Before a joint hearing of the

Dunedin City Council	**LUC-2016-230 and LUC-2013-225/A**
Otago Regional Council	**RM16.138**
Waitaki District Council	**201.2016.779 and 201.2013.360-1**

Under	the Resource Management Act 1991
In the matter of	applications by Oceana Gold (New Zealand) Limited for resource consents for the Coronation North Project

Statement of evidence of Michael Thorsen for Oceana Gold (New Zealand) Limited

14 October 2016

Applicant's solicitors:
Anderson Lloyd
Stephen Christensen | Pip Walker
Level 10, Otago House, 481 Moray Place, Dunedin 9016
Private Bag 1959, Dunedin 9054
DX Box YX10107 Dunedin
p + 64 3 477 3973 | f + 64 3 477 3184
stephen.christensen@al.nz | pip.walker@al.nz

anderson lloyd.

Qualifications and experience

1 My name is Michael James Thorsen.

2 I am Director and Principal Ecologist with ERA Ecology NZ Ltd.

3 I have been working professionally in the biodiversity management field since 1990 for a number of organisations including the Department of Conservation (17 years), Mauritian Wildlife Foundation, United States Fish and Wildlife Service, St Helena National Trust, Landcare Research, Birdlife International, and as a freelance ecologist on a wide variety of flora and fauna restoration and protection projects throughout New Zealand, in Hawaii, Mauritius, Seychelles, Marquesas, St Helena and Kiribati. I have a PhD in Ecology from The University of Otago.

4 I have been providing support on biodiversity issues to Oceana Gold (New Zealand) Limited (**OceanaGold**) at Macraes Mine since 2013. I am familiar with the area of the Macraes Mine and the general surrounds, having worked on vegetation and reptile studies in nearby areas for the Department of Conservation since 2005.

5 Although this is a Council hearing, I have read the Expert Witness Code of Conduct set out in the Environment Court's Practice Note 2014. I have complied with the Code of Conduct in preparing this evidence. Except where I state that I am relying on the evidence of another person, this written evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in this evidence.

Background

6 I provided OceanaGold with ecology advice after the 2013 Coronation Project had been consented. I was involved in formulating the Ecological Management Plan (**EMP**) that OceanaGold operates for Coronation and have worked on monitoring ecological mitigation that has been undertaken.

7 I have been involved in the following terrestrial ecology work for the Coronation North Project:

(a) In April 2016 providing an ecological impact assessment of effects associated with the Coronation North Project on vegetation, avifauna and herpetofauna, which was included in Appendix 6A of the Assessment of Environmental Effects (**AEE**) submitted in support of the resource consent applications;

(b) In April 2016 providing an ecological impact assessment of effects associated with the proposed Coal Creek Dam, which was included in Appendix 7 of the AEE;

(c) In May 2016 providing a report clarifying the ecological impact assessments for Coronation North and Coal Creek Dam after OceanaGold decided upon a revised (reduced) project footprint, which was included in Appendix 6B of the AEE;

(d) In May 2016 providing a report regarding impact management of the Project's ecological effects, which was included in Appendix 22 of the AEE;

(e) In responding to requests for further information from Waitaki District Council (**WDC**) and Dunedin City Council (**DCC**); and

(f) Throughout the project, providing OceanaGold with advice and support on biodiversity issues, including as the company has formulated a suitable mitigation response to submitters and worked toward obtaining other authorities it needs for the Coronation North Project, like a Wildlife Act authority.

8 In preparing this evidence I have reviewed:

(a) Existing resource consents for OceanaGold's Coronation Project including WDC land use consent 201.2013.360 and DCC land use consent LUC-2013-225 (the Coronation consent conditions);

(b) The AEE lodged as part of the application for the Coronation North Project including reports of other experts relevant to my area of expertise;

(c) The planning requirements relevant to my area of expertise in the Waitaki District Plan, Dunedin City District Plan and DCC's second Generation District Plan (**2GP**), and the Otago Regional Council (**ORC**) Regional Policy Statement (**RPS**) and Proposed Otago Regional Policy Statement (**PORPS**);

(d) The Kai Tahu ki Otago Natural Resource Management Plan 2005;

(e) The report by CJ Bibby :'Macraes Ecological District Survey Report for the Protected Natural Areas Programme' which forms the basis for the Department of Conservation's Recommended Area for Protection (**RAP**) over Trimbells Gully;

(f) Submissions relevant to my area of expertise;

(g) The WDC/DCC Recommending Report; and

(h) The statements of evidence of other experts giving evidence relevant to my area of expertise.

Scope of evidence

9 I have been asked by OceanaGold to prepare evidence on terrestrial ecology for the Coronation North project. In my evidence I:

(a) Summarise the vegetation and terrestrial fauna surveys carried out;

(b) Summarise the significant botanical and terrestrial fauna values in the Coronation North Project Impact Area (**PIA**);

(c) Summarise the ecological status of the area affected by the Coronation North Project;

(d) Assess the effects of the Coronation North Project on the values;

(e) Outline options for mitigating the effects, including an assessment of the usefulness of biodiversity offsetting in the Macraes context;

(f) Consider submissions raising issues relevant to my areas of expertise;

(g) Respond to the WDC/DCC Recommending Report;

(h) Provide comment on the relevant proposed consent conditions and the overall value of these draft conditions in addressing the ecological impact of the Coronation North Project; and

(i) Provide an overall conclusion.

10 My evidence is a summary of key points contained in the reports I provided in support of the Coronation North application. For full detail I refer the panel to those reports.

Surveys

11 In assessing the Coronation North project I reviewed all available literature on the natural history of the Macraes area and unpublished databases. I also assessed the PIA using expert walk-through surveys. Initially I surveyed a larger PIA area which, in May 2016, OceanaGold reduced in size.

12 I identified eleven vegetation communities within the revised Coronation North PIA (including the Coal Creek Freshwater Dam footprint). They are summarised in Table 1.

Vegetation type	**Area (ha) in project boundaries where vegetation loss is expected to be total**	**Area (ha) within wider PIA where some impact may occur on vegetation**	**Total area within PIA**
Basalt contact flush wetlands	0.2	3.7	3.9
Bluff	7.3	1.3	8.7
Cultivated	46.8	18.4	65.2
Ephemeral wetlands	0.2	1.2	1.5
Gully slope mosaic	24.6	60.9	85.5
Narrow-leaved tussock grasslands	163.4	53.1	216.5
Pine (disused)	2.9	5.7	8.6
Riparian herbfield & sedgeland	6.1	1.9	8.0
Seepage	0.1	0.1	0.2
Short tussock grassland	59.8	27.4	87.2
Shrubland	3.5	5.7	9.2
SUM EXOTIC VEGETATION	49.8	24.1	73.8
SUM NATURAL VEGETATION	265.2	155.4	420.6
TOTAL AREA	315.0	179.42	494.4

13 The information that was gathered during the inventory surveys was used to evaluate the ecological importance of the vegetation, birds and reptiles and their habitats, against criteria recommended in the Environment Institute of Australia and New Zealand's 2015 Ecological Impact Assessment Guidelines:

(a) Representativeness of communities;

(b) Distinctiveness of communities;

(c) Ecological functionality of communities (intactness, connectivity, buffering);

(d) Rarity of communities;

(e) Community diversity;

(f) Role in ecosystem servicing;

(g) Sites or communities of significance at:

(i) National (Threatened Land Environments, National Priorities for Conservation, Historically Rare or Threatened Ecosystems, Wetlands of National Importance, Ramsar Sites);

(ii) Regional (as identified in the Regional Plan); or

(iii) Local (as identified in District Plans) scales;

(h) Sites identified as worthy of protection;

(i) Presence of rare, At Risk or Threatened species;

(j) Presence of species of biogeographical interest; and

(k) Presence of genetically or morphologically distinct forms.

Ecological status of PIA

Botanical features

14 The PIA is representative of the general vegetation patterns in the area of the Macraes Ecological District (**ED**), although there is a gradient from west to east in this area with some species becoming less, or more, common. The vegetation of the Macraes ED is of a highly modified nature with a large amount of improved pastureland. The majority of the PIA is narrow-leaved tussock grassland and exotic pasture. The level of modification is evident in that the tussock land has been burnt numerous times in order to help exotic grasses establish and grow for pastoral purposes. Typical of this area, there is community patterning of narrow-leaved tussock grassland on broad topped spurs and slopes with short tussock grassland in drier and/or heavily grazed areas, the flatter and less rocky areas have been cultivated using ploughing, and interfingered shallowly to moderately incised drainage systems hosting gully wetlands and bluff vegetation.

15 The PIA has a very high botanical diversity with 175 indigenous species and 78 exotic species.

16 Overall the vegetation communities within the PIA are assessed as: of high representativeness, rarity and botanical diversity importance, having moderate integrity and role in providing a patchwork of natural ecological areas, having a moderate role in buffering the area for weed incursion and increased sedimentation, having a minor ecosystem support service role in protecting genetic diversity, having a minor role in reducing erosion and regulating flood

flows, having a negligible ecosystem cultural services role, and having a minor role in provisioning and providing irrigation water to downstream areas.

17 Within the Project area, and specifically within the DCC boundary, there are no areas of significant conservation value that are listed as significant in Schedule 25.4 of the operative DCC District Plan.

18 The Coronation North PIA does not contain any wetlands of National Importance or Ramsar sites. There are no wetlands identified by the ORC as Regionally Significant within the Coronation North Area.

Avifauna

19 Five indigenous species and six exotic species have been recorded in the PIA. Overall the ecological importance of the avifauna is classified as moderate to low.

Herpetofauna

20 Three reptile species have been recorded in the PIA (the McCann's skink *Oligosoma maccanni,* the southern grass skink *Oligosoma polychroma* and gecko *Woodworthia* "Otago large" - the latter two species are classified as 'At Risk - Declining'). The exotic whistling frog *Litoria ewingii* was recorded in the Coal Creek Dam area. The ecological importance of the lizard populations within the Coronation North Project area is categorised as moderate on the basis of; the presence of two At Risk species, the presence of genetically distinct lineages, the role they are likely to be playing in ecosystem function, and the low species diversity and abundance.

Invertebrates

21 A desktop review of invertebrate species indicates the PIA is likely to contain a diversity of invertebrate species.

Significant values in PIA

Botanical features

22 There are six Threatened plant species, 10 At Risk, one Data Deficient and six rare plant species within the Coronation North PIA. The silver tussock and hard tussock grasslands, basalt contact flush wetlands and long inundation ephemeral wetlands could be considered as vegetation communities that are rare in the Macraes E.D., mainly due to their limited extent and infrequent representation.

Effects on values

23 I outline the key points from my assessment because they are largely accepted

24 I consider the overall impact of the project on:

(a) Avifauna is moderate-low;

(b) Herpetofauna is moderate; and

(c) Botanical features is very high.

25 Here is where I differ from other experts:

(a) One of the significant plant species listed in the submission from the Director-General of DOC and Wildlands as occurring within the PIA is within the existing Coronation Project area, namely *Carex inopinata*;

(b) Further survey of the PIA for New Zealand falcon recommended by Wildlands is not warranted as the evidence is that this species uses the PIA rarely (if at all) and disagree that numerous bird species have probably not been detected;

(c) The proposed Otago Regional Policy Statement was used when assessing significance, contra Wildlands;

(d) There is disagreement with Wildlands on the level of project effects on some species; and

(e) I maintain that meaningful assessment of invertebrates at a site is difficult.

Mitigation options

26 Under my guidance OceanaGold has followed an appropriate approach to mitigation, using an implementation hierarchy of: avoid where possible, then remedy, minimise, offset, and finally undertake ecological compensation activities.

Avoid

27 Mining, by its very nature, makes it difficult to avoid an ecological feature where it overlays the targeted resource. For this reason, opportunities to avoid ecological features overlying the proposed extent of the Coronation North Pit were not possible. However, there were opportunities to avoid impacts arising from some mine activities. OceanaGold has chosen to reconfigure the footprint of the

Coronation North WRS margins to avoid some significant vegetation (and heritage features). I support this approach. Further, once the project is underway OceanaGold can also take steps to delineate any ecological features that fall within 20m of the proposed WRS margin and identify the tip-point to notify the relevant operator of the need to unload carefully.

Remedy

28 There is some opportunity to rehabilitate the WRS margin to provide habitat for lizards by depositing only larger aggregate and boulders in some areas on the outer margin. Experience demonstrates that these will be naturally colonised by some species of lizards from the surrounding area (EcoGecko 2013[1]), and the population density at these sites should increase as habitat quality increases with plant growth, particularly if this includes fruit-bearing plants.

Minimise

29 The impact of the Project may be minimised by use of methods OceanaGold already undertakes at the Mine such as dust suppression; weed surveillance (regular [every two years] inspection of the area around mine operations for new weed species); fire response (a site fire avoidance protocol and rapid response to any suspected fires); and rescue of ecological features (removing them [or propagating parts of them such as seeds or cuttings] and establishing them in a new location). This latter method has been utilised in the mitigation package OceanaGold is volunteering, with about seventeen threatened plant species to be rescued and cultivated.

Offset

30 During the formulation of mitigation options for the predicted ecological impact of the Coronation North project OceanaGold asked me to assess, from an ecological perspective, the practicalities of implementing a biodiversity offset using the 2014 New Zealand Government *Guidance of Good Practice Biodiversity Offsetting in New Zealand.* The *Guidance* definition of a biodiversity offset is:

> Measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground.

[1] Knox, C; Herbert, S; Bell, T. 2013. Lizard survey of the northern gully waste rock stack and western waste rock stack for Oceana Gold (New Zealand) Limited at Macraes Flat, Otago, New Zealand. EcoGecko Consultants Ltd.

31 I examined the offset process framework, identified the key ecological components, identified the ecological information that would be necessary when following the offset process, and informally followed the process using the Coronation North project data available to me.

32 I considered that the ability to use a biodiversity offset as compensation for the environmental impact of the Coronation North project would be dependent on several factors:

(a) The significance of the biodiversity in the project area;

(b) The residual impact of the project on this biodiversity, once the opportunities to avoid, minimise or remediate the impacts have been assessed;

(c) The availability of an offset site with like-for-like opportunities;

(d) The ability to demonstrate the capacity to manage the offset site to achieve a no net loss of biodiversity of an equivalent value to that lost in the project area;

(e) Commitment and resources to manage the offset site to an agreed plan; and

(f) Monitoring to show that the offset is being achieved.

33 I assessed all of those factors.

34 The *Guidance* is based on principles that individually make sense ecologically when planning mitigation activities. However, as a mitigation system I consider the *Guidance* is complicated, and there is a lack of integrity and clarity between the different components which would further complicate their implementation. Pursuing a biodiversity offset in the Macraes context would be complicated, lengthy, require good data sets (that mostly would be expensive to obtain), and would likely require considerable dialogue between the interested parties throughout the process. The availability of an offset site with 'like for like' biodiversity features is likely to be limited and would require the use of two or more sites. A large number of management actions would need to be undertaken for a considerable period of time at the offset sites.

35 In summary my conclusion was that in the Macraes landscape and ecological settings:

(a) To fulfil the ecological requirements of the *Guidance*, a large amount of ecological data would be required from both the impact site and offset site, specifically on their biodiversity features, and the value, condition,

management and monitoring effectiveness for each site. This would be expensive and time consuming to procure; and

(b) There are also limits to the project impacts that can be offset, and there is limited availability of offset sites containing similar features to Coronation North.

36 Overall, from an ecological feasibility perspective, I recommended that a biodiversity offset was not pursued as part of the Coronation North ecology mitigation package.

Compensate

37 Compensation involves undertaking activities off-site that will result in a gain in ecological value. A range of compensatory activities can be undertaken, either separately or in combination, to address Project impacts. These include methods that have been volunteered by OceanaGold for this project: legal covenanting of about 372 ha (*cf* the PIA of 315ha); research to better understand how to manage ecological features (in this case reptiles); and habitat creation (also lizards).

Submissions

DOC

38 The Director-General of Conservation has lodged a submission in opposition to the project on the basis that as notified OceanaGold's application did not adequately avoid, remedy or mitigate adverse effects of the proposed activity. However representatives of the Department of Conservation (**DOC**) have since been provided with further information by OceanaGold and have had discussions regarding a mitigation package including appropriate compensation and conditions of consent.

39 At the time of writing this evidence consultation on an appropriate suite of management and mitigation measures acceptable to both OceanaGold and DOC is ongoing.

KTKO

40 KTKO lodged a neutral submission on the project. KTKO is interested in ensuring that the objectives and policies of the Kai Tahu ki Otago Natural Resource Management Plan (2005) are given effect. They are preparing a Cultural Impact Assessment (**CIA**). They support a review condition being included in resource consents which will provide for the consents to be reviewed if the CIA identifies adverse effects on ancestral landscapes, rivers, taonga, indigenous vegetation

and habitats of indigenous fauna that ought to be mitigated. I agree with the review approach which is consistent with what occurred in the Coronation project.

WDC/DCC Recommending Report

41 While there are some differences in my assessment of the degree of ecological significance of the PIA and the assessment made by Wildlands for the Councils overall I consider that the mitigation that has been incorporated into the proposed conditions of consent adequately covers the adverse ecological effects of the Coronation North project.

42 Wildlands support legal protection of large areas of similar habitat close to the PIA and 'rescue' of important species and, consistent with this, the mitigation package proposed by OceanaGold incorporates these matters.

Comment On Draft Consent Conditions

43 I have read the draft consent conditions and consider that overall they adequately address the adverse ecological effects of the Coronation North project.

44 The proposed 289 hectare Island Block and 83 hectare Highlay Hill Conservation Covenant will protect a number of ecological features in perpetuity including regenerating shrubland, narrow-leaved tussock grassland, basalt-based rock-fall shrubland, a number of indigenous plant and fauna species including some considered rare and At Risk. There are undoubtedly further ecological values contained within these sites that remain to be discovered – as has happened with the existing OceanaGold covenants.

45 The rescue of 15 plant species from within the project footprint could, if well managed, reconstitute or bolster populations in nearby protected areas. While there is a large element of uncertainty involved in this work, these individuals would otherwise be lost to mine activities, and therefore it is worth including this condition. It should be noted that cultivation of some of these species has rarely been attempted and will require input from suitably experienced experts.

46 Supporting research into the use of artificially created habitats, such as those created as an end product of mine activities (such as Waste Rock Stacks), will increase our understanding of the benefits of undertaking these activities.

Conclusion

47 If the mitigation recommendations outlined in my evidence and in proposed conditions of consent are carried out I consider the impacts of the proposed Coronation North mining activity will be adequately addressed from an ecological perspective.

Michael James Thorsen

14 October 2016