

BEFORE THE HEARING PANEL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of an application by Grenadier Limited to the Manawatū-Whanganui Regional Council (reference **APP-2020203164.01**) for the suite of resource consents associated with the construction and development of a proposed eighteen hole links golf course and ancillary activities on land at 765 Muhunoa West Road, Ōhau

REPORT TO THE COMMISSIONERS

MRS CHRISTINE FOSTER (CHAIR), DR FLEUR MASEYK AND MR REGINALD PROFFIT

SECTION 42A REPORT OF CONNOR WHITELEY – SENIOR ECOLOGIST, BECA

6 April 2022

A. INTRODUCTION

Qualification and Experience

1. My name is Connor Jordan Whiteley.
2. I am currently employed by Beca in the role of Senior Ecologist. I hold a BSc Hons in marine and freshwater ecology from the University of Hull. I have held my current role at Beca since April 2021. I have over ten years of work experience, having been employed as a marine and freshwater ecologist variously in New Zealand and United Kingdom; for Auckland Council as a Freshwater Ecologist Specialist; and as an Ecologist/Senior Ecologist at Ecology New Zealand, Clean Stream Consultants, Swansea Environmental Forum, Hull International Fisheries Institute and the Institute of Estuarine and Coastal Studies.
3. In my current role as a Senior Ecologist I provide technical ecological advice on applications made under the RMA to and on behalf of private enterprise, Regional and District Councils, and public entities like Waka Kotahi NZ Transport Agency. I also regularly act on behalf of several Regional Councils providing ecological expertise in the form of reviewing technical assessments for consent applications made to them, including acting on their behalf by giving evidence at hearings. I have also provided ecological advice to Ministry for the Environment in relation to the development and continued implementation of the National Policy Statement for Freshwater Management (NPS FM) and National Environment Standard for Freshwater (NES FW).
4. I have reviewed the application by Grenadier Ltd (Applicant) dated the 2nd of July 2021 (and associated attachments), the s92 response dated 8 of September 2021, and the associated documents provided in late October 2021² and December 2021^{5,6}. These documents provide an overview and assessment of effects focussing on Schedule F habitat based on One Plan definition, effects on wetlands covered by the NES FW and the lagoon system. Technical inputs to the Applicant's AEE and impact assessments have been provided by Boffa Miskell, Bay Geological Services and Eco Nomos. I have been on site on 16 December 2021 alongside the Applicant's Ecologist and wider team.
5. I confirm that I have read and agree to comply with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014. My evidence has been prepared in compliance with those codes. In particular, unless I state otherwise, the evidence is within my area of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

B. SCOPE OF EVIDENCE

6. This evidence covers the ecological components of the application made by Grenadier Ltd to allow for development and operation of a Links Golf Course at 765 Muhunoa West Road, Ōhau. It should be read in conjunction with the Beca Letter entitled “Ecological Effect Review – Removal of Schedule F Habitat” dated 20 December 2021, of which I am the author; with developments since the drafting of that letter expressed in further detail where I have considered it necessary to further evaluate or clarify. To enable cross-referencing, this letter is appended by my report as Appendix A.
7. This evidence specifically covers the impact of the disturbance, vegetation clearance and loss of Schedule F habitat (defined in the Regional Council’s ‘One Plan’), the discharge of water and nutrients within 100m of natural wetlands (as defined within the NPS FM) and the take of bore water within proximity to natural wetlands and coastal lagoons.
8. In particular I will address:
 - a) Ecological value of four schedule F habitat types and the lagoon (Ōhau River of significance under Schedule B) and the effect development and operation of the Douglas Link Golf Course;
 - b) The Applicant’s proposed mitigation, offset and compensation;
 - c) The Applicant’s proposed consent conditions; and
 - d) My conclusions relating to the ecological effects on the environment.

C. DESCRIPTION OF THE ACTIVITY AND SCOPE OF CONSIDERATIONS

9. The application documents lodged with Horizon’s Regional Council (HRC) in July 2021 set out a description of the proposal. In summary, the application is made to enable the development and the operation of an eighteen-hole links golf course. The development will result in earthworks and vegetation clearance, of which 2.12 ha of Schedule F habitat is proposed to be converted to fairways permanently. The operation of the proposed links golf course will require the take of up to 208,267.5m³ of groundwater annually, with a maximum proposed rate of take of 26 L/s and a maximum of 1,388.45m³/day. The operation is also proposing to discharge water, by the way of an irrigation system, within 100m of two ‘natural wetlands’ as defined in the NES FW.

10. I have read the report and S92 responses in detail, including data used; analysis methodologies; limitations; and results, and generally consider the information presented an accurate reflection of the proposed activity and key ecological features of note.
11. Therefore for the sake of brevity, and to avoid unnecessary replication, I will not undertake a similar comprehensive analysis in this report and, with the exception of a brief summation, will instead only refer to those sections that I consider are in contention and important to highlight or consider further in the context of the consent process.
12. The Schedule F habitat is rare, threatened or at-risk habitat and further defined in the One Plan as:

“A rare habitat, threatened habitat* or at-risk habitat* is an area of vegetation or physical substrate which: (a) is a habitat type identified in Table F.1 as being “Rare”, “Threatened” or “At-risk” respectively, (b) meets at least one of the criteria described in Table F.2(a) for the relevant habitat type, and (c) is not excluded by any of the criteria in Table F.2(b).”*
13. In this instance, the areas impacted by the proposal have been assessed as meeting the ‘at-risk’ habitat definition by the Applicant, within their original assessment. I concur with this assessment.
14. An element of the definition I wish to draw particular attention to is that both vegetation and physical substrate factors should be considered when determining whether an area has characteristics consistent with Schedule F. It is not limited to a consideration of vegetation cover solely.
15. The Applicant’s Ecological report prepared by Boffa Miskell, dated 26 July 2021¹ provides a comprehensive analysis of habitats at the site that would qualify under Schedule F of the One Plan. The July 2021 report identifies four types of Schedule F habitat within the site, being Active duneland, Stable duneland, Saltmarsh wetland and Kānuka treeland.
16. Through further information request and response process, further discussions (S92 Question Meeting², Ecological Further Information Workshop³) were had with the Applicant’s expert on the definition and extent of the Schedule F habitat (excluding Saltmarsh wetland). The Applicant’s experts sought to reduce elements of the original defined Schedule F areas originally set out in

¹ Boffa Miskell Limited 2021a. Ecological survey: Douglas Links Golf Course. Report prepared by Boffa Miskell Limited for Grenadier Ltd.

² S92 Question Clarification Workshop, 20th October 2021, between Horizon’s Regional Council and Applicant’s Teams

³ Ecology Further Information Workshop, 2nd November 2021, Between Beca’s Ecologist and Water Quality Scientist and Applicant’s Ecologist, Coastal Geomorphologist, planner and hydrogeologist.

the July 2021¹ report, resulting in a subsequent difference of opinion between myself and the Applicant's respective expert. I will provide a summary of the analysis undertaken and why it is my position that the July 2021 report authored by Boffa Miskell¹, represents the most accurate identification of the site habitats and extent.

17. In responding to further information requests, Boffa Miskell's⁴ Ecologist originally responded that they *"did not consider it necessary to develop a standard offset model as per (Business and Biodiversity Offsets Programme (BBOP) 2009; Maseyk et al. 2017; 2015) but that a sensible and effects proportionate approach is sufficient..."* based on previous examples such as Transmission Gully, that they referenced. At that stage I was not confident that the ecological values described within the report around the duneland could or should be appropriate to offset the loss of the duneland, specifically the dunelands were described to be relatively representative. To get further clarification on this matter and additional matters a meeting was held between the Applicant and the Regional Council on the 20th October 2021². I attended this meeting via Zoom. The merits of the offsetting were discussed, and it was agreed by all in attendance that there was a logic to quantify the benefits of offsetting the loss of the dunelands and the finer ecological methodologies would be agreed on at an Ecological Further Information Workshop³.
18. During the Ecological Further Information Workshop³, it was agreed that REECE vegetation plots would be undertaken plots in accordance with a map sent out by Boffa Miskell. The plots would then be overlaid with the proposed restoration plan and then the restoration refined based on values more specifically. This was further confirmed by the Applicant's planner in an email dated 4th November 2021
19. However, the Applicant's ecologist adjusted the survey plots and used the survey to reclassify the Schedule F habitat. The findings were presented within a Boffa Miskell memo⁵. After reviewing the information and undertaking a site visit with the Applicant's team, it is my view that that the reclassification could not be supported. My full detailed analysis is contained in Appendix A.
20. In short, the Applicant's Ecologist applied further evaluation and tests relating to the quality of the vegetation in the terms of native dominance and did not consider the substrate the vegetation occurred on. For example, some areas originally assessed as Active Duneland were reassessed as Exotic Scrub.

⁴ Boffa Miskell Limited 2021b. Douglas Links Golf Course, Ōhau - Section 92 responses - Ecology. Letter prepared by Boffa Miskell Limited for Grenadier Ltd.

⁵ Boffa Miskell Limited 2021c. Douglas Links Golf Course, Ōhau – Survey Summary Memo. Report prepared by Boffa Miskell Limited for Grenadier Ltd

21. Additionally, the Applicant's experts presented a position that the presence and dominance of exotic vegetation reduced the initially assessed extent of Schedule F habitat.
22. I do not agree with the revised interpretation provided by the Applicant, nor the updated extent of area of Schedule F habitat impacted. Key areas of disagreement are:
 - a) I have noted that there is evidence of the instability of sand in some of the dune systems when examining various historical imagery of the area. Generally, these historical aerial images show a shifting duneland environment and therefore in my opinion it meets some of the descriptions of the substrate relating to Active Duneland; and
 - b) I do not agree that the presence and dominance of exotic vegetation justifies the removal of certain parts of the habitat from the Schedule F definition. The definition in Schedule F states that exotic invasive species could also be a feature of Stable Duneland and Active Duneland.
23. To frame the remainder of this evidence, I have therefore reverted to the historical classification and delineation of Schedule F habitat from the July 2021 report¹, unless otherwise specified.
24. In the report provided by Boffa Miskell, dated 26 July 2021¹ and the subsequent S92 responses from the Applicant⁶, a comprehensive analysis of the ecological value of the Ōhau River at the section alongside the proposed golf course has been undertaken. I generally concur with the description of the ecological value of the River as set out by the Applicant.
25. The main remaining feature of ecological significance is the saltmarsh wetland, described in application. It is considered a natural wetland provided for in the NPS FM and NES FW and is also habitat that meets the definitions for Schedule F in the Horizons One Plan.
26. There is an additional natural inland wetland area within the northern area of the site that meets the definition as a natural inland wetland under the NPS FM. This wetland is not considered significant (i.e. Schedule F habitat) under the One Plan and should only be considered under the NES FW. After reviewing the information I am in agreement with the Applicant that there is no impact on this natural wetland and is not discussed any further.

⁶ Boffa Miskell, Bay Geological Services and Eco Nomos, October 2021, Application, s92 Additional Information Response – Coastal

D. ECOLOGICAL VALUE

27. To determine the ecological value of the four Schedule F habitat types to be impacted, Boffa Miskell have relied on EIANZ Ecological Impact Assessment Guideline (2018). Table 4 of the EIANZ guidelines set out matters to be considered relating to representativeness, rarity/distinctiveness, diversity and pattern, and ecological context when assigning ecological value to a site or area or habitat/community.
28. In terms of the Kānuka treeland, I agree with the assessment presented by the Applicant's ecologist as the Kānuka treeland is representative of expected habitat in the ecological district. There is a wide range of indigenous species growing in the understorey. Kanuka has a threat status of Threatened – nationally vulnerable and has the possibility to host potential Threatened – At Risk species in regard to native lizards. I therefore agree with the High ecological value assigned to this feature.
29. In terms of the Saltmarsh wetland, I agree with the assessment presented by the Applicant's ecologist as the Saltmarsh wetland is representative of the community expected in the landscape, and contains a diverse number of species, as well as being a possible habitat for rare cryptic bird species. I therefore agree with the High ecological value assigned to this feature.
30. With respect to the assessments of Stable Duneland and Active Duneland habitat, the Applicant's Ecologist chose to assess these two features very separately and distinctly along clear, delineated boundaries within all reports. I do not agree with this approach, as these two habitats are interlinked and elements of either (including native fauna) are likely to be present in the other given their proximity and location at this site. Assessing these two habitats separately (and not acknowledging the strong inter-connectedness of the habitats and their features) may lead to an inaccurate assessment of the value of the ecosystem, and potentially also de-value their overall contribution to the wider ecosystem.
31. The Applicant originally has assigned an ecological value of 'High' for the Active Duneland, and 'Moderate' for the Stable Duneland. The Applicant's Ecologist in the Survey Summary Memo⁵ re-defined some of the areas to be exotic shrub which are considered to have Low ecological value. However, as previous stated I do not consider the updated assessment as accurate and therefore I have favoured the original assessment. The basis of some of the Applicant's assessment of ecological effects is strongly delineated along these habitat types. While I concur with the Applicant's original assessed values for each of the habitats (High and Moderate for Active and Stable Duneland respectively), I also consider that it is important to consider the relative features

found in each of these habitats and consider how they may cross specific habitat boundaries in certain instances. This forms the basis of some of my effects assessments further on in this evidence, particularly with respect to some of the assessments relating to threatened species.

E. EFFECTS OF THE ACTIVITY

32. The Applicant's Ecologist has assessed the potential direct and indirect adverse ecological effects associated with the proposal and determined the magnitude of effect using the EIANZ Guideline. I concur with the identified effects that have been identified across the various report. These potential direct and indirect adverse ecological effects are:

- a) Clearance or disturbance of indigenous vegetation (Boffa Miskell ¹);
- b) Loss of Threatened or At Risk species(Boffa Miskell ^{4,5});
- c) Increases in edge effects on indigenous habitats (Boffa Miskell ¹);
- d) Habitat fragmentation (Boffa Miskell ¹);
- e) Discharge of Sediment laden water (Boffa Miskell ¹);
- f) Effect of Golf Course Management (fertilizer, weed sprays, and golfers) (Boffa Miskell ¹, Boffa Miskell⁵, Boffa Miskell, Bay Geological Services and Eco Nomos⁶); and
- g) Change in Hydrology parameters (Boffa Miskell, Bay Geological Services and Eco Nomos⁶).

Clearance or disturbance of indigenous vegetation

33. The Applicant's Ecologist has identified around 16.12 ha of both Active and Stable Dune areas on the property. Of these areas, 2.12 ha is proposed to be converted to fairways permanently. The application proposes to remove 1.67 ha of Stable Duneland and 0.34ha of Active Duneland. The removal of 2.12ha equates to the loss of 13% of the total dune within the property boundary; but is less when considering the broader duneland system found along the coast (Boffa Miskell¹).

34. The Applicant's Ecologist has assessed the magnitude of effects using a scale between the Ōhau River and the next river outlet (Waiwiri Stream). After reviewing all information provided, I consider that there is approximately 8.8 ha of Active Duneland in this coastal space. The proposal, when considered at this scale, will impact some 3.86% of that system between Ōhau River and the Waiwiri Stream. For Stable Duneland, the Applicant's Ecologist has estimated 15 ha between the Ōhau River and Waiwiri Streams with the loss equating to a 1.7% loss at a wider scale. Using

the scale between the Ōhau River and Waiwiri Streams, the Applicant's Ecologist has determined a Low magnitude of effects. High and moderate value habitats that are impacted by a low magnitude of adverse effect result in (prior to any effects management) result in a Low level of adverse ecological effect when applying the EIANZ effects assessment matrix (Boffa Miskell⁷).

35. I have already set out my opinion of the contextual ecological scale that I think is appropriate to apply with respect to the magnitude of effect arising from the proposal in the Beca December 2021 letter (Appendix A). I summarise key elements of my opinion here:
- a) A range of factors should be considered when determining the zone of influence that may be affected by the biophysical changes caused by a project. In this instance, the Applicant's team have provided a high level of detail that relates to the study area which aligns with the property boundaries. The Applicant has not provided any ecological information, beyond very high-level statements, on the value of the wider dune systems that the site connects. This makes it difficult to contextualise the quality of the habitat features outside of the property boundary.
 - b) A level of judgement must be applied by ecologists to consider the overall magnitude of effect which influences the level of effect of a proposal, particularly the scale and zone of influence which the effects should be considered against.
 - c) Both Active and Stable Duneland are identified as regionally rare in the One Plan.
 - d) Indigenous vegetation associated with dunes is considered a national priority for protection of biodiversity by the Ministry for the Environment and the Department of Conservation as detailed within Protecting our Places⁷.
36. In my opinion, the broadening of the scale of comparison between the two watercourses overly dilutes the effective loss of these regionally rare and priorities for protection. On the other hand, I acknowledge that there is a need to consider an ecological context that is broader than the property boundaries themselves.
37. With the above in mind, I have considered Table 8 of the EIANZ guidelines which provides matters to consider when considering the magnitude of effect. I consider that the loss is detectable and will result in notable change to the existing baseline conditions; to the point where post-development character, composition or attributes will be partially changed. I do not agree with

⁷ Department of Conservation, Ministry for the Environment, April 2007, Protecting our Places -Introducing the National Priorities for Protecting Rare and Threatened Native Biodiversity on Private Land,

the Applicant's assessment of a 'low' magnitude (Boffa Miskell¹) as per those set out in Table 8 of the guidelines. I consider that prior to any management or mitigation, the magnitude of effect would be Moderate resulting in a Moderate Level of effect prior to management.

38. The EIANZ guidelines detail options in the 'High and Moderate adverse' category represent a level of effect that requires careful assessment and analysis of the individual case. Such an effect could be managed through avoidance, design, or extensive offset or compensation actions. Wherever adverse effects cannot be avoided, no net loss of biodiversity values would be appropriate. It is therefore my opinion that further management is required to address this effect. Irrespective of this point of difference, I note that the Applicant originally proposed a comprehensive compensation programme which I consider is acceptable and appropriate (as I set out in further detail below).

Loss of Threatened or At Risk species

39. The Applicant's Ecologist has confirmed the presence of at least two threatened species (sand daphne (*Pimelea villosa*) (Boffa Miskell¹) and Katipo (*Latrodectus katipo*) (Boffa Miskell⁵) within the property. There was uncertainty around the methodology to be deployed to survey and identify any native lizards at the Ecological Further Information Workshop⁸, however it was confirmed during the site visit that the Applicant had progressed to using Artificial Cover Object survey methodology. The result of the Artificial Cover Object survey for native lizard species is yet to be provided.
40. In regard to the sand daphne, the Applicant's Ecologists have sufficiently mapped the location of all individual plants occurring within the property and have confirmed that currently there are no individuals proposed within the footprint of clearance and therefore have assessed the effect as negligible on sand daphne. After reviewing the information, I agree on the assessed level of effect. However, I do note that the propagation of new individuals may result in sand daphne occurring within the proposed footprint by the time of development. It is my opinion however that this risk can be addressed through management measures.
41. In regard to Katipo, the Applicant's Ecologists have undertaken manual searching within two 20m x 20m grids. Fauna searches were undertaken within these defined areas. Two spiders were detected just outside the directly impacted areas proposed to be converted.⁹ The Applicant's

⁸ Ecology Further Information Workshop, 2nd November 2021, Between Beca's Ecologist and Water Quality Scientist and Applicant's Ecologist, Coastal Geomorphologist, planner and hydrogeologist.

Ecologist has concluded that very low level of effect due to no individual being detected within the direct work footprint.

42. After reviewing the information and undertaking the site visit, I do not agree with this assessment. Katipo spiders are a mobile species that are known to move through their habitat, either to locate a more suitable habitat or to find a mate. It is therefore not unreasonable to assume that katipo spider may occur within the work footprint at the time the project on the basis of the survey information collated by the Applicant's Ecologists at this time. Without a better understanding of the local population, it is difficult to truly determine the effect of the proposed works. However, it is my opinion the effects on this population can be managed through appropriate management or mitigation measures.

Edge Effects

43. It is my understanding that the Applicant's Ecologist considers that there is likely to be a reduction in edge effects compared with the current environment. This position is based on the premise the proposal will remove the pressure from the current agricultural practise and the activity of golf course management (such as weed and pest animal control) will reduce the current pressures. After reviewing the information, I am in agreement with the Applicant's Ecologist and consider this to be a positive effect.

Habitat fragmentation

44. The Applicant's Ecologist has assessed that while there will be further removal of some of the Stable and Active Duneland, this activity will not result in any further fragmentation. When I examine the proposed location of the holes, and greenways, I am in general agreement that the proposal will not result in any significant fragmentation. However, I do note a small amount of increased fragmentation. It is my opinion that this fragmentation can be addressed through management of the surrounding habitat.

Discharge of sediment laden water

45. The application stated that there are no perennial flowing streams occurring within the proposed development area and the sandy soils of the site will avoid the generation of fine silts or sediment. These factors have been assessed as limiting the generation of sediment laden water. The Applicant's Ecologist has proposed that well-maintained earthwork sediment management regimes will avoid any discharges of sediment laden water into the Ōhau River, the Salt Marsh or the one freshwater wetland.

46. I have not reviewed the sediment and erosion control plan, however, it is my assumption that should this plan meet the standard of the Regional Council's earthwork specialist then I would agree with the Applicant's Ecologist that the level of effect could be equated to negligible subject to appropriate mitigation and management measures in place.

Effect of Golf Course Management (fertilizer, weed sprays, and golfers)

47. In regard to the impact of golfers on the surrounding Schedule F habitat, the Applicant's Ecologist has determined that there is a small impact related to the trampling of native vegetation. However, they have indicated that this can be minimised by ball retrieval being undertaken by employees undertaking weed control and pest animal control. While the Applicant's Ecologist has not specifically assessed the effect of vegetation trampling, I have by inferred that the magnitude of effects are considered very low. I would agree with this assessment. I consider that through appropriate management of the golf course operation this this effect should be maintained as very low.
48. In relation to the use of fertiliser and the possible impact on the adjacent vegetation, the Applicant's Ecologist has assessed the risk as being "minimal and manageable". Justification for this assessment is founded on the nature of the soils (all sands) being highly unlikely that there will be lateral subsurface fertiliser or water travel. In addition, they make the statement that modern golf courses are not known to overuse resource (fertiliser and water) for golf infrastructure.
49. After reviewing the information and taking into account the surrounding landscape, there are several elements that I consider warrant further evaluation.
- a) As shown on within the original Boffa Miskell Report ¹ there is a shallow natural inland wetland (freshwater) occurring to the northern edge of the property boundary. This demonstrates that the water table must be in close proximity to the soil surface to result in the presence of a freshwater wetlands in this type of environment.
 - b) On the margins of the saltmarsh adjacent to the Ōhau River, I noted on the site visit that raupō was growing. This indicates an input of freshwater as opposed to a continuous brackish, estuarine influence as raupō are not considered to be especially saline tolerant.
 - c) During the site visit, the large area behind the Stable Duneland was inundated with surface water indicating that the drainage of surface water was limited, which could either indicating poor draining soils (which is considered unlikely given the highly sandy nature)

or that the water table is close to soil surface and therefore in period of high rainfall rises the water table above the soil surface.

50. These three aspects lead me to consider that the water table for the site is potentially close to soil surface at times, and there may be the opportunity for lateral flow of any discharges through this water table. There may be further information and assessment that the Applicant can provide to consider these diagnostic features in more detail.
51. Additionally, it is my understanding that golf course management in New Zealand can involve the use of chemical inhabitants to select for optimal grass growth, applied through irrigation. I am directly aware of two golf courses that implement/plan to do so, being a proposed golf course in Muriwai, Auckland and a currently operational one at Te Arai Point. I am also aware of other golf courses within the coastal landscape in New Zealand that have applied standard management regimes that may have contributed to shifting dune lake systems towards more eutrophic states.
52. With these presented, I am concerned about potential effects on the Salt Marsh and Ōhau River arising from a long-term golf management regime that includes nutrients and inhibitors as required for optimal golf-course maintenance, particularly in areas of particularly transmissive soils like occur here. However, without a more detailed understanding of the above three issues raised, I consider that a pragmatic solution could be to monitor the salt marsh and Ōhau River ecosystem for any impact potential impacts and where negative effects are detected, adjustments to the golf course management can be implemented.

Change in Hydrology parameters

53. The Applicant's team of Ecologists and hydrogeologist have provided a joint assessment (Boffa Miskell, Bay Geological Services and Eco Nomos⁶) on the potential effect of the bore water take on both the salt marsh wetland and the Ōhau River. An assessment of the potential depletion found that the bore take has the potential to result in 4% depletion effect. The Applicant has further indicated that the majority of the hydrological driver of the salt marsh is due to the connectivity to the Ōhau River lagoon and not the deep ground water. After reviewing the information, I am in agreement that 4% depletion is unlikely to have any detectable change on ecological parameters particularly the salt marsh wetland. I therefore concur with the Applicant's assessment and the level of effects arising from the proposed water take on the Ōhau River lagoon.

F. SUBMISSIONS

54. I have reviewed the submissions made on the application. Many of the submission topics fall outside of my area of expertise and I have not discussed them further.
55. I have noted the submission from Te Iwi o Ngāti Tukorehe Trust and other Tukorehe Mandated Authorities have expressed a position, that I understand to not be in support of the application. I further note that the remain submission are in support of the proposal.

G. OUTSTANDING MATTERS

56. At the time of writing this report, there are still outstanding matters pertaining the lizard population potential present throughout the site. During the evolving s92 process it was agreed additional survey work would be undertaken, using recognised methodologies, such as the deployment of ACO transect through potentially favourable lizard habitat. The Applicant's Ecologist has undertaken manual searching through some of the habitat and deployed 6 'critter pic' camera traps. However, as agreed with the Applicant's Ecologist, this was not considered sufficient effort to determine if there are any potential native lizard hotspots within the site.
57. The ACO survey has not yet been provided. It is therefore not possible to determine the effect on native lizards as it is not possible to confirm the diversity and/or locational abundance. Therefore, the correct form of management or avoidance cannot be considered at this time.
58. I have also set out further potential issues relating to hydrology and connectivity of the salt marsh features and Ōhau River, and the potential impacts that may arise from long-term operation of the golf course and any chemical management measures they may apply. I have recommended a monitoring regime be implemented, but further information could be provided to demonstrate these concerns are lower risk; or, to identify key contaminants that should be monitored and the methodology of monitoring.

H. EFFECTS MANAGEMENT

Management of Schedule F Habitat Loss

59. Within the original Boffa Miskell report¹ and Eco Nomos report¹⁰ both report authors recommended that to address the impacts associated with the loss of 2.12 ha of Schedule F habitat (1.67 ha Stable Duneland and 0.34ha Active Duneland), restoration work to offset these

¹⁰Eco NomosLtd, 2021, Proposed Golf Links: Muhunoa Road West, Ōhau: Coastal Processes and Vegetation – Opportunities & Constraints

losses should be undertaken. The Boffa Miskell report indicated a draft ecological restoration plan had been developed. Through the section 92 process further questions were asked to quantify the offset proposed. The Applicant's response was that they *did not consider it necessary to develop a standard offset model as per (Business and Biodiversity Offsets Programme (BBOP) 2009; Maseyk et al. 2017; 2015) but that a sensible and effects proportionate approach is sufficient*. The Applicant proposed that an approximately 1:11.5 ratio on area would be sufficient to address the loss of the schedule habitat.

60. The original proposal identified the need to address the effects of the loss of schedule F as an offset or compensation (as recommended). During the process, the Applicant sought to remove the need offer offset for the loss of schedule F habitat to prevent notification of the application. During the site visit both the applicant's planner and ecologist advised that the restoration plan was still to progress as outlined but they were just not identifying it as an offset to address the loss of schedule F habitat.
61. It was my opinion at the time and is still my position, that in general a 1:11.5 ratio on area should be sufficient to compensate the ecological effects associated with the loss of Schedule F habitat. My understanding is that this could NOT be considered an offset without some form of quantification. As detailed within paragraph 18, to address this concern, it was agreed that the Applicant's Ecologist, that they would undertake REECE vegetation plots to quantify the level of native vegetation being lost by the proposed greenways and the level of native vegetation being restored within the area proposed for restoration.
62. While this information was not provided, based on all information, including the site visit, I remain comfortable that the proposed restoration of the duneland system at a ratio of 1:11.5 will provide sufficient compensation of the effects.
63. I am confident that the compensation restoration proposal will result in a net ecological gain if it is undertaken in a way as described within Eco Nomos report⁹. *"The work will involve a range of activities (e.g. plant and possibly animal pest control, planting, ongoing maintenance, management of human use and disturbance, etc). It will require preparation of a detailed restoration plan as a strategic approach is critical to success in difficult sites like this. An experimental approach will also be required to some elements given the limited experience with successful restoration of native dune communities to date on the Manawatu coast. This coast has unique characteristics which mean that lessons from dune restoration elsewhere, while valuable, will not likely be adequate to address all issues likely to be faced."*

64. This proposal is fundamental to compensate for the effects of the proposal and it is critical that appropriate condition(s) requiring the plan and setting clear outcomes for it are set.
65. While the restoration plan will primarily address effects pertaining to the loss of Schedule F habitat, the restoration plan also has the potential to address effects pertaining to the small amount of habitat fragmentation. As it is highly likely that the restoration will increase connectivity between existing duneland fragments. Consideration should be given during the design of the restoration plan to this outcome as well.

Loss of Threatened or At Risk species

66. In regard to the potential impact on sand daphne possibly occurring within the works footprint at the time of clearance, it is recommended that a relocation plan is developed that outlines a suitable timeframe to survey for any new individuals prior to construction commencing and outlines a relocation methodology should individuals be detected with the works footprint. This should provide sufficient mitigation to address the potential effect on the sand daphne.
67. To mitigate the potential effect on katipo spiders, it is recommended that a Katipo Spider Management Plan is developed. This plan should include at a minimum adequate survey methodologies within all of the proposed Duneland to be cleared, identification of suitable release sites, and a recommendation that where high numbers of katipo are relocated to, additional habitat enhancements are undertaken to address any issues with carrying capacity. The development and implementation of the Katipo Spider Management Plan should mitigate the effects on katipo spiders as a result of the proposed development and encroachment into their habitat.
68. There may be a similar approach to lizard fauna that may be present at the site; subject to the receipt of information from the Applicant's Ecologists. However, without confirmation that there are no natural hotspots of high density, it is not possible to confirm the correct way to address the effects.

Effects of Golf Course Management

69. I hold residual concerns regarding the potential impacts on the Salt Marsh Wetland and the Ōhau River lagoon that may be associated with the discharge of nutrients in the form of fertiliser and the effect of any growth inhibitors that may be used.
70. To address the uncertainty, it is recommended that an adaptive wetland and lagoon monitoring plan is developed, and monitoring undertaken during the initial operation of the golf course with

a view to making sure that no change in ecological value of the features occurs as a result of the proposal. This monitoring should be able to detect any changes within the Salt Marsh Wetland and the Ōhau River lagoon and be relied on to adjust the golf course operations and management regime with respect to additives for golf course management.

71. I consider that implementation of the monitoring plan should determine whether lateral movement of nutrients from the greenway closest to Salt Marsh Wetland and the Ōhau River lagoon are occurring. Any such monitoring plan should seek to monitor key ecological parameters of the Salt Marsh Wetland and the Ōhau River lagoon. The plan should take an adaptive management approach to identify actions to undertake should adverse changes be detected.

I. CONCLUSIONS

72. I have reviewed all of the information submitted in relation to the proposal to establish and operate a links golf course at 765 Muhunoa West Road, Ōhau. It is my opinion that the Applicant has provided sufficient information to consider the ecological effects associated with the proposal, with the exception of actual and potential effects on native lizards. It is my understanding that some further survey data may be provided in relation to this matter. I have also raised my concerns about the on-going management of the golf course and the potential effect of nutrients/growth inhibitors on down gradient ecological features.
73. While there is some disagreement between the Applicant's experts and myself with respect to approach to assessing ecological values (particularly around an appropriate ecological context), it is my assessment that the majority of potential ecological effects can be addressed and appropriated managed via mitigation and off-setting.
74. A critical component that has influenced my conclusions is a compensation proposal. It is therefore my recommendation that this restoration be formalised as compensation for the moderate level of effect of the loss of Schedule F habitat. Therefore, appropriate conditions and setting of outcomes for the restoration plan will be important to achieving an appropriate level of ecological compensation for the proposal.

DATED this 6th day of April 2022



Connor Whiteley

Senior Consultant Ecologist (BECA)

APPENDIX A

Ecological Effect Review - Removal of Schedule F Habitat

Horizon Regional Council
Private Bag 1105
Manawatu Mail Centre
Palmerston North, 4422
New Zealand

20 December 2021

Attention: Fiona Morton
By Email fiona.morton@horizons.govt.nz

Dear Fiona

Ecological Effect Review - Removal of Schedule F Habitat

This letter report to Horizons Regional Council (Horizons) provides a summary of two key matters in accordance with the agreement between Horizons and Beca Ltd (Beca) relating to assistance with processing an application made to Horizons by Grenadier Ltd.

It provides:

- A review of the information provided by the applicant and subsequently informed by a site visit undertaken to the site in relation to Schedule F characteristics of the Horizons Plan; and
- A review of the information provided by the applicant and to undertake an assessment of the level of effect associated with the proposal.

The site visit was undertaken on 16 December 2021 alongside the applicant's ecologist.

It is understood that this information will be used to inform a notification decision to be made by Horizons.

Schedule F characteristics

The first step of this process is to review the updated Schedule F assessment undertaken by the applicant's ecologist. It is my understanding of schedule F areas¹ are:

A rare habitat, threatened habitat* or at-risk habitat* is an area of **vegetation or physical substrate** which:*

(a) is a habitat type identified in Table F.1 as being "Rare", "Threatened" or "At-risk" respectively,

(b) meets at least one of the criteria described in Table F.2(a) for the relevant habitat type, and

(c) is not excluded by any of the criteria in Table F.2(b).

¹ [https://www.horizons.govt.nz/HRC/media/Media/One%20Plan%20Documents/Schedule-F-Indigenous-Biodiversity-\(amended-by-PC-1-2016\).pdf?ext=.pdf](https://www.horizons.govt.nz/HRC/media/Media/One%20Plan%20Documents/Schedule-F-Indigenous-Biodiversity-(amended-by-PC-1-2016).pdf?ext=.pdf) (accessed 20 December 2021)

From the above definition, both vegetation and physical substrate are factors to determine whether an area has characteristics consistent with Schedule F and it is not limited to a consideration of vegetation cover of its own accord. It is therefore considered appropriate to consider both vegetation and substrate for the purpose of delineating what may be consistent with definition of Schedule F.

Schedule F areas were delineated by Boffa Miskell in their initial application documents (Ohau proposed golf course Ecological Assessment Douglas Links Golf Course, 26 July 2021). Additional vegetation plots were undertaken in response to requests for further information and subsequent conversations with the applicant's team. This is documented within Bryce Holmes email 16/12/2021, stating:

1. *Vegetation – agreed to undertake plots in accordance with the maps sent out by Boffa Miskell. The plots will then be overlaid with the proposed restoration plan and then the restoration refined base on values more specifically.*

There is some variation to the location of the vegetation plots previously discussed and agreed upon; and certain areas which were previously agreed to be surveyed have not been in the latest tranche of information gathering.

Since providing their response to certain parts of the further information request, the applicant has submitted updated areas delineated as Schedule F. It appears that some of the vegetation plots requested and the findings of those plots have been used by the applicant to refine and re-delineate areas previously defined as Schedule F in the original AEE. The key issues I have noted are as follows:

- At the Northern Holes (see figure 1) no RECCE vegetation plot was surveyed over an area previously identified as vegetation type 9 (Knobby Clubrush stable dune). The applicant's delineation in the AEE of this vegetation type was informed by a simple site walkover. In the applicant's s92 response, this has been reclassified as type 6 (exotic scrub) which is not a Schedule F habitat. Given that no additional specific RECCE plots were undertaken in this area, I consider that it would be inappropriate to re-define this area as Type 6; and it would be unlikely that this would be able to be reclassified as non-Schedule F habitat due to the physical substrate considerations (expanded further below).
- The area previously identified as vegetation type 9 has subsequently been revised to vegetation type 6a within the response. These areas appear to present a mixture of native and exotic vegetation exhibiting a grassland type community occurring on Stable Duneland formed on recent coastal sand. These areas have been removed from the 'Schedule F' delineation and definition, apparently due to the presence of some exotic vegetation. I do not agree with this interpretation as it is my understanding that there is native vegetation present (described within the Stable Duneland definition) and recent coastal sand forming the substrate (described within the Stable Duneland definition). The presence of exotic vegetation also being present does not invalidate the Schedule F definition by itself (the definition says that "*Exotic invasive species are also a feature of Stable Duneland*").
- At hole 14, I consider that it is defined as Active Duneland formed on raw coastal sand. The instability of the sand can be noted when examining the various historic imagery of the area that shows a shifting environment and therefore meets the substrate description. On the site visit, I noted areas with Sand convolvulus and Sand Carex while undertaking the site visit along with other native species within the exotic species described by the applicant. This area also meets the definition of Active Duneland within Schedule F; and it is likely to be a transitional zone between Active Duneland and Stable Duneland.

I consider the delineation as submitted in the AEE (Map 3, Pg 60) to be more appropriately defined and the updated delineation to not be representative of Schedule F classification.

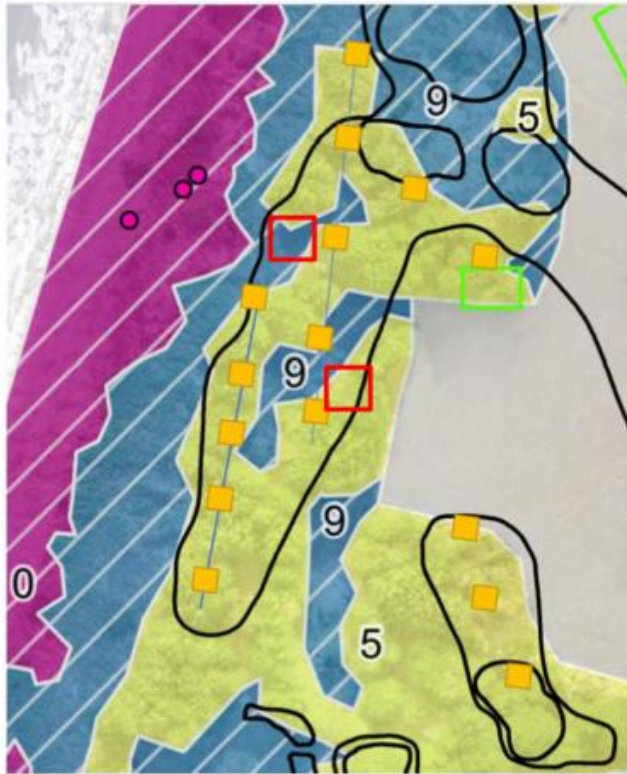


Figure 1 Agreed northern sample plot locations demarked by the orange boxes.

Ecological Value

In determine the ecological value of the dune system I have used the information presented and compared it against the four criteria within the EIANZ Ecological Impact Assessment Guideline (2018). Given there are two Schedule F habitat types being impacted by the proposed application I have assessed the ecological value separately; although these two habitats are interlinked and elements of either are likely to be present in the other given their proximity and location. I have not taken the position of the applicant ecologist to fragment the ecosystem, identified within the site, as this leads to an inaccurate representation of the value of the ecosystem.

Table 4 of the EIANZ guidelines set out matters to be considered relating to representativeness, rarity/distinctiveness, diversity and pattern, and ecological context when assigning ecological value to a site or area or habitat/community.

Table 4 Attributes to be considered when assigning ecological value or importance to a site or area of vegetation/habitat/community.

| Matters | Attributes to be considered |
|------------------------|--|
| Representativeness | <p>Criteria for representative vegetation and aquatic habitats:</p> <ul style="list-style-type: none"> • Typical structure and composition • Indigenous species dominate • Expected species and tiers are present • Thresholds may need to be lowered where all examples of a type are strongly modified <p>Criteria for representative species and species assemblages:</p> <ul style="list-style-type: none"> • Species assemblages that are typical of the habitat • Indigenous species that occur in most of the guilds expected for the habitat type |
| Rarity/distinctiveness | <p>Criteria for rare/distinctive vegetation and habitats:</p> <ul style="list-style-type: none"> • Naturally uncommon, or induced scarcity • Amount of habitat or vegetation remaining • Distinctive ecological features • National priority for protection <p>Criteria for rare/distinctive species or species assemblages:</p> <ul style="list-style-type: none"> • Habitat supporting nationally Threatened or At Risk species, or locally¹⁹ uncommon species • Regional or national distribution limits of species or communities • Unusual species or assemblages • Endemism |
| Diversity and Pattern | <ul style="list-style-type: none"> • Level of natural diversity, abundance and distribution • Biodiversity reflecting underlying diversity • Biogeographical considerations – pattern, complexity • Temporal considerations, considerations of lifecycles, daily or seasonal cycles of habitat availability and utilisation |
| Ecological context | <ul style="list-style-type: none"> • Site history, and local environmental conditions which have influenced the development of habitats and communities • The essential characteristics that determine an ecosystem’s integrity, form, functioning, and resilience (from ‘intrinsic value’ as defined in RMA) • Size, shape and buffering • Condition and sensitivity to change • Contribution of the site to ecological networks, linkages, pathways and the protection and exchange of genetic material • Species role in ecosystem functioning – high level, key species identification, habitat as proxy |

Figure 2 Extract of ecological value assessment from EIANZ Guidelines.

Active Duneland

From a representativeness perspective, the Active Duneland presents with a typical structure of an active dune system; indigenous species are generally dominant on the exposed dune front with pest plants occur more frequently the closer the Active Duneland comes to the Stable Duneland boundary. The expected species are present. I would therefore consider the value for representativeness as Moderate given the relative abundance and presence of exotic species

From a rarity perspective, Active Dunelands are considered *rare* under the One Plan and the Active Duneland is host to at least two At Risk – Declining species which have been detected within this Schedule F habitat. The Government’s “Protecting our Places” (Ministry for the Environment and Department of Conservation 2007,) identifies four national priorities for biodiversity protection and adds three further categories to those described by Holdaway et al. (2012), indigenous vegetation associated with sand dunes is one of them. I have therefore determined the value for ‘rarity’ as High.

From a diversity and pattern perspective, the Active Duneland is functioning as is to be expected for an Active Duneland, with the historical aerial showing the shifting nature of the active dunes and the vegetation responding in kind. There is some disturbance noted with the deposition of rubbish and there is disturbance from vehicle access to the beach and dunes; alongside some impacts from exotic pest species. I would therefore consider it reasonable to determine the value for diversity and pattern as Moderate.

In terms of ecological context, the area of Active Duneland subject to the proposal is connected to an extensive duneland ecosystem running in either direction. The site is an important linkage site between the dunes system either side of the Ohau River and while exhibiting some impact from human activities it is

relatively remote from the two beach access points/towns (Hokio Beach & Waikawa Beach). From an ecological context it is considered to be Moderate value.

Using the EIANZ framework the overall ecological value of the Active Duneland is considered to be **High**.

Stable Duneland

From a representativeness perspective, the Stable Duneland presents with a typical structure of a stable dune system, indigenous species are present throughout the Stable Duneland; while indigenous plant species are generally in greater abundance towards the Active Duneland with a trend of exotic species becoming more abundant as the Stable Duneland progresses toward the current pasture system further from the coast. It was noted on the site visit that where light wells/tree fall had occurred in recent history within the macrocarpa areas (Stable Duneland), then native duneland species such as Beach Spinach *Tetragonia trigyna* appear to establish. The expected species identified within One Plan are present. I would therefore consider the value for representativeness as Moderate - Low given the relative presence and abundance of exotic species

From a rarity perspective, Stable Dunelands are considered rare under the One Plan and the Stable Duneland is host to at least one At Risk – Declining species which have been detected within this Schedule F habitat. It is also my opinion that there is strong likelihood that katipo spider (that have been detected) are likely to be present in the Stable Duneland habitat. As with the Active Duneland systems, the Government's "Protecting our Places" (Ministry for the Environment and Department of Conservation 2007,) identifies four national priorities for biodiversity protection and adds three further categories to those described by Holdaway et al. (2012), indigenous vegetation associated with sand dunes is one of them. It is therefore reasonable to determine the value for rarity as High.

From a diversity and pattern perspective, the Stable Duneland hosts exotic macrocarpa stands which is leading to the fragmentation of more typical/expected Stable Duneland habitat. There are still Stable Duneland features such as dune hollows and it was noted that here where still duneland patterns occurring such as higher moisture retention within the dune hollows. I would therefore consider it reasonable to determine the value for diversity and pattern as Moderate - Low.

In terms of ecological context, the Stable Duneland system is connected to a more extensive duneland ecosystem running in either direction. The area subject to the proposal is an important linkage site between the dunes system either side of the Ohau River and while exhibiting degradation from human activities it is relatively remote from the two beach access points/towns (Hokio Beach & Waikawa Beach). From an ecological context it is considered to be Moderate value.

Using the EIANZ framework the overall ecological value of the Active Duneland would be considered **Moderate**.

Magnitude of Effect

To provide context the EIANZ guides ecologists to assess the magnitude of effect with the following guidance:

- An ecologist should consider an impact on the zone of influence and specifically references a *reach of stream* not a local catchment or the wider catchment but a reach (Pg76), thus arguably advocating a very focused scale.
- Furthermore, when describing scale or extent the EIANZ indicates that the scale "...should firstly be expressed in terms such as **study area, corridor, project footprint, or zone of influence**, which were established at the start of the assessment process." (Pg79).
- **Zone of influence:** the areas/resources that may be affected by the biophysical changes caused by the proposed project and associated activities.

- The criteria for describing magnitude of effect references both feature and site (pg83).
 - *Very high*
 - *Total loss of, or very major alteration to, key elements/features/ of the existing baseline conditions, such that the post-development character, composition and/or attributes will be fundamentally changed and may be lost from the **site** altogether; AND/OR*
 - *Loss of a very high proportion of the known population or range of the element/feature*

The EIANZ guidelines caution about assessing magnitude of effect at the spatial scale of the effect is not recommended, and using the example of example, *removal of 10m² kanuka at the edge of a 20m² stand for an access road may reduce the site's kanuka cover by 50%; but if the surrounding land supports extensive kanuka, and the species is common in the Ecological District, the wider context of that clearance needs to be considered.*

The applicant's team have refined the study area to be defined by the site which aligns with the property boundaries. The applicant has not provided any ecological information, beyond very high-level statements, on the value of the wider dune systems that the site connects to. This defined area further aligns with the project footprint.

On the above information, a level of judgement must be applied by ecologists to agree the overall magnitude of effect which influences the level of effect of a proposal; particularly the scale and zone of influence of which the effects should be considered against, I have considered the following:

- The area of direct impact on the applicant's property forms part of than overall wider duneland system. There has been limited information assessing the wider contextual value of the broader environment; although the fact that these extend beyond the boundaries of the land parcel assessed is not disputed.
- Both Active and Stable Duneland are identified as regionally rare in the Horizons One Plan
- Indigenous vegetation associated with dunes is considered a national priority for protection of biodiversity by the Ministry for the Environment and the Department of Conservation

When considering the removal of Schedule F habitat for the application, it has been identified by the applicant that the overall activity will result in 2.12 ha being converted to fairways permanently; of which 1.67 ha is Stable Duneland and 0.34ha is Active Duneland. The removal of 2.12ha equates to the loss of 13% of the total dune within the property boundary; but less when considering the broader duneland system found along the coast.

A number of rare and threatened fauna (at least Katipo Spiders; herpetofauna surveys have not been completed at the time of writing this letter) and botanical species have been identified across the Active and Stable Duneland system, and I consider it likely that they will be present in these areas. Loss of range for these species by the conversion of the duneland to golfing green is long-term to permanent.

Table 8 within the EIANZ guidelines provides matters to consider when considering the magnitude of effect. With the above in mind, I consider that the loss is a detectable and will result in notable change to the existing baseline conditions; to the point where post-development character, composition or attributes will be partially changed.

I do not agree with the applicant's assessment of a 'low' magnitude as per those set out in Table 8 of the guidelines.

I therefore consider that prior to any management or mitigation, the magnitude of effect would be **Moderate**.

Level of Effect

When combining the ecological values of the two dunelands and the magnitude of effect, the overall level of effect High or Moderate for the individual constituents of the dunelands. Overall, given the relatively lower expected disturbance of the higher-value active duneland in comparison to the stable duneland, I consider

that the level of effect from the overall proposal as it stands is **Moderate**. This relies on the application of the Schedule F as delineated by the original AEE (Ohau proposed golf course Ecological Assessment Douglas Links Golf Course, 26 July 2021).

The EIANZ guidelines detail *options in the 'High and Moderate adverse' category represent a level of effect that requires careful assessment and analysis of the individual case. Such an effect could be managed through avoidance, design, or extensive offset or compensation actions. Wherever adverse effects cannot be avoided, no net loss of biodiversity values would be appropriate.*

In this instance the permanent loss of Schedule F duneland could be avoided; but it is an intrinsic part of the proposal. Some of the effects arising from that change in land use can be remedied or mitigated; but the loss of rare habitat and functionality is not able to be mitigated; and hence either offsetting and/or compensation for the proposal is required.

Yours sincerely



Connor Whiteley

Senior Ecologist

on behalf of

Beca Limited

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