then been 'naturalised' in the final Vpt 12 Photo Simulation – January 2019 image.

I note that that as an A3 printed image of what is quite a wide panoramic view, this does shrink what you would see when 'on the ground' considerably. The visible portions of the waste rock stacks and the open cut pit will appear to be closer and bigger when you are standing at the viewpoint. The comparative scale of the change, though, is quite small relative to what can be seen of the already consented pit and relative to the broader consented mine activities; being the combination of open cut pit, the Coronation North WRS and haul roads and less yet relative to the broad sweep of the upper Mare Burn basin area.

As noted, the main part of the extension to the pit shell is to the mine east. This extension will push over the currently consented haul road boundary towards the proposed Trimbells WRS. Relative to Vpt12, it will extend the pit away from the viewpoint and the local road. This will potentially make the pit appear somewhat longer.

The other part of the extension in the mine west 'corner' is slightly more elevated and will add to the section of the consented pit high wall that extends upslope against Sisters Peaks. However, the Coronation North Pit Back will progressively 'rise up' within the northern margin of the pit above natural ground level and obscure the pit void as seen from Vpt 12. The final placement of the pit backfill will be shaped to re-form the pit edge up against the slope of the northern promontory of the Sisters Peaks. In so doing, the backfill will cover the cut face within the western 'corner' of the pit and obscure the remainder of the western pit face beyond.

As noted at section 6.3.12 of the April 2016 LVA: *The mitigating factor for the pit void relative to potential views from Longdale Road is that much of the pit will be obscured by land along its northern or near edge, though the upper extent of the side and back walls of the pit will remain visible.* As outlined above, the proposed pit backfill will form a new 'northern frontage' to the mine that will obscure the open cut and its side walls from Vpt 12 and potentially most, if not all, of the proposed eastern pit cutback. At RL 640 m, it is expected that top of the backfill will be approximately 30 m above the edge of the existing pit on the western edge.

The proposed active pit backfilling will also have a positive landscape effect in negating part of the pit void and re-forming the northern aspect of the Sisters Peaks promontory.

Trimbells WRS will have a lesser 'footprint' than the combined Area B and Area C of the consented Coronation North WRS, but will still obscure part of the Taieri Ridge, rising up to the skyline of the ridge. As shown in the Vpt 12 – January 2019 images, the visual effect of this is consistent with what is consented relative to Coronation WRS.

[2] The Vpt 12 – January 2019 photo-simulations have been generated in the same manner as the previous April 2016 photo-simulations. The methodology is outlined at Appendix 8 – Photos and Photo-simulations of the April 2016 LVA

From the April 2016 LVA, the concluding comment relative to VPT: was:

In essence, the combined landscape and visual effects of the Coronation North WRS and the Coronation North Pit as seen from this viewpoint will be high in the first instance. In 10 – 15 years, these effects will be countered, to some degree, by the established rehabilitation of the slopes of the waste rock stack. Given that these mine elements are relatively close to the viewpoint and the open cut pit will be a lasting feature, the visual effect on this view will remain, but in the longer term will reduce to moderate-high to moderate.

In regard to the proposed Coronation North Expansion, the potential waste rock stack-related landscape and visual effects will remain much as before, but with the lesser landscape effect of having a strip of land left untouched between what would be the smaller, stand-alone Coronation WRS and the proposed Trimbells WRS. While this strip of land is not directly visible from Vpt 12 on Longdale Road, it's retention will have positive ecological outcome.

In regard to the proposed changes to the Coronation North open cut pit, both the proposed south-east pit cutback and the western pit wall layback will increase the worked area of the pit. however, the effect of this will be 'balanced' by the proposed backfilling on the north to northwest aspect of the pit. The placement of the backfill rising up above natural ground level and being placed against the Sisters Peak promontory will have a positive outcome. This will be due to the reinstatement of a portion of the local landscape and the visual screening of pit relative to Longdale Road.

In my opinion, the landscape and visual effect of the changes proposed by the Coronation North Extension will be no more than minor within the context of the consented Coronation North Project.

Regards

David McKenzie
Registered FNZILA
Technical Principal: Landscape Architecture

Appendix 1

Coronation North Extension Project Description

The Coronation North Extension Project is driven by several aspects, as follows:

- Successful exploration activity OceanaGold has located an additional resource not previously identified at the time of consenting the previous project.
- Geotechnical constraints with pit wall stability.
- Optimisation in design of waste rock movement from the Coronation North Pit and the Coronation Pit extension (consented as part of the Coronation North development) and subsequently waste rock stack design.

The overall effect of these aspects is to:

- Increase the volume of ore being excavated from the mining operation to:
    - Extend the life of mining by approximately 4 months.
    - Increase in unconsented area of 57.39 ha, balanced be the set aside of 52.9 ha of consented area resulting in a net increase/decrease of 4.49 ha.
    - Reduce effects (in almost all cases) to significant biodiversity values, when compared with the existing consented baseline.
    - Provide a reduction of visual effects when compared with the existing consented baseline.
    - Improve the safety of current operations and long-term stability of the pit walls.

The specific Project Elements of the Coronation North Extension are:

- **Pit Cutback** – Following more detailed exploration drilling and pit optimisation, approximately 2.8 million tonnes of gold bearing ore have been identified close to the existing Coronation North Pit. It is proposed to extend the Coronation North Pit to the south east in order to access the underlying gold resources, in an area partially consented for haul road and topsoil access. The cutback will result in approximately 28.8 million tonnes (or 12.2 million m3). The additional area required for this cutback is 25.76 ha.
- **Pit Wall Stability Layback** – As the Coronation North Pit has developed, greater knowledge and understanding of the underlying geology and pit wall behaviour has been gathered. In order to ensure the safe removal of ore from the Coronation North Pit, the Pit wall is required to be laid back. This will result in approximately 14.12 ha of additional unconsented area.
- **Pit Backfill** – The Pit Cutback will allow for approximately 19.3 million tonnes (9.2 million m3) of waste rock to be placed at the north western end of the Coronation North Pit. The pit backfill will rise approximately 30 m above the natural ground level on the north western side of the Pit to an elevation of RL 640 m.
- **Trimbells Waste Rock Stack (Trimbells WRS)** – Detailed scheduling of waste movement has led to the design of Trimbells WRS, which is located high in the catchment of Trimbells Gully and partially covers Area B and area C of the consented Coronation North Waste Rock Stack. Trimbells WRS requires an additional 17.51 ha of unconsented area and has a final elevation of RL 675 m. The design of the Trimbells WRS as a replacement for the Area B and C of the consented Coronation North WRS has allowed for a significant area of consented land to be relinquished. The area equates to 52.9 ha which has several benefits as outlined in the Section 6[3].
- Surface runoff will continue to be diverted around the open pit and waste rock stack workings and managed with diversion drains and silt control dams located in gullies of disturbed areas, as is currently implemented. Any additional sediment control required will be installed prior to any additional disturbance within each catchment area.

These Project Elements are shown in the following plans.

[3] Refer to Section 6 of the Proposal's AEE.

Mining of the Coronation North Pit Cutback will be conducted in conjunction with the Coronation Pit extension (consented as part of the Coronation North Project). Waste rock will be placed in the consented Coronation North Waste Rock Stack (Area A), Coronation North Pit Backfill and Coronation Waste Rock Stack. A detailed materials balance of waste rock movement is summarised in **Table 1 Waste Rock Materials Balance**[4]. The overall balance suggests net surplus of available volume of 3.6 million m^3 (8.9 million tonnes) in the designed waste rock storage. For the purposes of design and subsequently consenting, it is preferable to take a more conservative approach to ensure suitable capacity of storage.

Table 1 Waste Rock Materials Balance

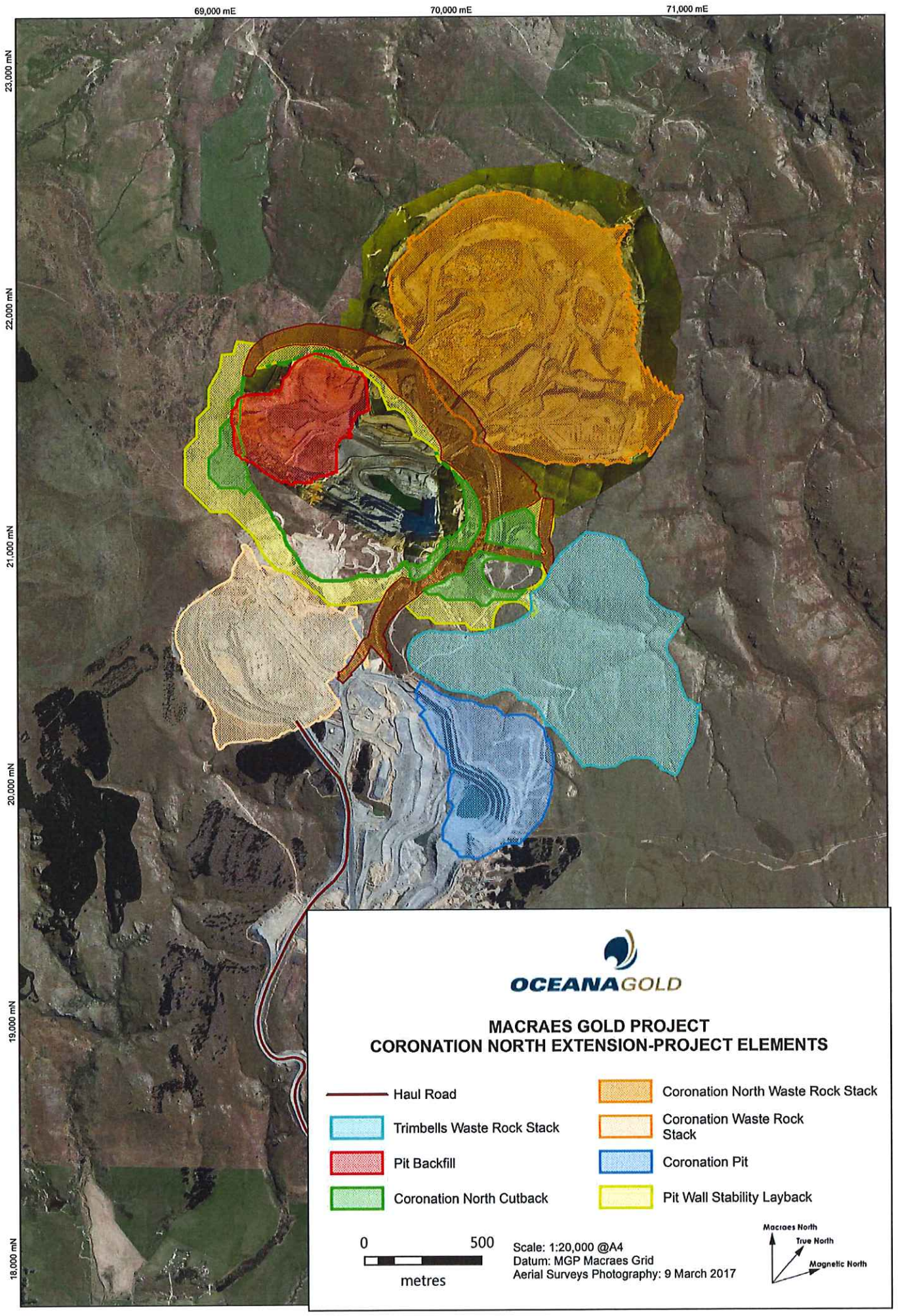
Source	Volume	Tonnes	Destination	Volume	
Coronation North Pit	7.7	15.6	Coronation North WRS	12.2	25.6
Coronation North Pit Extension	12.6	26.2	Coronation WRS	2.1	4.4
Coronation Pit Extension	16.9	35.0	Trimbells WRS	17.6	36.3
			Coronation North Backfill	9.2	19.3

In addition to the Project Elements the following measures will be taken as part of the good practice for environmental management at Macraes:

- Surface runoff will continue to be diverted around the open pit and Waste Rock Stack workings and managed with diversion drains and silt control dams located in gullies of disturbed areas, as is currently implemented. Any additional sediment control required will be installed prior to any additional disturbance within each catchment area.
- Surface and ground water collected within the pit will continue to be used for dust suppression activities onsite. This water will be utilised in the watercarts for keeping the dust on the haul roads, waste rock stack, and pit floors to a minimum.
- Discharges to air will continue to be managed by the operative Dust Management Plan. The plan includes methods which may be used to minimise dust generation. Dust and Total Suspended Particulate ("TSP") will continue to be monitored at existing monitoring sites.
- In preparation for excavation of the Coronation North Pit extension, Coronation Pit extension and Trimbells Gully WRS, topsoil and the underlaying brown rock (i.e. weathered schist) will be stripped for the purposes of rehabilitation. It is not envisaged that additional footprint will be needed for temporary stockpiles as this material will be used directly on existing waste rock stack final surfaces.
- The closure plan will continue to be comprised of progressive rehabilitation of Trimbells WRS , Coronation North WRS, Coronation WRS and the Pit Backfill. The open pit will form a pit lake within the remaining pit shell. All other rehabilitation programmes will remain as previously planned and consented.
- Access to Trimbells WRS will still be utilise existing consented alignments. The main access from the Coronation to the Coronation North Pits will be diverted approximately 300 m to the mine's south east but will be contained within the proposed disturbance envelope.
- Temporary pedestrian access will largely remain unchanged from that established for the Coronation North Project. There will be a slight realignment in the mine west corner where the access will be pushed westward.

[4] All volumes and weights in the table are expressed in millions.

- The Coronation North Extension will be carried out, managed and monitored on substantially the same basis as the consented Coronation and Coronation North projects 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 and groundwater management, sediment control, progressive rehabilitation of waste rock stacks.
- The existing haul road access to the Coronation North project area will largely remain unchanged. Mining access will continue to be from the haul road leading up from Horse Flat Road.
- Hauling of Ore will be undertaken under a 'no night time hauling' policy until such time that agreement can be obtained with the affected party to alter that policy (see Section 6 for more information).
- Ore will continue to be processed at the existing processing plant and the existing processing rate at the plant of approximately 5-6 Mt per annum will also remain the same.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OCEANAGOLD
MACRAES GOLD PROJECT
CORONATION NORTH EXTENSION-PROJECT ELEMENTS
Haul Road
Trimbells Waste Rock Stack
Pit Backfill
Coronation North Cutback
Coronation North Waste Rock Stack
Coronation Waste Rock Stack
Coronation Pit
Pit Wall Stability Layback
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metres
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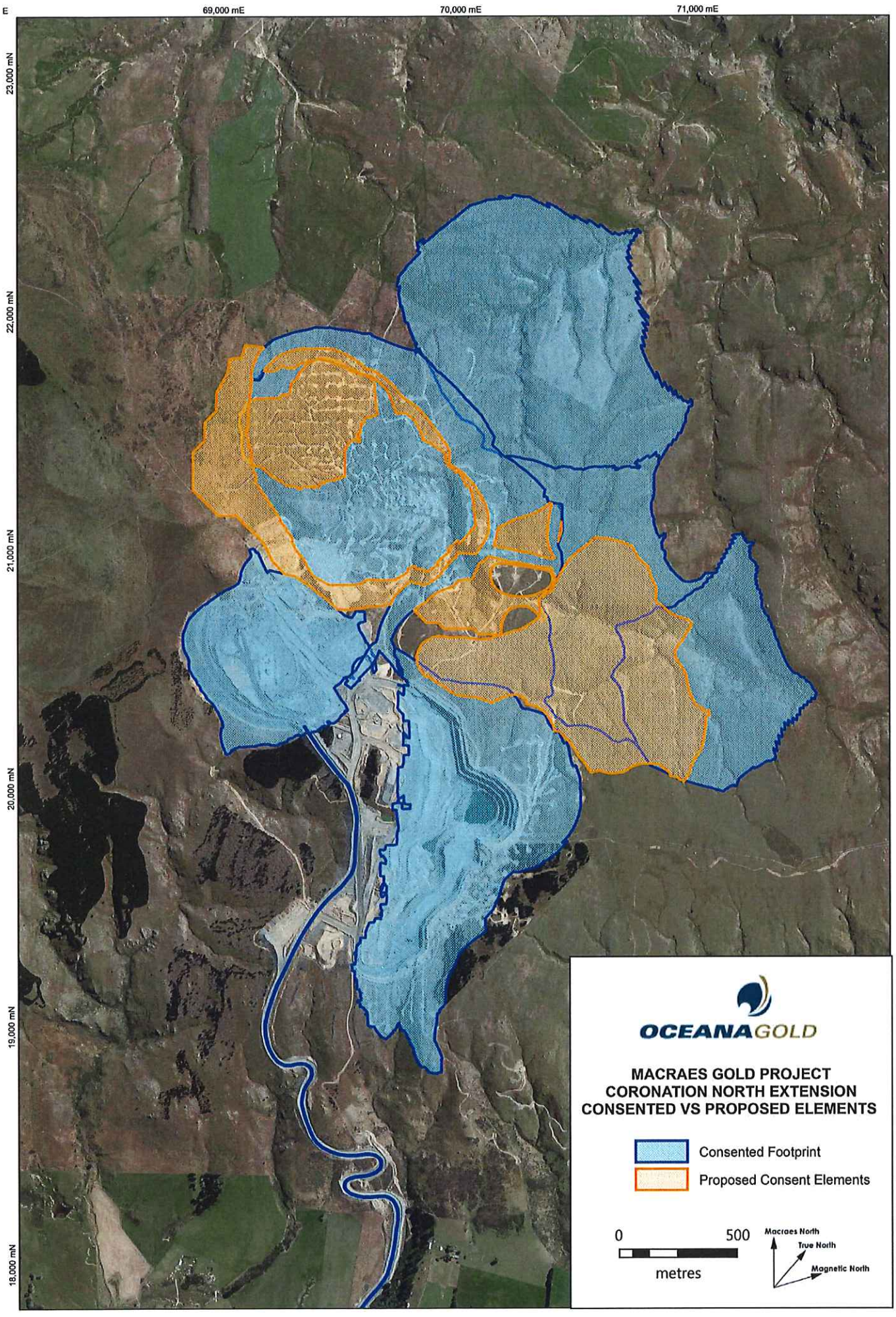
Aerial Surveys Photography: 9 March 2017
Macraes North
True North
Magnetic North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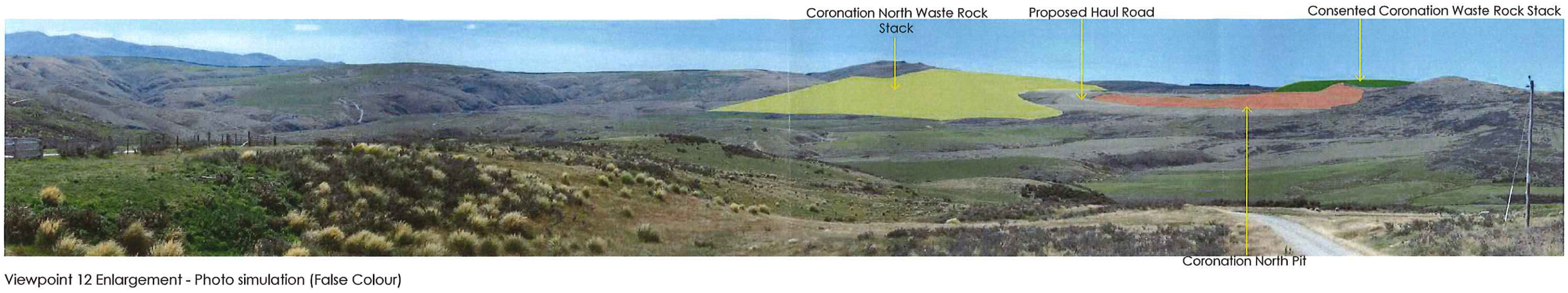
OCEANAGOLD
MACRAES GOLD PROJECT
CORONATION NORTH EXTENSION
CONSENTED VS PROPOSED ELEMENTS
Consented Footprint
Proposed Consent Elements
0
500
metres
Macraes North
True North
Magnetic North

Appendix 2

'Viewpoint 12 – Longdale Cattleyards, Longdale Road' images from Coronation North Project: Landscape and Visual Assessment, April 2016

Viewpoint 12 - Longdale cattleyards, Longdale Road



Viewpoint 12 Enlargement - Photo simulation (False Colour)

Viewpoint 12 Enlargement- Photo simulation

OPUS

Oceana Gold: Coronation North Project - Landscape and Visual Assessment

JOB NUMBER: 3-81043.00 SCALE: N/A

DATE: April 2016

P:\Projects\3-81043.00 - Coronation North Project Landscape Effects\Site Photos\Panaromas\Indesign

Appendix 3

Section 6.3.12 Extract from Coronation North Project: Landscape and Visual Assessment, April 2016

6.3.12 View 12 - Longdale Cattleyards, Longdale Road

Travelling 'east' from Hyde – Macraes Road along Matheson Road, which becomes Longdale Road north of Station Hill, the area of the Project does not become visible until just past the conifer plantation beyond 'Hill 721' and then as the traveller descends to Longdale homestead.

The **View 12 photo** provides a broad view of the upper catchment basin of the Mare Burn that drains much of eastern 'back' slopes of the Taieri Ridge. As indicated on the Viewpoint Map, the View 12 viewpoint is approximately 3.5 km from the central high point of the proposed Coronation North WRS. This viewpoint is indicative of what will be seen of the Coronation North Project Area from the nearest public point on the DDC side of the Taieri Ridge.

In the View 12 photo the Kakanui Mountains can be seen in the distance in the centre left edge of the photo. Highlay Hill is on the skyline in the middle left of the photo and high points of the Sister Peaks are in the centre right of the view. The conifer plantations above Longdale homestead are in the right of the photo. The land falls away to Coal Creek in the foreground, which flows to the Mare Burn. Part of the proposed Coal Creek freshwater storage reservoir will be visible from the viewpoint. Maori Hen Creek and Trimbells Creek drain the slopes between the Sister Peaks and Highlay Hill and also flow to the Mare Burn.

The Longdale homestead is the closest residence to the Coronation North Project on the north side of the Taieri Ridge; being approximately 3.2 km northwest of the central point of the proposed waste rock stack. The proposed haul road around the northern edge of the Coronation North Pit will be approximately 1.8 km from the homestead. However, there are shelterbelts and rising land immediately to the southeast of the homestead that will obscure the waste rock stack from the homestead. The Longdale property is owned by OceanaGold and has been leased back to the previous owner who will continue to farm that part of the property that is not within the Coronation North Project area.

Approximately 1.5 km further north on Longdale Road is the Mount Highlay homestead (the O'Neil residence). This homestead is set within a sheltered gully that drains to the Mare Burn and the Taieri River to the north and west. There is a sizable local ridge that rises up to 658 masl immediately southeast of the Mount Highlay homestead that obscures the Coronation North Project area from the O'Neil residence. Consequently, there will be no visual effects that will potentially affect this isolated residence.

Viewshed Map 1 indicates that an aspect of the proposed Coronation North WRS will be directly visible from the View 12 viewpoint and this is verified by the **View 12 photo-simulation**. The photo-simulation shows that the northern faces and a portion of the western flank of the proposed Coronation WRS will be visible in the middle ground of the view with Highlay Hill rising behind it. The north-running arm of the proposed Coal Creek freshwater storage reservoir will be visible in the middle ground between the local road and the proposed waste rock stack. The western portion of the consented Coronation WRS will be seen to the left of the highest of the Sister Peaks and the northern-most of the peaks will be removed by the excavation of the Coronation North Pit. Aspects of the upper western, southern and eastern cut slopes of the proposed Coronation North open cut pit will be visible, as will sections of the proposed haul road run across the north end of the pit and then running between the pit and the waste rock stack to the south. The southern extent of the haul road and the land it traverses will obscure the Coronation Pit Extension from this viewpoint.

Viewshed Map 2 implies that the Coronation Pit Extension or at least aspects of its upper cut slopes will be visible from this viewpoint. However as mentioned above, this pit will be obscured by the unmined section of land between the two pits. This section of land will be

within the working mine and is likely to be used as a stockpile area for lower grade ore and for topsoil. It would then be rehabilitated to pasture at mine closure.

As shown in the photo-simulation, the elevated southern portion of the Coronation North WRS will occupy a portion of the skyline to the west of Highlay Hill. The waste rock stack will grade into the Taieri Ridge with the natural ridge line visible in the centre of the view. The ridgeline will then grade into the consented Coronation WRS that then grades into the highest of the Sister Peaks.

The proposed Coronation North WRS, having a maximum footprint that is approximately 2.8 km long by 1 km long and being up to 200 m high in parts, will form a distinct landform within the upper Mare Burn 'basin'. As shown in the photo-simulation, this new 'central ridge' will have a similar 'stepped' configuration to, but will be more pronounced, than the natural ridge to its immediate east; being immediately east of Trimbells Gully. It will, however, be somewhat smaller than the natural ridge to the east of that; being the elevated landform that sits between two, larger eastern tributaries to the Mare Burn.

The natural drainage pattern of the local ridges in this 'quarter' of the upper Mare Burn 'basin' has become more pronounced as a result of the flatter areas above and the sloping headlands between the side gullies having been cultivated and established in higher yielding pasture. The result of this is that their green pasture cover stands out from the un-improved 'tussock' grassland in the gullies and on other ridge tops and headlands. This further emphasises the natural drainage pattern.

The flanks of the Coronation North WRS will not be as dissected as those of the natural ridges or headlands and will be smooth and uniform by comparison. The vegetation cover of the waste rock stack will also be uniformly green at the outset. As the grazing regime on the waste rock stack will be managed to ensure the grass swale thickens up to protect the flanks of the stack from erosion, the waste rock stack will stay 'green' for quite some years. As has been required by past conditions, *tussock species, which are as far as practicable sourced from the Macraes Ecological District* are to be included in the revegetation process, but it will take considerable time for the tussock plantings to become distinguishable from a distance, especially in the face of on-going grazing.

In time, this vegetation cover will mature to a similar colour to that of the cultivated and grazed slopes in the left and right middle ground of the view as occurs elsewhere in the Macraes Gold Project site. With a greater length of time, it is expected that the consented Coronation WRS, being above and set back from the land in the Mare Burn basin that is more intensively grazed, will re-colonise with tussock and return to a colour and texture that will be similar to that of the Sister Peaks.

The proposed Coal Creek freshwater storage reservoir will be visible in 'front' of the Coronation North WRS with its north-running arm confined within the local, incised gully section of Coal Creek. The reservoir dam will not be visible as it and the downstream section of the reservoir will be obscured by a low ridge that the creek currently flows around. What will be seen of the reservoir will have the appearance of an upland, stock water or duck pond and will be in context with the farming activities around it.

The proposed Coronation North Pit will create a void that will be approximately 1 km in diameter at its upper edge and result in a landform that is not commonplace in the upper Mare Burn 'basin'. In the excavation of the pit void the north-eastern of the four Sister Peaks promontories will be removed.

As shown in the Viewpoint 12 photo-simulation, there will be sections of new haul road traversing around much of the upper perimeter of the Coronation North Pit. The northern section of haul road will have the effect of blocking a portion of the potential view into the pit and will be retained as a visual buffer at the end of mining operations. However, the majority of the haul road sections and formation will be broken down as part of site rehabilitation, shaped and grassed and, like the slopes of the waste rock stack, returned to productive use.

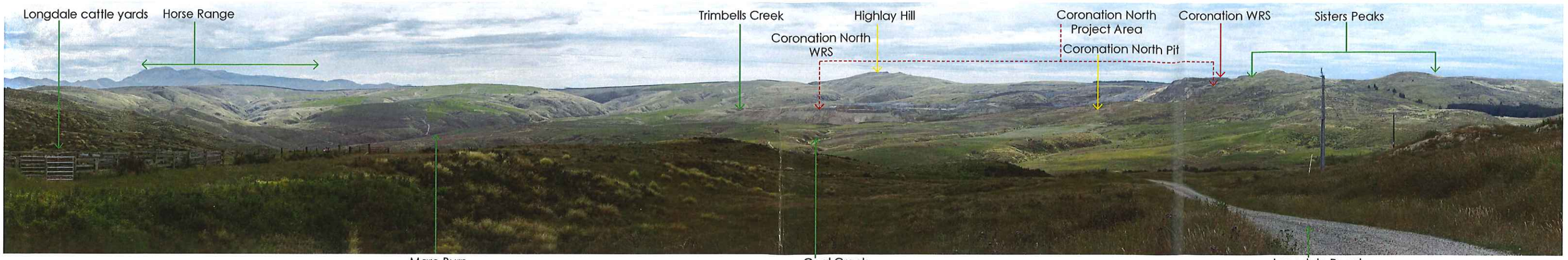
Locally, both the landscape and visual change brought about by excavating the open cut pit and the immediate landform change that creates, along with the formation of sections of haul road and the more gradual building-up of the Coronation North WRS will be very obvious. The landscape mitigation of the waste rock stack and the redundant sections of haul road will limit the effect of these two mine components, with time. The pit void will remain and over a long period of time will fill with water and become a steep sided lake. The mitigating factor for the pit void relative to potential views from Longdale Road is that much of the pit will be obscured by land along its northern or near edge, though the upper extent of the side and back walls of the pit will remain visible.

As with the previous Coronation Mine conditions, OceanaGold locate, form and shape all earthworks so that their profiles, contours, skylines and transitions closely resemble and blend with the surrounding natural landforms with the intent of maximizing their integration into the surroundings. As is the expectation of Dunedin City's 2GP, the disturbed land will be restored to an acceptable standard.

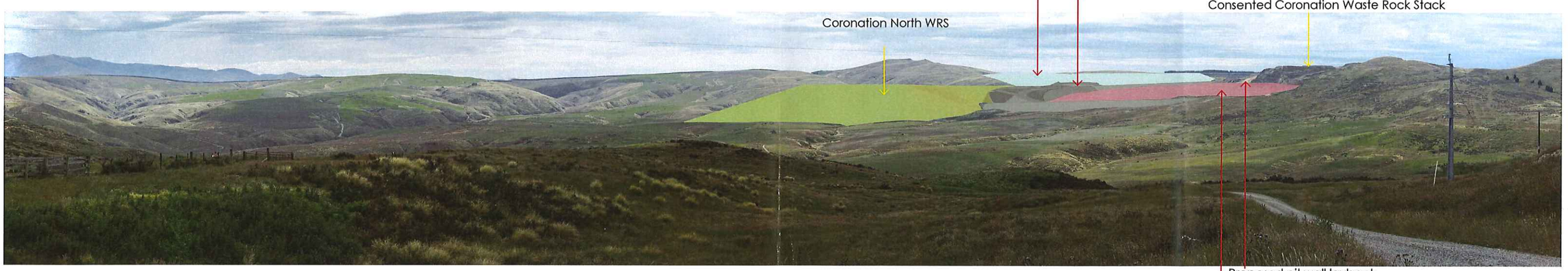
In essence, the combined landscape and visual effects of the Coronation North WRS and the Coronation North Pit as seen from this viewpoint will be high in the first instance. In 10 – 15 years, these effects will be countered, to some degree, by the established rehabilitation of the slopes of the waste rock stack. Given that these mine elements are relatively close to the viewpoint and the open cut pit will be a lasting feature, the visual effect on this view will remain, but in the longer term will reduce to moderate-high to moderate.

Appendix 4

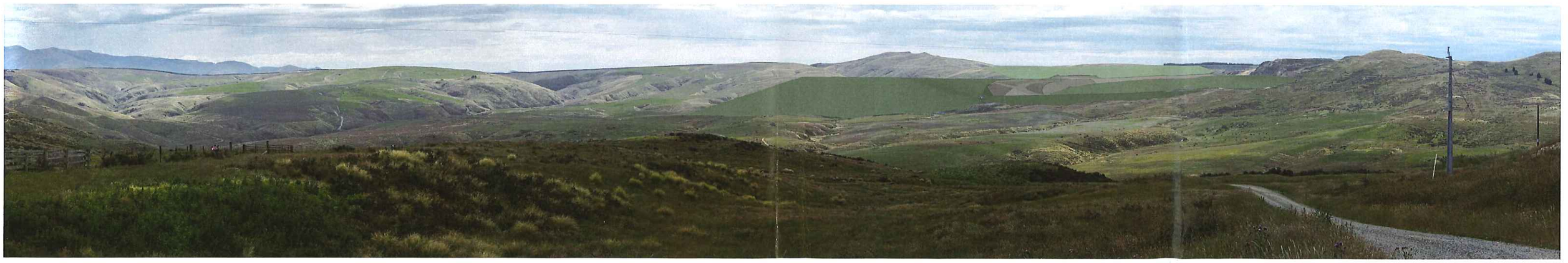
'Viewpoint 12 – Longdale Cattleyards, Longdale Road' images, January 2019



Viewpoint 12 - Longdale cattleyards, Longdale Road - January 2019



Viewpoint 12 Enlargement - Photo simulation (False Colour) - January 2019



Viewpoint 12 Enlargement- Photo simulation - January 2019

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Oceana Gold: Coronation North Expansion- Landscape and Visual Assessment

JOB NUMBER: 3-C1680.05 SCALE: N/A

DATE: January 2019