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Reference: MDL 000778

1 April 2020

Ms Elyse Neville (ORC consents department)
Otago Regional Council

Via email: Elyse.Neville@orc.govt.nz

Dear Elyse

RE: Oceana Gold (NZ) Ltd - Deepdell North Stage III – Request for further information - Section 92(1)

Thank you for your request for further information regarding Otago Regional Council consent application number RM20.024 and for your patience while this request was collated.

Please find the relevant responses below.

A. Air Quality

Otago Regional Council has raised a number of air quality matters which are additional to and/or similar to the matters addressed in the air quality assessment report (Beca 2019) lodged with the application. OceanaGold is continuing to utilise the services of Beca to provide further assessment / clarification of the specific air quality matters raised within the Otago Regional Council section 92 letter. This subsequent assessment report (Beca 2020) is attached to this letter as **Appendix A** and should be considered alongside Beca (2019) which was lodged with the resource consent application as Appendix L.

Question 1.

The AEE includes a brief discussion of Respirable Crystalline Silica (RCS) and PM_{10}/$PM_{2.5}$ monitoring undertaken in relation to existing mining activities in 1998- 2000 but, does not provide any specific details. It is noted that considerable advancements have occurred in the state of knowledge regarding the potential effects of RCS over the past 20 years. Please provide further detail in respect of this matter, with reference to:

(a) measured RCS;
(b) PM10 concentrations;
(c) the separation distance between the monitors and mining activities;
(d) current accepted guidelines; and
(e) the proximity of sensitive receptors to the proposed Deepdell activities.

Beca (2020) provides further discussion on these matters as requested by ORC. Please refer to attached **Appendix A** for a detailed response to this question.

Question 2.

Assess the dust effects associated with construction activities, notably construction of the large bund on the eastern side of the haul road that is indicated in the plans. In this assessment consider methods proposed to control potential effects on the Howard residence and property during the construction period.

The likely dust effects of the proposal were assessed in the air discharge assessment report attached to the resource consent application as Appendix L (Beca, 2019). Attached to this letter, Beca (2020) provides further assessment on the likely dust from construction/mining activities and effects on potentially sensitive receptors (including private residential dwellings).

The proposal is to use dust mitigation methodologies that are consistent with existing mining activities at Macraes Gold Operations. These methodologies include a site-wide Dust Management Plan and associated measures and result in very little dust generation.

Further, the wind direction that would transport dust from the proposal area to the nearest residence (the Howards) has a very low frequency. The proposal presents a low risk of causing offensive or objectionable dust effects at this adjacent residence.

Question 3.

Having specific regard to the location of the Howard residence, assess the merit of employing continuous particulate monitoring methods during the 2-year period of proposed activity at Deepdell. Monitoring should be located between the proposal and the Howard residence and provide 1-hour and 24-hour suspended particulate concentration data with reference to trigger levels that could be used to instigate additional dust control conditions as required.

As outlined in Beca (2019) and Beca (2020), the extensive mitigation measures/methodologies being carried out at the site and continuing for this proposal would prevent dust from being generated in any more than minimal amounts. Further, low frequencies of winds in the direction of the nearest residential dwelling (Howards) would provide little opportunity for transport of dust from the proposal. As such, continuous particulate monitoring between the activity and the Howards residence is unnecessary and will not provide any useful information.

Question 4.

Propose specific consent conditions for the proposed discharge to air permit. In this refer to the specific dust gauges of relevance (DG07 and DG15), the suspended particulate monitoring, reporting proposed and appropriate trigger levels with response actions. When proposing conditions include any changes that may be proposed as a result of questions 1-3 of this letter.

Recommendations for conditions are provided within Beca (2020). These recommendations are:

- Monitoring sites (dust gauges) DG07, DG17 and DG24 remain relevant to this proposal and are used for monitoring dust. Monitoring site DG24 is a control.

- It is recommended that existing consented limits at the above monitoring sites are appropriate and can be adopted for this proposal. The existing consented limits are:

  > *Insoluble dust deposition rates at sites DG17 and DG07 must not exceed 3 grams per square metre per 30 days (g/m^2/30 days) of insoluble dust above background more than twice in any calendar year.*

- Monitoring site DG15 is located at the Macraes Village and is unlikely to be affected by the Deepdell North Stage III proposal.

The recommendations provided by Beca (2020) align with the existing proposed conditions 1-12 for the air discharge permit (1.8) within the resource consent application (within Appendix S – proposed consent conditions).

B. Deepdell East Waste Rock Stack (WRS) Design

Otago Regional Council has requested information/clarification relating to the WRS design. Additional information has been provided by Engineering Geology Limited (EGL, 2020) which is attached as **Appendix B** to this letter. The information contained in EGL (2020) provides the basis for the following information regarding WRS geotechnical matters. **Appendix B** also contains an updated version of the Deepdell East Waste Rock Stack Design Report (EGL, 2020a). This is intended to replace the Deepdell East Waste Rock Stack Design Report attached to the resource consent application as Appendix J. The amended report includes the following updates:

1. Minor update to text in Section 1 Introduction regarding clarification of the original WRS design volumes and levels.
2. Update of Table 5.1 to clarify the range of unfavourable foliation dips run in the analyses for the original report.

Question 5.

From the volumes discussed in Section 1.0, it appears that the volume of waste rock will exceed that of the proposed waste rock stack (WRS). Clarity that other appropriate locations have been or will be identified for disposal of the balance of waste rock, and that appropriate consents are in place or will be applied for.

The WRS design has capacity to store all scheduled waste rock from the project and has some spare volume for contingencies. As such, no other waste rock storage locations are considered necessary. It is appropriate to apply for a larger amount of storage than what is required in order to accommodate substandard ore being encountered while mining or any potential need to store additional material for other unforeseen circumstances.

The proposal is forecast to produce approximately 53.3Mt (*mass*) of waste rock. The consent application is for a WRS design height up to 580mRL. While the waste rock mass in the pit is estimated with some accuracy and is not likely to vary, the *volume* of the waste rock deposited in the WRS can vary slightly due to potential variation of the *density* of the waste rock after it is deposited in the WRS.

The accepted average density of WRS at the Macraes Gold Operations site is 2.1t/m^3. Using an average density of 2.1t/m^3, the scheduled WRS volume is equal to 25.4Mm^3 and the resulting crest elevation for that volume is 556mRL.

The 580mRL design which is applied for under this consent has a volume of approximately 27.2Mm^3 at a density 2.1t/m^3. The volume capacity of the WRS at a crest height of 580mRL that has been applied for as part of this consent therefore exceeds the forecast volume of waste rock from the proposed mining operations by approximately 1.8Mm^3.

Question 6.

Confirm that the large tension cracks observed in the Deepdell South Pit eastern wall have been appropriately considered in the slope stability analyses. It may be appropriate to undertake a sensitivity analysis considering a significantly reduced cohesion value for the schist.

It is confirmed that the tension cracks have been considered in the slope stability analyses. As outlined in the attached letter (EGL 2020), the cracks have been appropriately considered and will be buttressed by the placement of waste rock within the existing pit. The cracks do not affect the ultimate stability of the WRS.

Question 7.

Clarify when and how the design requirement for shear keys will be reviewed. Comment on whether additional test pits be carried out in the vicinity of the potential shear key prior to construction of the WRS.

As outlined in the attached letter (EGL, 2020), sufficient test pits have been carried out in order to outline the expected soil profile depth to rock. Most areas test-pitted indicate that the soil depth to rock is less than 1m. The north eastern extent of the WRS (test pit 4) is an exception, where loess soil is known to exist to a depth of approximately 4m. Excavation to rock for adequate shear keys will be supervised by OceanaGold staff and no further test pits are planned. A review of the design requirement for shear keys is also not considered necessary, however in the event that the conditions upon excavation differ significantly from conditions encountered in the test pits then such a review will be undertaken.

Question 8.

We note that mapped dips are not always in the downslope direction, however, there is variability in both dip and downslope directions across the WRS footprint. Please provide justification for the use of a downslope dip of 15 degrees at Section B-B' (20 degree dip mapped nearby), 10 degrees at Section C-C' (25 degrees mapped nearby) and 0 degrees at Section D-D' (25 degrees mapped nearby). Alternatively, sensitivity analyses could be undertaken to assess the effect of more unfavourable dip/slope combinations which may exist.

The attached letter (EGL, 2020) contains an explanation of how the varying foliation dip angles were taken into account within EGL (2019), which formed part of the resource consent application as Appendix J. This also contains justifications for doing so.

C. Geotechnical Review for Deepdell Stage 3 Pit

Otago Regional Council has requested information/clarification relating to the pit design. OceanaGold has provided a response outlined in the Pells Sullivan Meynink letter (PSM, 2020) attached as **Appendix C** to this letter. The information contained in PSM (2020) provides the basis for the following answers.

Question 9.

The Mohr-Coulomb strength parameters for intact schist are significantly different from those used for assessing stability of the waste rock stack and Deepdell South backfill. Please provide some further discussion on the development of the adopted parameters and/or demonstrate that the stability objectives can be achieved with lower strength parameters.

Attached PSM (2020) provides this discussion in detail and demonstrates why the strength parameters used are suitable.

Question 10.

(a) Comment on whether the potential for block failure (such as planar sliding, wedge failure, and toppling) under seismic conditions been considered.

The Otago Regional Council request asks whether failure of the pit wall has been considered. This information has already been provided within the geotechnical assessment provided as part of the request for further information from Waitaki District Council and is included with this letter as PSM (2020a) and is attached to this letter within **Appendix C**.

As stated within the PSM (2019) report attached to the resource consent application within Appendix J, the risk of a wave being generated in the pit lake and overtopping the pit walls with 2.4m of freeboard is negligible. The 35m pit freeboard as a result of the water levels in this proposal will result in effectively zero chance of any slope-failure-generated wave over topping the pit walls. This risk is further lessened by the pit wall design being stable under both static conditions and seismic events modelled up to a 2,500-year return period and as such, presenting a low risk of collapse.

D. Mining air blast and vibration assessment

The Otago Regional Council engaged an external consultant to peer review the vibration and air blast assessment report (TechNick, 2019) lodged as part of the resource consent application within Appendix G and requested further information from OceanaGold based on that peer review. During a phone conversation on 27th February 2020, this was explained by Otago Regional Council as being required for an assessment of natural hazards effects of the proposal. While the relationship between vibration/air blasts effects and potential natural hazards effects has not been made apparent by Otago Regional Council, answers to the questions in the request for information, have been provided by the author of the vibration and air blast report and these answers are provided in detail within the attached letter (TechNick, 2020) as **Appendix D**.

Question 11.

This report refers to a previous report. Confirm that the previous report referenced is the document titled "Technical Report, January 2018b, Mining Vibration Assessment – Deepdell North Stage III Project, Macraes New Zealand, dated 30 January 2018", and that the mining vibration assessment part of this January 2018 report is still valid for the Deepdell North Stage III project.

TechNick (2020) attached provides a detailed answer to this request for clarification

Question 12.

Subject to comment 11 above, the vibration formula constant and exponent referenced in the above January 2018 report are the same as that used for the Coronation Pit assessment. Comment on whether any monitoring been undertaken for the Coronation Pit project which can be used to verify these parameters.

TechNick (2020) attached provides a detailed answer to this request for comment.

Question*13.*

Subject to comment 11 above, the historical vibration readings from Deepdell North (referenced in the above January 2018 report) are reported in terms of RPPV (mm/s). Clarify this parameter, i.e. is this raw peak particle velocity, or a root mean square (RMS) value.

TechNick (2020) attached provides a detailed answer to this request for clarification.

Question 14.

AS2187.2 – 2006 J7.3 states that "...ground vibration levels can vary from two- fifths to four times that estimated." Confirm whether the adopted K factor suitably accounts for this variability, or if the assessment accounts for this variability in another way.

TechNick (2020) attached provides a detailed answer to this request for clarification.

Question 15.

Clarify how the airblast levels presented in the table in Section 4 of the report have been calculated. The formula and overpressure (kPa) levels presented appear to correspond to higher airblast levels.

TechNick (2020) attached provides a detailed answer to this request for clarification.

E. Surface water

The Otago Regional Council engaged an external consultant to peer review the water assessment report assessment report (GHD, 2019) lodged as part of the resource consent application within

Appendix E and requested further information from OceanaGold based on that peer review. Further information and answers to the request for further information are provided in detail within the attached letter (GHD, 2020) as **Appendix E** as well as within the attached letter (Ryder, 2020) **Appendix F**.

Question 16.

Model hydrological calibration:

(a) Provide a presentation of the 6.5 year hydrological calibration period (graphically)

(b) Provide analysis and tabulation of model performance by comparing simulated flows to observed based on Moriasi et al. 2007, using hydrological parameters NSE and PBIAS.

(c) Provide a presentation of any calibration data for runoff or water levels within the existing mine site, to assess suitability of the water balance model for simulating disturbed site flows (and subsequently, predicting water quality loads).

GHD (2020) attached provides a detailed answer to these requests.

Question 17.

Water quality modelling:

(a) Provide context on why the normal distribution was utilised versus a DWC/EMC approach, and how the 20% standard deviation applied to these distributions captures the range of observed concentrations from monitoring data.

(b) Describe how the Deepdell Creek and wider Shag River catchments outside of the mining domain were simulated for water quality. This may include describing any landuse mapping that was undertaken, or if 'natural' water quality modelling parameters were applied to any landuse outside of the mining footprint.

(c) Describe (and present) how the baseline water quality model was calibrated for Deepdell Creek and Shag River based on the current state (including current mining operations) in order for scenarios of the Deepdell North Stage III project to be assessed.

GHD (2020) attached provides a detailed answer to these requests.

Question18.

Provide all of the available nutrient data for Deepdell Creek and Shag River, and a detailed assessment of what suitable nutrient guidelines would be to control periphyton growth. As the Ecological Effects Assessment states that dual nutrient management will be considered, standards should be provided for both dissolved inorganic nitrogen and dissolved reactive phosphorus.

Ryder (2020) attached as **Appendix F** provides this information in detail as well as the requested standards.

Question19.

Provide a breakdown of the total length of reclamation undertaken by Oceana Gold in the Deepdell Creek catchment to date. This is to understand the potential for cumulative effects.

This question is addressed within Ryder (2020), within the answers to questions 23 and 26. See also Appendix D within Ryder (2020) which contains a Deepdell Creek disturbance map for the Macraes Goldmine Area.

Question 20.

Provide the likely contaminant concentrations in both Highlay Creek and its Western Tributary (location shown in appendix 1) and proposed water quality standards for these creeks that can be applied in consent conditions. For nutrients, these standards should be set to control plant growth rather than toxicity.

Both GHD (2020) and Ryder (2020) attached provide a detailed answer to these requests. Please also refer to the updated proposed discharge monitoring schedule attached to this letter as **Appendix G.** This proposed monitoring schedule attached is intended to supersede that which was part of the consent application. Further, please note that the monitoring schedule proposes monitoring for a wide range of nitrogen parameters, but it is intended that water quality limits for nitrogen will be set through nitrate limits (as opposed to DIN) within the Water Quality Management Plan. Setting water quality limits through a nitrate parameter will align with existing monitoring at site and recognises that the majority of nitrogen discharges from the site are in the form of nitrate.

Question 21.

Provide an assessment of the effects of culverting the "Highlay Tributary" (location shown in appendix 1), particularly around construction effects.

Ryder (2020) provides a detailed answer to this request.

Question 22.

Provide an assessment of the effects of the expected increase in nitrate concentration (see Figures 10, 11, 17 and 18 of Appendix E in the application) on periphyton growth in Deepdell Creek and Shag River based on existing water quality and ecological data. The Ecological Effects Assessment does not do this to an appropriate standard.

Both GHD (2020) and Ryder (2020) provide a detailed answer to this request.

F. Freshwater Ecology

The Otago Regional Council engaged an external consultant to peer review the Aquatic Ecology assessment report (Ryder, 2019) lodged as part of the resource consent application within Appendix E and requested further information from OceanaGold based on that peer review. Further information and answers to the request for further information are provided in detail within the within the attached letter (Ryder, 2020) **Appendix F**.

Question 23.

Provide an assessment of the cumulative loss of habitat since the mine was started and compare this to the mitigation already undertaken to offset habitat loss.

Ryder (2020) provides a detailed answer to this request.

Question 24.

Water quality impacts are to be mitigated via water releases from the to be constructed Camp Creek dam.

- ***Provide detail regarding how the effectiveness of this mitigation will be monitored.***
- ***The dam must be designed to release flows of sufficient size to scour algal and macrophytes, and have the water capacity to do this through the summer. Provide an assessment that addresses these issues and investigates the overall feasibility of the dam to be able to provide flushing flows.***
- ***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. Provide the proposed trigger levels for algae and macrophyte growth that will result in flushing to be required, and how these levels are to be monitored.***

Ryder (2020) provides a detailed answer to the above requests. Please note that an amended proposed monitoring schedule is also attached as **Appendix G.**

Question 25.

Provide details of the frequency of the existing monitoring of flora and fauna and the water quality sampling regime are required.

Ryder (2020) provides a detailed answer to this request.

Question 26.

Provide an assessment of the cumulative effects of stream loss.

Ryder (2020) provides a detailed answer to this request.

I trust that this information satisfies your request for further information. If you would like to clarify or confirm any issues above, please let me know.

I look forward to confirmation that the section 92(1) request has been met or if you require any further clarification of specific information above to do so.

Yours sincerely,

Phil Petersen
Mitchell Daysh Ltd phil.petersen@mitchelldaysh.co.nz

Appendices attached to this letter:

A. Air Quality Letter
B. WRS Geotechnical Assessments
C. Pit Geotechnical Letter
D. Airblast and Vibration Letter
E. Water Quality Letter
F. Aquatic Ecology Letter
G. Updated discharge monitoring schedule