

BRIEF OF EVIDENCE OF PETER ROBERT COCHRANE

Qualifications and Experience

- 1 My full name is Peter Robert Cochrane.
- 2 I hold a bachelor's degree and a master's degree (first class Honours) in Earth Sciences from the University of Waikato.
- 3 I have over 30 years' experience in resource management science in central and local government, and in private practice. I have been with Tonkin & Taylor Ltd since 1996 where I am currently a Principal and Project Director. I currently hold the role of Manager of Water Engineering.
- 4 I have extensive expertise in groundwater management and the effects of mining proposals on groundwater and surface water resources. My experience in this field includes:
 - a) **Golden Cross Mine Hauraki** – Review of groundwater monitoring programme for Waikato Regional Council. This involved a comprehensive review of a groundwater monitoring plan to monitor the effects of the development and operation of the Golden Cross mine on groundwater levels and ground and surface water quality.
 - b) **Solid Energy Huntly** – Review of groundwater consents for dewatering of abandoned flooded underground coal mines, coal measures, and Tertiary rock formation as a part of Solid Energy's Awaroa opencast programme for Waikato Regional Council.
 - c) **Solid Energy Huntly** – Preparation of a dewatering plan for Solid Energy to enable development of the Awaroa No 4 Project. This included the development of a detailed six-year programme to dewater the former Rotowaro 1, 3, 5 and 6 mines and Callaghan's and Mahon's mines to enable opencast mining, and assessment of dewatering surface water resources.
 - d) **GlenCoal Ltd Coal Mine Mangatawhiri** – Review of an application to develop a new opencast coal mine at Mangatawhiri for Waikato Regional Council. This included an evaluation of the effects of mining on ground and surface water resources including effects of dewatering on the hydrology of the Kopeura Stream.
 - e) **Puke Coal Ltd Huntly** – Assessment of the effects of developing a former opencast coal mine to a landfill, including the effects of engineering works on groundwater levels in natural ground and abandoned underground workings of the former Glen Afton Mine, prediction of likely breakout of groundwater at mine adits, and assessment of the effects of landfilling on groundwater and surface water quality.

- f) **Oceana Gold NZ Ltd Macraes Mine** – I have provided a technical review role to ORC on several recent projects at the site, including the Coronation North Mine expansion and Frasers Pit West applications.
- g) I have acted as peer reviewer many times and have previously provided expert opinion on matters related to groundwater hydrology and surface water quality.

Code of Conduct

- 5 I have read the Code of Conduct for expert witnesses contained in the 2014 Environment Court Practice Note and that I agree to comply with it. I have considered all the material facts that I am aware of that might alter or detract from the opinions I express. In particular, unless I state otherwise, this evidence is within my sphere of expertise and I have not intentionally omitted to consider material facts known to me that might alter or detract from the Opinions I Express.

Oceana Gold Ltd

- 6 On instruction from ORC I have reviewed the hydrogeological aspects of an application by Oceana Gold NZ Ltd for Deepdell North Stage III, and prepared a report entitled: Review of groundwater aspects of Deepdell North Stage III, dated 26 February 2020.
- 7 I produce a copy of my report attached and marked **PRC1** and am happy to answer any questions you may have.

Signature:  Date: 15 July 2020
Peter Robert Cochrane

Attachment PRC1:
Review of groundwater aspects of Deepdell North Stage III, dated 26 February 2020.

Otago Regional Council
70 Stafford Street
Dunedin

Attention: Elyse Neville

Dear Elyse

Review of groundwater aspects of Deepdell North Stage III

Introduction

This letter summarises our review of the groundwater assessment report submitted to Otago Regional Council (ORC) in support of a consent application by Oceana Gold New Zealand Ltd for the Deepdell North Stage III Project. The purpose of our review is to assist ORC with assessment of this aspect of the resource consent application.

This work has been carried out in accordance with our letter of engagement of 3 February 2020.

Scope

Our assessment has primarily involved a review the report titled *Oceana Gold (New Zealand) Ltd (OGNZL) Deepdell North Stage III Project Groundwater Assessment*, prepared by GHD dated January 2020.

We have also reviewed pertinent sections of the following reports, as they relate to matters raised in the GHD Groundwater Assessment report:

- *Oceana Gold New Zealand Ltd Deepdell North Stage III Project Aquatic Ecology Assessment*, prepared by Ryder Environmental Ltd dated November 2019.
- *Oceana Gold New Zealand Ltd Deepdell North Stage III Receiving water quality analysis*, prepared by GHD dated November 2019.

The technical scope of the review has focused on the effects of the Deepdell North Stage III Project on groundwater levels, flows and groundwater quality in the vicinity of the project, and its consequent effects on flow and water quality in Deepdell Creek.

The review has focused on the validity and robustness of the inputs and assumptions, and the validity of the conclusions drawn from the assessment provided in the reports referenced above. It does not extend to a full peer review or detailed assessment of the report itself, and our services do not constitute a means by which principal design responsibility can be passed on to T+T.

Assessment

The Groundwater Assessment Report identified and addressed three main issues:

- 1 Effects on groundwater levels;
- 2 Effects on surface water flows; and,
- 3 Effects on groundwater quality.

Effects on groundwater levels

The Groundwater Assessment Report concluded that the effects on groundwater levels would be constrained to within the boundaries of land owned by OGNZL, and as there are no other identified groundwater users in the area¹, no other groundwater users are expected to be impacted by dewatering activities. We agree with this conclusion.

The report recommends ongoing monitoring of groundwater levels in monitoring bores DDB01 to DDB06, which we support.

The effect of dewatering on springs which provide a source of stock water has previously been raised as a concern by adjacent property owners (Kinney property), via the submissions process, on another Macraes project (Coronation North). In this instance, we understand that the consent application has not been notified and therefore no submissions have been received. This assessment could be revisited in the event that submissions relating to stock water or other matters are raised in the future.

Effects on surface water flow in Deepdell Creek

The Groundwater Assessment Report concluded that although the proposed dewatering is not expected to directly impact groundwater levels near Deepdell Creek, it may reduce groundwater discharge to Deepdell Creek, particularly following the completion of mining.

The Groundwater Assessment Report however did not quantify this potential adverse effect, but concluded that this effect would be minor.

The Receiving Water Quality Analysis report (Section 2.2.1) states that Deepdell Creek is characterised by extended periods of low flow, particularly through summer and with some occasions of no visible or measurable surface flow. This report goes on to quantify an annual 7 day low flow at 4L/s.

Section 5.1.1 of the Aquatic Ecology Assessment report concludes that provided low flows are not further reduced by the Project, it is unlikely that fish and crayfish populations in Deepdell Creek and downstream would be adversely affected.

Based on the conclusions reached in the reports reviewed, it is possible that the Project would result in a reduction in low flow in Deepdell Creek (particularly following mine closure) to the extent that this could adversely impact on the ecology of Deepdell Creek.

However both the Receiving Water Quality Analysis report and Aquatic Ecology Assessment report note that Oceania has proposed to augment flow by up to 10 L/s in Deepdell Creek via the Camp Creek Dam. While this is primarily to mitigate potentially high sulphate concentrations in Deepdell Creek and Shag River, the implementation of this proposal will be sufficient to address any adverse effect on low flow in Deepdell Creek as a result of the Deepdell North Stage III proposal.

The AEE identifies the construction and use of the Camp Creek Dam as mitigation for potential water quality effects on Deepdell Creek and the Shag River. We support this as a mitigation measure and would expect a consent condition(s) requiring this mitigation measure to address potential adverse effects of the Deepdell Stage III Project on both the hydrology and water quality of Deepdell Creek.

¹ As recorded in the ORC bore consent database.

Effects on groundwater quality

The project has the potential to impact groundwater quality through the infiltration of seepage from the waste rock stacks into groundwater and through discharge from the pit lake. The Groundwater Assessment Report concluded that the potential adverse effects on groundwater quality is expected to be less than minor. We agree with that conclusion.

Applicability

This letter has been prepared for our client Otago Regional Council with respect to the particular brief given to us. It may not be relied upon in other contexts or for any other purpose, or by any other person, without our prior written agreement.

Please feel free to contact Peter Cochrane should you have any questions.

Yours sincerely



Tim Morris
Project Director

26-Feb-20
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