Before a joint hearing of the

Otago Regional Council
Waitaki District Council

RM 20.024

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

STATEMENT OF EVIDENCE OF GRAHAM USSHER FOR OCEANA GOLD (NEW ZEALAND) LIMITED

4 August 2020

Introduction

1 My name is Graham Thomas Ussher. I am a Restoration Ecologist and Director of RMA Ecology Limited, a company specialising in ecological effects assessment and management.

2 I hold the qualifications of Bachelor of Science (Zoology; 1993), Master of Science (Conservation Ecology; 1995) and Doctor of Philosophy (Conservation Management; 2000) from the University of Auckland, New Zealand.

3 I have 25 years' experience in environmental research and consulting with a particular focus on land-based ecology and methods for providing improvements to indigenous biodiversity. I have previously been employed as a Principal Ecologist at Tonkin & Taylor Ltd, Environmental and Engineering consultants, Auckland (2007 – 2016) where I was a senior-level ecologist and helped lead the Ecology Team. Over my period of employment there I managed, undertook fieldwork, reported on or reviewed in excess of 120 projects involving ecological effects assessments, management and ecological mitigation/ restoration in New Zealand spanning small to large scale of effects, and covering all aspects of land use.

4 In my current role at RMA Ecology Ltd, I have undertaken approximately 100 projects since 2016 that have involved site assessment, impact evaluation, effects management design (including offsetting), management plan preparation and construction management, including wildlife and plant salvage, monitoring and reporting.

5 My experience that is directly relevant to the matter addressed by this evidence is listed below.

a. Science advisor to the NZ government multi-agency biodiversity offsets research programme from 2010-2012 lead by the Department of Conservation, which culminated in the development of the guidance document 'Guidance on good practice offsetting in New Zealand' produced by MfE and DOC, 2014.

b. Lead author and researcher for the preparation of national guidance on biodiversity offsetting to roading projects in New Zealand for the NZ Transport Agency, 2016-2017.

c. Co-author to the guidance document prepared by Local Government NZ entitled 'Biodiversity offsetting under the Resource Management Act; September 2018'. Co-presenter for 14-city workshop programme around New Zealand to socialise report findings amongst regulatory authorities and practitioners (2019).

6 Although this is a Council hearing, I have read the code of conduct for expert witnesses contained in the Environment Court Consolidated Practice Note 2014. I have complied with it when preparing my written statement of evidence and I agree to comply with it when presenting evidence. I confirm that the evidence and the opinions I have expressed in my evidence are within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Background

7 I have been involved in the Deepdell North Stage III project since July 2018, when Oceana Gold (New Zealand) Limited (hereafter '**OGNZ**') engaged me to provide a review of the work undertaken by Dr Thorsen and his ecology team. The focus of my work was advising on an appropriate effects management framework to apply to ecology values within the project footprint, and to provide independent advice on the application of biodiversity offset models and industry good practice when designing and communicating these.

8 As part of my work on this project, I prepared two written review reports to OGNZ in 2018 and early 2019 on the work undertaken by Dr Thorsen. I also provided ongoing advice.

9 I visited the Deepdell North site in October 2018 with Dr Thorsen and Mr Lee, which included viewing previous rehabilitation sites, rare plants mentioned in Dr Thorsen's evidence, as well as visiting shrubland, wetland and seepage environments within the Deepdell North proposed project footprint area and the project site more generally.

10 Since my involvement in the project in 2018/ 2019 there have been several refinements to the ecology assessment work undertaken by Dr Thorsen, and as a consequence, to the ecological effects management package. These include the re-design of the Waste Rock Stack, revision to numbers or areas of ecology values potentially impacted, and the inclusion of the proposed offset management areas (and associated updates to offset models arising from this). I have reviewed these refinements and my review comments have

been incorporated as changes to the effects management package discussed in Dr Thorsen's evidence, and are reflected in my evidence.

11 I have not visited the proposed offset restoration sites. I rely upon the information provided by Dr Thorsen with regard to those sites (Redbank Station Covenant, and the Ephemeral Wetland site at Mt Stoker Road).

12 Although I have visited the Deepdell North Stage III site and had in-depth, ongoing discussions with Dr Thorsen about his work, the extent of my assessment work has been to query, review and provide recommendations regarding effects management. While I have queried Dr Thorsen on specific matters relating to his ecological surveys and interpretation of the data that he collected, I have relied upon Dr Thorsen's depth of understanding of the site history, ecological context, and the ecology of individual species to provide an appropriate ecological context for my work. I am satisfied that Dr Thorsen's work in this regard is of a high quality, and that I can rely upon it as a basis for the review and advisory work that I have subsequently undertaken for OGNZ.

13 In preparing this evidence, I have reviewed the following documents;

a. The ecological assessment report prepared by Dr Thorsen entitled *'Deepdell North III Project: Impact of project on vegetation, avifauna, herpetofauna and invertebrates: December 2019*' which forms part of Appendix D to the AEE;

b. The summary Impact Management Plan that describes the impacts of the project and the management of adverse effects, prepared by Dr Thorsen, which forms part of Appendix D to the AEE;

c. The offset models prepared by Dr Thorsen that outline the loss:gain calculations for biodiversity addressed in the offset package (3 x Excel spreadsheets with subsequent revisions);

d. The management plans prepared by Dr Thorsen for Redbank Station covenant and the Ephemeral Wetland offset area on Mt Stoker Road

e. The review by Wildlands Consultants Ltd of documents forming the ecology portion of the Application materials, entitled '*Review of terrestrial ecology aspects of the Oceana Gold Ltd application for the proposed Deepdell North mine at Macraes: July 2020: Draft.*

f. The draft Lizard Management Plan prepared by Ryder Environmental Ltd for OGNZ entitled '*Deepdell North III Lizard Management Plan: August 2020'*. Dated 2 August; 2nd draft.

Scope of Evidence

14 My evidence addresses the following:

a. The framework upon which the effects management programme for Deepdell North Stage III has been developed;

b. A summary of the management actions that together comprise OGNZ's proposed package to manage adverse effects on ecological values; and

c. An assessment of the propose package against the effects management framework.

Effects management framework

15 The design of the ecological management approach and package for Deepdell North III includes elements of policy, non-statutory guidance, and good practice as undertaken by experienced ecologists.

16 Dr Thorsen has undertaken a comprehensive assessment of the ecological values of the site. The approach employed – engaging experts with an appropriate level of experience and expertise to survey the site - follows good practice, and has generated a comprehensive description of the site and its terrestrial ecology values. I note that, subsequent to the lodgement of the Assessment of Environmental Effects report, the Department of Conservation and the reviewer for Waitaki District Council consider that the information provided regarding native lizards across the site was inadequate; in response I understand that OGNZ has provided additional information regarding the extent, quality and importance of habitats across the site to native lizards, and the approaches that may be employed to minimise and manage adverse effects upon these (Ryder, 2020). This additional work adds to the robustness of the information provided by OGNZ regarding the range of ecology values present at the site.

17 Policy 5.4.8 of the Proposed Otago Regional Policy Statement (**'pORPS'**) provides the policy framework under which potential adverse effects on indigenous biodiversity for this project must be considered. The Policy adopts an 'effects management hierarchy' approach to sequential consideration of tools that manage potential ecological effects. This approach is also a

fundamental concept that is central to effects management in international practice, and has recently been formally adopted in New Zealand (**Figure 1**), as outlined in the good practice guidance developed by the Environment Institute of Australia and New Zealand (hereafter, '**the EIANZ guidelines**').

18 The EIANZ guidelines provides technical interpretation of concepts of ecological assessment, significance assessment, evaluation of the importance of ecological effects (using a matrix assessment system), and guidance on the range of tools available to avoid, minimise, or provide redress for residual adverse effects.

19 The EIANZ matrix approach is central to an effects assessment. It has been developed as a guide for ecologists undertaking effects assessments under the RMA and I support its application to this project. It was designed precisely for this type of proposal, where the potential effects are diverse, complex and may occur on species, communities and ecosystems, and where it is important to separate out ecologically significant effects on biodiversity from effects that are not.

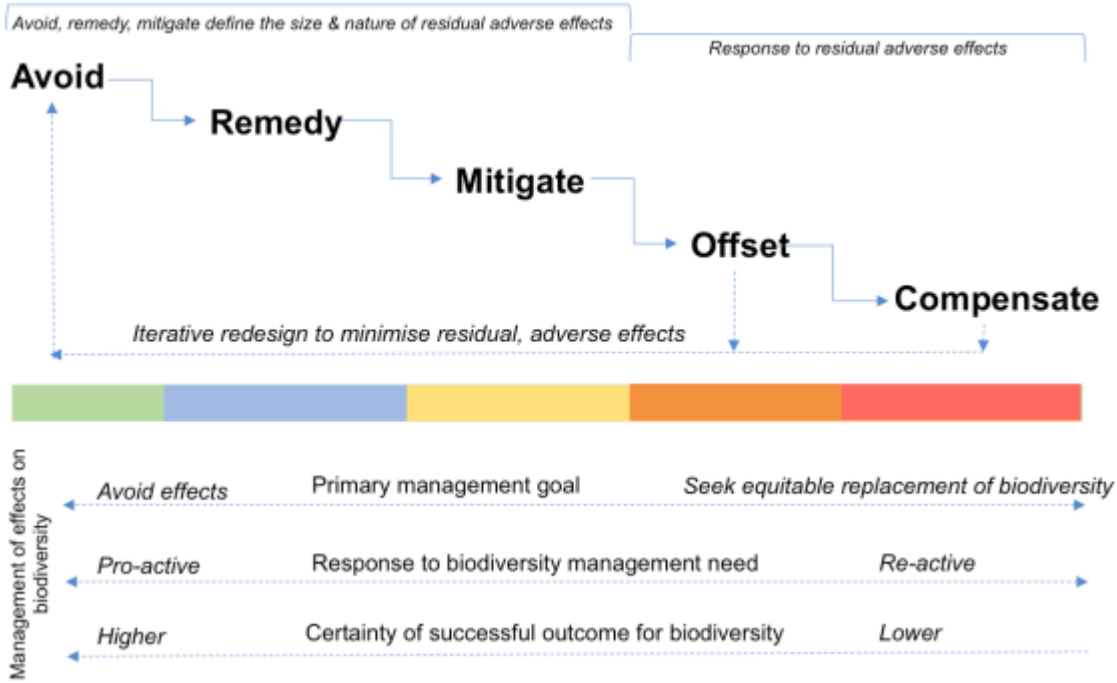

Figure 1. The effects management hierarchy (source, Offsetting under the RMA: 2018).

20 I am an author of the EIANZ guidelines. The guidelines were developed in collaboration with experts in ecological impact assessment from the United

Kingdom and Australia, where impact assessment has been a formally recognised discipline for many years. Our work on the New Zealand guidelines built on existing practice, incorporated an internationally-recognised framework from overseas and tailored language and application to our specific legal environment (mostly relying on the RMA). The EIANZ guidelines are a collaboration between leading ecologists in New Zealand, and drafts of the document were circulated to the broader community of ecological practitioners as well as government agencies and organisations involved in managing environmental resources. The guidelines have a broad base of support across local government and private practitioners.

21 The EIANZ guidelines and the impact assessment matrix in particular, provides a robust, concise and consistent approach to effects assessment, whilst ensuring that individual expert evaluation and opinion is preserved. In the five years since its first release (1st Edition; 2015), I have seen its application by practitioners increase markedly, with a similarly strong uptake by local authorities (including Councils). Overall, the tool assists with bringing a greater level of consistent analysis and transparency around assessments of the significance of effects, and encourages a greater consideration of the depth and breadth of values and issues that may be present within sites proposed for development.

22 Dr Thorsen has relied upon the EIANZ framework to provide an assessment of the importance of values within the site, and the importance of the level of adverse effects that will likely result from the Deepdell North III project. In my opinion, he has applied it appropriately and in accordance with its intended purpose. He has used it to provide a standardised assessment of the level of effects that may be expected due to the project. This has generated a list of species and vegetation communities for which a level of potential effect can be stated. That list can be used to then assess the need for, and viability of, ecological tools that may serve to minimise the severity of effect, or where appropriate, provide ecological redress for losses by undertaking positive actions elsewhere.

23 The results of the EIANZ matrix assessment must be interpreted in the planning context relevant to the subject site, as this assists with the setting of appropriate thresholds for determining which of the actions in the hierarchy shown in **Figure 1** are appropriate for the ecological feature in question and the site.

24 In the case of Deepdell North III, guidance is provided by Policy 5.4.6, which sets thresholds of effect for some species (effectively forcing avoidance or minimisation of adverse effects), and a threshold above which ecological redress must be provided where avoidance, remedy or minimisation of effects are not provided.

25 For the former, OGNZ proposes actions that avoid or mitigate (minimise) the severity of effect on species or communities, by undertaking salvage, plant propagation and relocation/ transplantation into appropriate sites out of the project footprint.

26 For the latter, which concerns the threshold over which a biodiversity offset should be considered, I understand that while a relatively confined issue remains outstanding on the scope of an exception for plants in the myrtle family that are potentially at risk should myrtle rust disease spread into Otago, there is agreement between the parties over the wording of Policy 5.4.6(c) (ENV-2016-CHC-103) which sets a clear threshold such that an offset should ensure:

a. There is no loss of Threatened species, and

b. There is no measurable loss within the Ecological District of At Risk-Declining species (other than manuka, kanuka and matagouri).

27 No measurable loss within the Ecological District context is interpreted by OGNZ as no greater than a 'low' level of effect arising from an assessment using the EIANZ matrix. A summary of the results of that assessment is included in the report prepared by Dr Thorsen that summarise the project impacts (part of Appendix D to the AEE).

28 I note that Dr Thorsen has also considered the status of vegetation communities under the pORPS and the Waitaki District Plan, and from that he has expanded the list of ecological features for which losses predicted from this project should be subject to biodiversity offsetting.

29 In addition to the list of ecological features (species or communities) that are considered by Dr Thorsen to be necessary to specify targeted minimisation and/or offsetting, several other species have been included. These have arisen from matters raised by Wildlands in its review of the AEE on behalf of Waitaki District Council, and from ongoing discussions between OGNZ and the Department of Conservation. Those additions are noted in **Table 1**, which provides a summary of the ecological features that are included in the effects

management package proposed by OGNZ. That list includes those considered by OGNZ as 'required' by the various policies and Plans, separate from those features offered as additional components of the package which would not normally be considered under a strict interpretation of the Policies or the minimum requirements of the EIANZ framework (hereafter referred to as the 'additional' parts of the effects management package).

30 Where mitigation is proposed to alleviate effects, the actions included are appropriate for the species under consideration. For plants, salvage where possible is proposed. Where it is not, or where direct transfer of plants to a receiving site has been assessed by Dr Thorsen as having a low chance of success, it is instead proposed to take propagatable plant material (seed or cuttings), and undertake propagation and planting out at an appropriate site. Table 2 provides a summary of the numbers of each of the native plants included in the package that will be propagated/ planted out as redress for loss at the project site. The intended outcome is to establish greater numbers of each plant than are currently present within the project footprint, within a natural setting, and with appropriate long-term protections in place.

31 For lizards, OGNZ is in the process of agreeing a formal approach with the Department of Conservation to the identification of an appropriate suite of salvage, relocation, and habitat recreation actions across the four species of lizard recorded from the site and its immediate surrounds. In addition, pest control is proposed as a short-medium term action (up to 10 years) to improve local populations at several proposed management sites (as a form of offset). Also included in this lizard package is habitat recreation over parts of the finished footprint of the Waste Rock Stack and a range of research initiatives (a form of compensation) to contribute towards a better overall understanding of how to effectively monitor these species.

32 The proffered actions for lizards are designed to address the Department of Conservation's requirements under the Wildlife Act. Because the Department's considerations under the Wildlife Act do not follow the RMA framework, where species are effectively being managed under the Wildlife Act (as is the case for lizards in this application) they are perhaps best seen as an exception, rather than trying to relate issues strictly into the RPS policy framework.

33 For the actions proposed as 'additional' parts of the effects management package, I do not consider that the same requirement to demonstrate a 'no-

net-loss' or net-gain' benefit should be applied. However, despite this, I note that many of the actions to salvage or improve lizard populations from the project footprint are also likely to result in considerable benefits to resident lizard populations at relocation release sites or pest management areas. Furthermore, habitat recreation over parts of the finished Waste Rock Stack is likely to provide habitat for some native species within a short period of time (based on the results of previous work undertaken by OGNZ that recently assessed the use of constructed rock habitats by native lizards[1]).

34 To determine an appropriate level of management required to provide enhancements to biodiversity features., Dr Thorsen has used the Maseyk et al. 2016 disaggregated offset model[2]. That biodiversity offset model was developed for the Department of Conservation to provide a robust – but fairly straight-forward – tool for estimating the extent and change in condition that may be required to balance losses of ecological values at an impact site with enhancements at one or more offset sites. The model replaces some of the more complex offset models that have been used in past years in New Zealand, however it retains the fundamental basis of using area occupied and condition of an ecological feature to calculate anticipated losses, and to balance those against predicted gains at a degraded site that is available for enhancement.

35 Dr Thorsen has provided a separate offset model for each component of biodiversity (each vegetation community) that he has assessed as resulting in a residual adverse effect that exceeds a minimum impact threshold, and therefore requires ecological redress. His design of the model is informed by guidance provided in the user manual that accompanies the offset model, as well as guidance provided in the national guidance document regarding offsetting under the RMA (LGNZ, 2019). Both are appropriate sources of guidance to reply upon. I have reviewed the offset models provided by Dr Thorsen and provided advice over several iterations. I consider the use of the models by Dr Thorsen to be appropriate and sound. The ecological judgements that he has used to populate the models are based on his detailed understanding of the environments at Macraes and the offset sites, and the

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.

2 Maseyk, F.J.F; Barea, L.T; Stephens, R.T.T; Possingham, H.P; Dutson, G; Maron, M. 2016. A disaggregated biodiversity accounting model to improve estimation of ecological equivalency and no net loss. Biological Conservation 204: 322-332.

level of enhancement that may be expected given the management of stock, weeds, habitat manipulation, and animal pest control possible.

Summary of the effects management package

36 **Table 1** provides a summary of the biodiversity features that are included within the overall effects management package.[3] The package includes biodiversity that OGNZ considers trigger the need for an offset, as well as actions or initiatives that have arisen from discussions with Waitaki District Council and the Department of Conservation, even if the risk of loss, or significance of loss of those values does not strictly trigger consideration under the pORPS.

37 **Table 2** provides a summary of the anticipated outcomes from applying the hierarchy of effects management tools. It is important to note that losses anticipated on biodiversity features for which an offset is required are at least balanced by enhancements at the offset sites to a no-net-loss standard. I understand that the two offset sites proposed (Mt Stoker ephemeral wetland site and Redbank Covenant area) each support more equivalent habitat that is available to be restored, or which will be improved through stock, weed and animal pest control than is needed to satisfy the no-net-loss objective. This indicates that the management programme for each of the offset sites will either result in far greater gains for biodiversity beyond no-net-loss, or that additional areas can be brought into the management programme should monitoring show an underachievement of biodiversity improvements within the portion of the sites used as an offset.

38 Within the overall effects management package, most biodiversity features for which there will be a measurable loss, or which have a conservation classification of At Risk-Declining, will be salvaged, propagated or enhanced such that an equivalent number, area, or overall gain in biodiversity value is achieved. There is less certainty regarding native lizards.

39 The effects management package proposed for native lizards is extensive and broad in scope, however animal pest control proposed to generate benefits is not proposed in perpetuity. It is likely that intensive pest control (or for southern grass skink, a change in grazing regime to bring about habitat enhancement), will result in enormous benefits to local populations within a short period of time, especially over the large area that will be managed (144 ha or so). Those

[3] The information in this table has been sourced from the evidence of Dr Thorsen's Impact Summary report that forms part of the evidence in chief of Dr Thorsen, and from tables within the evidence of Dr Thorsen.

benefits are certain to adequately address the residual effects of the loss of lizards within the project footprint. However, without ongoing pest control beyond 10 years, any improvements to pasture habitat and rock habitat creation also included in the effects management package may not by themselves provide adequate, permanent benefits to lizards that outweigh the possible temporary (but extensive) nature of a 10-year pest control programme.

40 For matagouri (*Discaria toumatou*) no active enhancement is proposed that would constitute a formal offset or mitigation (propagation or plant salvage). Instead, benefits to matagouri away from the project site are proposed by placing a formal protection covenant over parts of Redbank EEA. That covenant will protect existing matagouri communities from possible future clearance or degradation arising from permitted farming activities. Therefore, the management proposed as ecological redress is to provide a means of averting potential future loss of matagouri at the Redbank site.

Table 1. Biodiversity features that are included within the overall effects management package. Overall Project Effect is the result of the EIANZ level of effect matrix which assesses ecological importance and magnitude of project impact on the ecological feature.

Class	Feature	Threat classification	Overall effect	Mngmt action	Mngmt Approach	Management site
Features that comprise the effects management package under the pORPS						
Flora	Ephemeral wetland	Crit. End. Hist. Uncommon	High	Offset	Weed control, enrichment plant	Mt Stoker Road
Flora	Seepage	Endangered Hist. Uncommon	Low	Offset	Weed control, fencing	Redbank EEA
Flora	Shrublands	Not threatened	Very low	Offset	Plant, fencing	Redbank EEA
Features that comprise the 'additional' effects management package						
Flora	*Carmichaelia crassicaulis*	At Risk - Declining	Very low	Mitigate	Salvage, propagate, plant out	Highlay Hill covenant
Flora	*Carex tenuiculmis*	At Risk - Declining	Very low	Mitigate	Salvage, propagate, plant out	To be confirmed
Flora	*Carmichaelia petriei*	At Risk - Declining	Very low	Compensate	Manage at Redbank EEA	Redbank EEA
Flora	*Discaria toumatou*	At Risk - Declining	Very low	Formal protection	Averted loss through protection covenant	Redbank EEA
Flora	Low producing grassland	Not threatened	Low	Compensate	Manage stock, include covenant	Redbank EEA
Flora	*Juncus pusillus*	At Risk - Declining	Very low	Mitigate	Salvage, propagate, plant out	Ephemeral wetland EEA
Flora	*Leptinella pusilla*	At Risk - Declining	Very low	Mitigate	Salvage, propagate, plant out	Highlay Creek Covenant
Flora	*Lobelia ionantha*	At Risk - Declining	Low	Mitigate	Salvage, propagate, plant out	Ephemeral wetland EEA
Flora	*Rytidosperma buchananii*	At Risk - Declining	Very low	Mitigate	Salvage, propagate, plant out	Highlay Creek Covenant
Flora	*Melicope simplex*	Locally Uncommon	Very low	Mitigate	Salvage, propagate, plant out	Highlay Creek Covenant
Flora	*Myrsine divaricata*	Locally Uncommon	Very low	Mitigate	Salvage, propagate, plant out	Highlay Creek Covenant
Flora	*Juncus distegus*	Naturally Uncommon	Low	Mitigate	Salvage, propagate, plant out	Redbank EEA
Flora	*Carex subtilis*	Naturally Uncommon	Very low	Mitigate	Salvage, propagate, plant out	Highlay Creek Covenant
Flora	*Parsonsia capsularis var. tenuis*	Data Deficient	Low	Mitigate	Salvage, propagate, plant out	Highlay Creek Covenant
Flora	*Carex resectans*	Locally Uncommon	Low	Mitigate	Salvage, propagate, plant out	Ephemeral wetland EEA
Reptile	Cryptic skink	At Risk - Declining	Very low	Mitigate	Salvage, predator control	Cranky Jim's Covenant
Reptile	Southern grass skink	Not threatened	Very low	Mitigate/ Offset	Salvage, predator control Grazing management	Cranky Jim's Covenant Redbank EEA
Reptile	Korero gecko	At Risk - Declining	Low	Offset	Predator control	Cranky Jim's Covenant
Reptile	McCann's skink	At Risk - Declining	Low	Mitigate/ Offset	Habitat recreation, predator control	Finished WRS at mine Cranky Jim's Covenant
Research programme: Create new habitat and assess utility of artificial refuges for monitoring translocations						
Research programme: Mt Stoker Road covenant ephemeral wetland research; form, function, threats						

Table 2. Summary of the anticipated outcomes relative to equivalent redress. Green cells represent actions that collectively are anticipated to result in beneficial outcomes for a biodiversity feature such that residual effects are reduced to nil. Qualifiers within boxes refer to actions proposed: M = mitigation, O = Offset (see **Table 1** for explanation of management approach and proposed site). Red coloured cells represent a biodiversity feature for which a residual adverse ecological effect could result despite beneficial actions being undertaken; this occurs for lizards where pest control is not sustained beyond a short-medium term and therefore biodiversity gains are likely to erode over time (i.e. enhancement gains obtained may not be permanent).

Feature	Effects management package	Equivalent redress proposed?
Features that comprise the effects management package under the pORPS		
Ephemeral wetland	0.3 ha loss offset by 2 ha of wetland enhancement	**O**
Seepage	0.07 ha loss offset by 0.8 ha of seepage enhancement	**O**
Shrublands	3.73 ha loss offset by 12 ha of shrubland enhancement	**O**
Features that comprise the 'additional' effects management package		
Carmichaelia crassicaulis	Loss of 2 plants; replace with 10 propagated plants	**M**
Carex tenuiculmis	Loss of 10 plants; replace with 20 propagated plants	**M**
Carmichaelia petriei	Loss of 7 plants; replace with 15 propagated plants	**M**
Discaria toumatou	Averted loss through protection covenant	**O**
Low producing grassland	Loss of 49.47 ha partially offset by protection and enhancement of 24.55 ha equivalent grassland elsewhere, & protection of higher value communities	**O (like-for-like) and O (trade up)**
Juncus pusillus	Loss of 1 m^2 patch; replace with 10 propagated plants	**M**
Leptinella pusilla	Loss of 1 m^2 patch; replace with 10 propagated plants	**M**
Lobelia ionantha	Loss of 0.5 m^2 patch; replace with 10 propagated plants	**M**
Rytidosperma buchananii	Loss of 1 plant; replace with 5 propagated plants	**M**
Melicope simplex	Loss of 11 trees; replace with 20 propagated trees	**M**
Myrsine divaricata	Loss of 2 shrubs; replace with 10 propagated shrubs	**M**
Juncus distegus	Loss of 370 m^2 rushes; replace with 50 propagated rushes	**M**
Carex subtilis	Loss of 1 plant; replace with 5 propagated plants	**M**
Parsonsia capsularis var. tenuis	Loss of 1 plant; replace with 10 propagated plants	**M**
Carex resectans	Loss of 1.6 m^2 patch; replace with 10 propagated plants	**M**
Cryptic skink[#]	Loss of up to 40 individuals balanced by salvage, and predator control over up to 144 ha for 10 years.	**M and O**
Southern grass skink[#]	Avoid 0.21 ha high quality habitat. Loss of up to 204 individuals balanced by salvaged into, and predator control over up to 144 ha for 10 years, AND remove grazing to improve habitat at additional covenant site.	**M and O**
Korero gecko[#]	Avoid 0.89 ha high quality habitat. Loss of ca. 375 – 750 individuals balanced by predator control over up to 144 ha covenant site for 10 years.	**O**
McCann's skink[#]	Avoid 0.89 ha high quality habitat. Loss of up to 750 individuals balanced by predator control over up to 144 ha covenant site for 10 years, AND recreate habitat over 10 ha of finished Waste Rock Stack site.	**M and O**

[#] Based on 'Scenario 2: Realistic' from the Ryder Ltd draft Lizard Management Plan (see EiC of Dr Tocher).

Assessment of the effects management approach and overall package

41 In my opinion, OGNZ has approached the development of an effects management approach and package in a comprehensive, clear and robust manner.

42 It has applied a well-considered effects management framework that blends existing good practice guidance on effects assessment and effects management, with the expectations of relevant polices for the region. In addition, OGNZ has responded positively to including a range of other values into the effects management package (as raised by submitters) which will require significant investment in plant and wildlife salvage, propagation and relocation.

43 While the evidence of Dr Thorsen and the approach by OGNZ has focussed on identifying relevant values and an appropriate quantum and management regime for each, there are several other key parts that should be kept front-of-mind when designing a robust effects management package.

44 These include ensuring that:

a. Due effort has been invested in avoiding adverse effects in the first place;

b. The beneficial management actions proposed for the ecological enhancement sites are not already being undertaken (i.e. the actions proposed for this project are additional to what is occurring at the management sites);

c. The ecological enhancement sites are afforded some form of long-term legal protection, and that the proposed enhancements will persist for as long as the project impacts do;

d. Equivalence of biodiversity types is maintained by undertaking beneficial actions on the same or similar species and communities as are impacted; and

e. The locations of the ecological enhancement sites are in close proximity to the project impact site, unless there are compelling ecological reasons not to do so.

45 I have discussed each of the above matters with OGNZ and Dr Thorsen, and I am satisfied that each matter has been given due consideration. Several of these matters (such as avoidance through design, and additionality at

proposed ecological enhancement sites) were matters that I raised with OGNZ at the start of my involvement in this project (2018). Based on the information from discussions over that period, and the descriptions within the evidence of Mr Lee and Dr Thorsen, I am satisfied that appropriate weight has been afforded to these.

46 I note that the draft conditions of consent (20.10 – 20.13) require that the proposed ecological enhancement sites are afforded some form of legal protection, and that this is required to be in place within 24 months of the exercise of the consent. I agree that this is appropriate and will provide an appropriate guarantee of protection for the sites and their use only for ecological enhancement purposes.

47 The issue of equivalence is addressed throughout the technical documents provide by Dr Thorsen, and through the efforts of the proposed effects management package to ensure that benefits are directed at the same species or communities that will be impacted at the project site.

48 The issue of proximity is an interesting matter. In my experience, proximity is rarely addressed directly, although its importance becomes apparent when an offset site is so distant that ecological benefits are at risk of accruing within a different ecological 'landscape' or are dislocated from the human communities where the impacts have occurred. I am aware that OGNZ pursued, early on, opportunities for ecological enhancement within the local area around Macraes, but was unsuccessful. The resultant package includes an enhancement site that is close to the mine (Redbank) and one that is considerably more distance (the Mt Stoker ephemeral wetland site).

49 The wetland enhancement site is located approximately 30 km to the south-west of the mine site. Although many other wetlands exist closer to the mine site, I understand from Dr Thorsen that none are of the scale or regional importance as the Mt Stoker Road site. Given the relatively greater importance of restoring larger examples of rare features (such as ephemeral wetlands), I regard the inclusion of this site as acceptable. It could be argued that this single, larger site would provide a superior outcome compared to attempting to manage smaller wetlands closer to the mine, and hence this larger more distant site would fulfil the '…*best ecological outcome*…' aspiration of pORPS. I note that despite the site being distance, it is still within the relevant frame of ecological reference for the overall site analysis - which is the Macraes Ecological District.

50 Overall, in my opinion, I consider that the effects assessment process undertaken by OGNZ, and the effects management package proposed to address unavoidable adverse effects on indigenous values meets current good practice, and will deliver benefits that achieve no-net-loss where appropriate, or otherwise produce benefits that are at least commensurate to losses.

51 The benefits of the proposed package extend beyond management of biodiversity on the ground, as OGNZ has included research investment that will assist with extending conservation knowledge more broadly, and shown a willingness to go well beyond the minimum that could be considered to be required by the pORPS.

Graham Thomas Ussher

Principal ecologist

4 August 2020