

To: Elyse Neville, Otago Regional Council

From: Richard Allibone, Water Ways Consulting Ltd

Date: 7 February 2020

Subject: OceanGold Deepdell North Stage III mine extension RM19-

Dear Elyse

I have reviewed the aquatic ecological information provided by the applicant for the Deepdell North Stage III mine extension in the consent application.

The application provides an assessment of effects on the aquatic ecology in the proposed mine area and waste rock stack. The proposed mine and waste rock stack are all to be constructed in the Deepdell Stream catchment near Macraes, Central Otago. Ryders Environmental (2019¹) have provided the assessment of aquatic ecological effects. This assessment assesses the current state of the aquatic habitat, macroinvertebrate and fish communities and provides an assessment of the direct effects of the habitat loss associated with mine development and also the downstream effects on water quality and aquatic fauna and flora downstream of the mine area. The assessment used appropriate methods and also uses data for multiple sites and data collected on multiple site visits to describe the local environment and to determine the effects of the proposed mine extension. In broad terms the proposed mine extension will cause the loss of some headwater streams that will be covered by the waste rock stack or incorporated into the mine pit. The waste rock stack is also expected to leach sulphides and nitrates into the water courses around the mine with potential effects on the instream flora and fauna.

Mine area

The proposed new mining activity will occur in the Deepdell Stream catchment alongside existing mine developments. Deepdell Stream and its tributaries are habitat for a threatened fish², the Taieri flathead galaxias and also for the at risk koura³, the freshwater crayfish. Two major tributaries of Deepdell Stream, Highlay Creek and Camp Creek are within the project footprint and Deepdell Creek itself will receive runoff water from the mine area via these tributaries. This assessment notes the stream courses to be lost in the Highlay Creek subcatchment are small headwater streams that are generally ephemeral or intermittent in nature. It is estimated 350 m of ephemeral and intermittent stream in the Highlay Creek subcatchment will be lost. These stream reaches have been impacted by farming activities and previous mine activity and the habitat quality has been degraded. These reaches of stream do not support populations of the threatened fish or koura.

Camp Creek has a highly modified tributary running alongside the haul road that will remain unaltered. A second tributary with ephemeral head waters that flow to a small pond and then flows into a cut-off drain to the modified stream will be subject to the most habitat loss. The report

¹ Ryders Environmental (2019) OceanaGold (New Zealand) LTD Deepdell North Stage III Project Aquatic ecology assessment.

² Nicholas R. Dunn, Richard M. Allibone, Gerard P. Closs, Shannan K. Crow, Bruno O. David, Jane M. Goodman, Marc Griffiths, Daniel C. Jack, Nicholas Ling, Jonathan M. Waters and Jeremy R. Rolfe. Conservation status of New Zealand freshwater fishes. *New Zealand Threat Classification Series 24. Department of Conservation, Wellington* 11 p.

³ N. Grainger, J. Harding, T. Drinan, K. Collier, B. Smith, R. Death, T. Makan and J. Rolfe (2018) Conservation status of New Zealand freshwater invertebrates, 2018. *New Zealand Threat Classification Series 28. Department of Conservation, Wellington* 25 p.

estimates 450 m of ephemeral water courses and 100 m of the cut-off drain will be lost in the Camp Creek subcatchment. The pond and the remaining cut-off drain will be converted into a diversion water course for dirty water that will be directed to an existing silt pond.

In total the mine extension will lead to an estimated loss of 800 m of ephemeral and intermittent water courses and the loss of 100 m of low quality permanent water course. The diversion of the cut-off drain will also change the flow path of a small volume of water in the Camp Creek subcatchment and reduce the habitat quality in this water course

Assessment of Effects

The aquatic ecological report provides a description of the existing aquatic environment at the mine area. This report shows that two streams areas directly affected by the mine development, Highlay Creek and Camp Creek are impacted by the existing mining activity and more widely by the farming activities in these catchments. Streams are generally accessible to stock and grazing occurs along the stream with some associated stock damage to the streams. The habitat and macroinvertebrate communities are impacted but not to a high degree by the farming activity. The threatened fish, the Taieri flathead galaxias is absent from the stream reaches to be lost in the mine development, as they occur in the permanently flowing reaches downstream of the development. Koura are also present in some of the stream reaches to be lost. Therefore, there is little or no direct impact on the populations of threatened fish but some impacts on koura populations.

There will be water quality changes with an expected increase in sulphates and nitrates in the downstream water course that will affect streams downstream of the mine and waste rock stack in Highlay Creek, Camp Creek and Deepdell Stream. The Ryder Environmental (2019) assessment notes that OceanaGold⁴ conducted toxicity tests for the effects on sulphates on the Taieri flathead galaxias and found no effects at the concentrations expected in the Highlay and Deepdell Creek catchments. However, the assessment of effects in the consent application relies on the modelled increases in sulphate levels provided in the GHD water quality analysis⁵. The assessment of effects also assesses the effect of the expected increase in nitrate concentration in the Deepdell catchment. The nitrate levels are expected to remain within the NPS-FW band B which is the 95% species protection level, that has occasional impacts on the 5% of most sensitive species. Given the impacted nature of the Deepdell catchment as a result of the farming and mining activity it can be expected that sensitive invertebrates may have already been lost and this mining proposal while having a cumulative effect will be limited on the impact on the present fauna.

It is expected that the nitrate level will not meet the Schedule 15 requirements in the Otago Regional Plan.

Mitigation

The assessment by Ryder Environmental (2019) provides some mitigation suggestions for the loss of koura habitat. The main proposed mitigation is constructing a clean water cut-off drain that could support koura and attempting to make a silt retention pond into koura habitat. The first of these mitigation options will struggle to provide flowing water and this means the habitat created is far from ideal. Similarly, the use of a sediment retention pond is unlikely to provide good koura habitat as the settling sediment and poor water quality are not ideal for koura habitat.

No mitigation is being offered for native fish as none are expected to lose habitat when the mine is constructed. However, there is a cumulative loss of small stream habitat around the whole mine area and the loss of these small headwaters will be affecting the occupants of these ephemeral

⁴ OceanaGold (NZ) Ltd. 2018. Assessment of the potential impact of waste rock stack leachate on the early life cycle stages of the Taieri flathead galaxias (*Galaxias depressiceps*).

⁵ GHD. 2019 Deepdell North Stage III Project Receiving Water Quality Analysis. Prepared by GHD for Ocean Gold New Zealand Limited.

streams. It would be informative to assess the cumulative loss of habitat since the mine was started and compare this to the mitigation already undertaken to offset habitat loss.

Water quality impacts are to be mitigated via water releases from the to be constructed Camp Creek dam. The effectiveness of this mitigation will require monitoring. It is also proposed that dam flushing flows can be used to manage algal and macrophyte build up in Deepdell Creek if the increase in nitrates promotes excessive plant and algal growth. For this to be workable some triggers levels for algae and macrophytes need to be set in the consent conditions and these monitored for. In addition, the dam must be designed to release flows of sufficient size to scour algal and macrophytes and have the water storage capacity to do this through the summer. I would recommend that applicant check what the feasibility of providing flushing flows is.

Ryder Environmental (2019) recommend that regular monitoring of the fish and invertebrate populations in Deepdell Creek and Highlay Creek should continue and nitrate and phosphorus monitoring in Deepdell Creek and commence this in Highlay Creek. These recommendations are supported and in addition sulphate monitoring should be conducted in Highlay and Deepdell Creek to confirm the predicted water quality effects are not being exceeded. The frequency of the existing monitoring of flora and faun and the water quality sampling regime have not been reported and the frequency of sampling especially for water quality parameters needs to be determined. This will require further discussion with the applicant to understand the current sampling and to agree on possible future sampling regimes.

Conclusion

The assessment of aquatic effects provides a good assessment of the likely effects of the mine proposal. The impacts of stream loss are on limited, but the cumulative effect has not been assessed. The threatened fish in the Deepdell Creek catchment will not lose habitat and water quality effects are also not expected. Habitat loss for koura will occur and the effectiveness of the proposed mitigation is uncertain and will require monitoring to show it is effective. Similarly, the increases in sulphate and nitrates are not expected to cause significant impacts aside from the potential increase in algal and plant growth. With a good monitoring framework and confirmation the proposed Camp Creek dam can flush nuisance growths the effects can be managed.

If these issues can be address via consent conditions, I would recommend the consents are granted.

If you have queries regarding this assessment please contact Richard Allibone by phone 03-4544849, 021 904950 or by email at waterwayscon@gmail.com.

Regards



Richard Allibone