22-Nov-2018

BEFORE THE HEARINGS PANEL
FOR THE WELLINGTON CITY COUNCIL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of Proposed Plan Change 83 to the Wellington City District Plan

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STATEMENT OF EVIDENCE OF DR ASTRID CORA VAN MEEUWEN-DIJKGRAAF

NOVEMBER 2018

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1 INTRODUCTION

1.1 My name is Dr Astrid Cora van Meeuwen-Dijkgraaf.

1.2 I hold the degrees of Bachelor of Science, Master of Science with Honours (Environmental Science and Botany), and Doctor of Philosophy (Ecology, plant animal interaction) from the University of Auckland. I am a Senior Ecologist with Wildland Consultants Ltd, a position I have held since 2007, based in Wellington. My experience is set out in Appendix A.

1.3 My involvement in Plan Change 83 started in 2017 and I have visited the site of the plan change and undertaken assessments of potential ecological effects and potential mitigation options. I am quite familiar with the relevant land and its features.

1.4 My involvement at Kiwi Point Quarry includes assisting with the initial assessment of ecological effects report (Wildland Consultants 2017), assisting with assessment of effects on lizards at the proposed quarry site (Wildland Consultants 2018a), and development of various mitigation options provided in the mitigation options report (Wildland Consultants 2018b).

1.5 I have undertaken several site visits:

- On 6 December 2017 to assist with the assessment for potential effects on lizards;
- On 31 July 2018 to assess potential mitigation areas within and adjacent to the site;
- On 10 October 2018 to view the vegetation on the Tyers Road cut face and on the face along SH1;
- and on 17 October to view various portions of the Waitohi Stream.

1.6 While I understand that the present hearing is not a matter to which the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note (2014) applies, I confirm that I have approached the preparation of this evidence in the same manner as I would for Environment Court proceedings and have complied with the requirements of the Code. I confirm that the issues addressed in this evidence are within my area of expertise and the opinions I have expressed are my own except where I have stated that I have relied

on the evidence of other people. I have not omitted material facts known to me that might alter or detract from my evidence.

2 SCOPE OF EVIDENCE

2.1 I have been asked by Wellington City Council to prepare ecological evidence on its behalf as a proponent of Proposed Plan Change 83.

2.2 The evidence I was asked to prepare specifically relates to a summary of work that Wildland Consultants Ltd have carried out to date and any comments on submissions that are relevant to my areas of expertise, specifically regarding ecology.

2.3 My evidence will address the following points:

(a) The assessment of ecological effects for the proposed expansion of the Kiwi Point Quarry.
(b) The assessment of lizard populations within the proposed Kiwi Point Quarry expansion area.
(c) Mitigation options for the potential loss of indigenous vegetation and habitat within the proposed Kiwi Point Quarry expansion area.
(d) Responses to the s42A report.
(e) Responses to relevant submissions to Proposed Plan Change 83.

3 Key documents and information that I have referred to and relied on in preparing my evidence include:

(a) Wildland Consultants 2017: Assessment of ecological effects for proposed expansion of the Kiwi Point quarry, Ngauranga Gorge, Wellington. *Wildland Consultants Ltd Contract Report No. 4378*. Prepared for Wellington City Council. 31 pp.
(b) Wildland Consultants 2018a: Assessment of lizards for a proposed expansion of the Kiwi Point Quarry, Ngauranga Gorge, Wellington. *Wildland Consultants Ltd Contract Report No. 4378b*. Prepared for Wellington City Council. 13 pp.

(c) Wildland Consultants 2018b: Mitigation options for the potential loss of indigenous vegetation and habitat at the proposed Kiwi Point Quarry, Wellington, *Wildland Consultants Ltd Contract Report No. 4378d*. Prepared for Wellington City Council. 33 pp.

3.1 EXECUTIVE SUMMARY

Proposed Plan Change 83 has been notified to rezone part of Open Space B land in the Ngauranga Gorge to Business 2 to enable expansion of the Kiwi Point Quarry. Wildland consultants have carried out an assessment of ecological effects, and an assessment of lizard populations within the proposed expansion of the Kiwi Point Quarry, which includes land currently zoned as Business 2 and the land currently zoned as Open Space B, which is subject to the Plan Change. Regardless of the current zoning, the proposed quarry expansion will result in significant adverse ecological effects and thus requires mitigation. A mitigation options report has been developed to assess whether sufficient mitigation is available within the site or on nearby sites which would benefit from additional conservation actions, to mitigate the ecological effects of the proposed quarry expansion. The mitigation options report is not a formal mitigation plan, nor does it address quarry rehabilitation or mitigation of landscape effects. I have also reviewed and addressed submitters concerns, including concerns from Greater Wellington Regional Council (GWRC) and the WCC S42A report.

4 THE SITE

4.1 In this report, 'the site' refers to the area currently zoned as Business 2 and the area zoned as Open Space B which is subject to the Proposed Plan Change 83, which would be rezoned to Business 2 to enable the full quarry development to go ahead.

4.2 The site ranges from 60-180 metres elevation above sea level, is located in the Wellington Ecological District, is within the Tyers Stream and Waitohi Stream catchments, and has a predicted vegetation type of coastal kohekohe, tawa forest (Singers & Rogers 2014).

5 SUMMARY OF CONCLUSIONS FROM THE ECOLOGICAL ASSESSMENT

5.1 Within the proposed quarry site. the assessment of ecological effects identified eight different vegetation/habitat types on a variety of landforms with different sun aspects. All the vegetation types comprising indigenous forest were found to be ecologically significant under Policy 23 of the Regional Policy Statement for the Wellington region.

5.2 The original assessment of ecological effects stated that the quarry site comprised 13.3 hectares including approximately 3.5 hectares of indigenous vegetation types which were mapped and described as ngaio-māhoe-māpou forest, [ngaio]/māhoe forest, regenerating forest, mixed gully forest, and māhoe forest (Wildland Consultants 2017). The actual area of indigenous vegetation actually comprises 4.91 hectares and this was all to be potentially cleared.

5.3 Since the production of this report, an alternative quarry layout has been proposed which has reduced indigenous vegetation clearance somewhat, and it has also become clear that some areas of indigenous vegetation within the proposed quarry extension are unlikely to adversely affected. This has changed the amounts of the vegetation types to be affected calculated in subsequent reports.

5.4 Ngaio-māhoe-māpou forest is representative of the original vegetation type, is strongly reduced and poorly protected and contains a diversity of plant species, including kānuka (*Kunzea robusta*; Threated-Nationally Vulnerable), and one kōwhai (*Sophora microphylla;* locally uncommon species) tree. Loss of this vegetation type, including the loss of locally important genetic material, would result in significant effects.

5.5 [Ngaio]/māhoe forest is strongly reduced and poorly-protected within Wellington Ecological District, and is representative of current vegetation types. Loss of this vegetation type will also have significant effects.

5.6 Regenerating forest, mixed gully forest, and māhoe forest are also representative indigenous vegetation types at the site. These have lesser ecological values, but still protect Category 3 land

environments (20-30% indigenous vegetation left), provide food and habitat for birds and reptiles, buffer indigenous vegetation within Tyers Reserve from wind and ecological weeds, and provide riparian protection for Tyers Stream and Waitohi Stream. These environmental effects are significant and would require mitigation and remediation.

5.7 Although potential effects on the Waitohi Stream are technically outside the scope of Wellington City Council Plan Change 83, and instead come under the ambit of the Wellington Regional Council, it was felt that an integrated mitigation package would provide greater ecological benefits in the long term. Waitohi Stream is confined along most of its length by development, and the upper catchment, upstream of Kiwi Point Quarry, is largely residential with impervious surfaces and the stream directed through underground culverts. Within the quarry itself there are still open reaches and areas of riparian vegetation. The loss of open reaches and riparian vegetation would be significant and is largely proposed to be avoided with any residual effects requiring mitigation and remediation.

6 SUMMARY OF LIZARD ASSESSMENT

6.1 As development of the quarry has the potential to remove lizard habitat, an additional assessment on the effects on lizard populations was carried out (Wildland Consultants 2018a). An analysis of previous records and habitat requirements determined that the likelihood of ngahere gecko, copper skink, and northern grass skink occurring at the site was low. The chance of barking gecko being present is very low and there is an unlikely chance of ornate skink, glossy brown skink, and Raukawa skink being present at the site. However, despite the use of a diverse range of survey methods, no lizard species were detected.

6.2 Overall, it is likely there are either no lizards or only very low numbers of lizards at this site, and a salvage and lizard management plan is not suggested. If any lizards are found during development of the quarry they should be promptly moved and released into suitable adjacent habitats outside the quarry expansion area.

6.3 A Wildlife Act Authority is required, however, because we cannot be certain of the absence of indigenous lizards and because development of the quarry will remove habitats that appears suitable for indigenous lizards. To account for the potential loss of lizard habitat, it is suggested that habitat enhancement be undertaken at a nearby site, through rodent control and potentially also the creation of rock piles or by planting indigenous trees and shrubs often utilised by lizards.

7 SUMMARY OF MITIGATION OPTIONS REPORT

7.1 The quarry footprint was changed between production of the initial ecological assessment report and the mitigation options report, resulting in reporting of differing amounts of proposed vegetation clearance. In total, the revised proposed quarry footprint is 12.32 hectares, including 4.15 hectares of indigenous vegetation to be cleared. Changes to the configuration and areas proposed to be cleared are set out in the following paragraphs. The total of 4.15 hectares of indigenous vegetation proposed to be cleared takes account of these changes.

7.2 It has been agreed that mitigation should be in kind (i.e. like-for-like), on a site(s) with similar environmental gradients, close to the affected area, and with the potential for additional conservation actions over an area larger than the area to be affected. For practicality reasons, mitigation should be carried out within land currently owned by Wellington City Council. A nominal 1:3 ratio was suggested in the ecological assessment report, and in discussion with GWRC this 1:3 ratio could include other activities such as rodent control, stock fencing, and harvesting and propagation of plant material to retain local genetic plant stock.

7.3 Reconfiguration of the proposed quarry from the initial extent has avoided potential adverse effects on 0.25 hectares of indigenous forest and 0.03 hectares of blackberry-pōhuehue vineland, but resulted in the loss of an additional 0.01 hectares of [ngaio]/māhoe forest from the Open Space B portion of the land.

7.4 The Proposed Plan Change included reconfiguration of the abattoir grazing area, which had the potential to result in the loss of

approximately 0.4 hectares of Wellington City Council's restoration planting trials. We have proposed that the abattoir grazing area is reconfigured to avoid the planting trials, resulting in a minor reduction in the overall grazing area, from 1.72 to 1.70 hectares. This reduced the amount of indigenous vegetation loss to be mitigated. The viability of this approach is awaiting confirmation by Taylor Preston Ltd, and the decision on whether quarried material will be transported via haul road or conveyor to the crushing plant.

7.5 It is proposed to retain all remaining areas of riparian vegetation within the proposed quarry extension and within Kiwi Point Quarry as a whole. Within the proposed quarry extension this includes 0.43 hectares of mixed indigenous-exotic gully forest. It is suggested that the quality of the riparian vegetation along the entire Waitohi Stream within the Kiwi Point Quarry (including areas outside the proposed quarry extension) is progressively managed from the currently mixed indigenous-exotic vegetation to greater dominance of indigenous species. As the quarry operations come to a close, or relocate from the northern to the southern face, various options to improve the stream condition and floodplain should be explored, including removing confining bunds, access ways, and infrastructure, increasing the width of the riparian vegetation where this is practicable, and investigating the daylighting of a *c*.150 m reach of stream.

7.6 In addition, the proposed quarry configuration is unlikely to result in adverse effects on 0.08 hectares of ngaio-māhoe-mapou forest on the face adjacent to State Highway 1, and 0.27 hectares of exotic vineland and scrub would also be retained and could be rehabilitated or used for landscape planting.

7.7 The mitigation options report identifies a range of sites where potential mitigation tasks could be carried out. This includes stream restoration options already discussed, and conservation activities in adjoining and adjacent sites such as the removal of pest plant species and ongoing weed control for at least five years, the planting of indigenous species, relocation of soil and plants to early stages of quarry development, and infill or additional mitigation planting where this is required. The sites that have been identified were selected

because they are close to the subject site, have similarities in topography, slope, sun aspect, and coastal climate, and include pockets or vestiges of vegetation similar to the subject site. It is therefore expected that over time and with suitable management vegetation and habitats can be established similar to that which is proposed to be lost as part of the Quarry development. Thus, terrestrial restoration activities, for the loss of 4.15 hectares of indigenous vegetation, are predicted to result in a gain of 11.84 hectares of indigenous coastal scrub and forest.

7.8 To mitigate for the loss of fauna habitat it is proposed to undertake rodent control for at least five years within 39.74 hectares adjacent or close to the quarry; including Imran Terrace/Maldive Street Reserve, Tyers Reserve, and the Ngauranga site across State Highway 1. All these areas already receive some level of possum control which would also result in some control of rodents. Thus only a conservative proportion of each site is included as a potential mitigation benefit, totalling 3.96 hectares.

7.9 Potential mitigation additional to that proposed above would include goat-proof fencing of the abattoir grazing area. Any stock that escapes from the abattoir grazing area into the surrounding areas will browse available vegetation and thus affect indigenous plant species health and composition, including any planted or rehabilitated areas. The scale of this potential effect is hard to quantify as it depends on the species, number of individuals, and length of time that stock is browsing indigenous vegetation. Nevertheless, it is an important contribution to the maintenance of surrounding indigenous vegetation and any restoration areas.

7.10 Wellington City Council is already undertaking the collection of seeds and cuttings from the site for propagation and planting, to retain local genetic diversity. Again the value of this work is difficult to quantify in terms of mitigation benefits but does make an important contribution.

7.11 The mitigation options report proposes the use of direct transfer of plants and soil to retain elements of the original ecosystem, including important soil microbes. Whilst Wellington City Council mostly supports this approach, they have noted that this should be considered a trial of this method and may not contribute greatly to

addressing the overall loss. Should some or all of the direct transfer areas fail, then these areas should be replanted in a more conventional manner. This would therefore still result in a net increase of mitigation benefits.

7.12 All the proposed mitigation areas are on land owned by Wellington City Council and zoned as Open Space B, other than the Waitohi Stream. None of the Open Space B areas are currently proposed to be developed, and would likely need to be the subject of both a plan change and resource consent prior to any proposed development.

7.13 The terrestrial rehabilitation options (not including the stream restoration options) identified in the mitigation options report amount to a mitigation ratio of 1:2.8. With the inclusion of rodent control this becomes a ratio of 1:3.8. The actual benefits of the suggested mitigation options will be greater than this due to stock fencing and propagation of local genetic plant material.

7.14 The mitigation ratio also does not take account of any ecological benefits that might accrue through habitat creation or using indigenous plant species in landscape planting or in remediation of the site subsequent to the quarry being exhausted. These ecological benefits would be additional to that identified above.

7.15 In conclusions the mitigation options report has demonstrated that there is sufficient area and a range of options available to ensure that the loss of 4.15 hectares of indigenous vegetation can be suitably mitigated. The Quarry Management Plan, that will need to be developed as part of the Resource Consent Application, should confirm which options are to be implemented, and could also take account of any of the additional benefits outlined above.

8 RESPONSE TO ISSUES RAISED IN S42A report

8.1 Mr Stephen Fuller is critical of the failure to include site rehabilitation as a mitigation option, or the ecological benefits of landscape mitigation planting. I was not asked to prepare a Quarry Management Plan, merely to identify if there were sufficient options to mitigate for the loss of the indigenous vegetation proposed to be cleared. Site rehabilitation and landscape mitigation planting will provide additional

ecological benefits, but most of these benefits would occur at some future date as parts of the quarry no longer required are rehabilitated. The mitigation options report sets out options that could commence immediately upon the start of quarrying to mitigate for the loss of indigenous vegetation and habitat from the site. The Quarry Management Plan could take account of the ecological benefits of the rehabilitation of the site and landscape mitigation and reduce the amount of mitigation to commence at the start of the quarrying operation.

8.2 Reduced habitat connectivity is discussed in Section 3.6 of the November version of the mitigation options report (Wildland Consultants 2018b). The bird species known from the site and adjacent areas are all excellent fliers and known to travel considerable distances to reach preferred food sources. A small loss of area of indigenous vegetation will not significantly reduce connectivity for these species. Moreover, the loss of vegetation could be mitigated for by a nearly three-fold increase of indigenous vegetation compared to that proposed to be removed. The options outlined in the mitigation options report would assist with improving connectivity for small terrestrial fauna species, such as lizards and invertebrates, and may improve future connectivity and habitat for aquatic species also.

8.3 Direct transfer is seen as a risky proposition. The success of direct transfer, as with the success of landscape planting and post-quarry rehabilitation of created benches, depends on good site preparation. The key issue will be providing sufficient soil to enable plants to be retained or established. Top soil needs to be removed and redeployed as part of site rehabilitation, so it may as well be utilised immediately in a potential mitigation opportunity, rather than potentially become anaerobic and weedy in a stock-pile. The biggest cost is the need for on-site machinery to move the soil (and vegetation); this equipment will be available during the creation of the quarry benches. Should direct transfer prove to have limited success then at least there is soil to be able to plant in to.

8.4 Rejection of an integrated approach for ecological and landscape mitigation. As set out in paragraph 8.1 I was not asked to prepare a

Quarry Management Plan, merely to identify if there were sufficient options to mitigate for the loss of the indigenous vegetation proposed to be cleared. The Quarry Management Plan could take account of the ecological benefits of the rehabilitation of the site and landscape mitigation and reduce the amount of mitigation to commence at the start of the quarrying operation.

8.5 The objectives, policies and methods proposed in S42A Appendix 2 – 'Proposed amendments to plan change provisions' seem appropriate in relation to ecological aspects. A couple of small points however:

- All mitigation and rehabilitation areas for the entire quarry need to be mapped, and these maps included and/or updated in the Quarry Management Plan. These maps need to be made available to any contractors involved with activities such as vegetation clearance or earthworks so that they do not inadvertently clear these areas.
- All mitigation and rehabilitation areas for the entire quarry also need to be legally protected by a mechanism suitable to protect the values that are to be established (e.g. biodiversity protection, visual amenity, etc).
- *Means to assist native vegetation to regenerate on grazing land* – presumably this only relates to areas to be retired from grazing and not those areas to be retained for grazing by Taylor Preston Ltd. This needs to be clarified.
- *Staged daylighting of Waitohi Stream and restoration of its riparian vegetation* – this potentially implies that all of the Waitohi Stream and all of its associated riparian vegetation is to be restored. This will not be possible along the entire stream with Kiwi Point Quarry. Suggested alternative wording would be; *Staged daylighting of <u>an identified section(s) of</u> Waitohi Stream and restoration of its riparian vegetation <u>including widening riparian vegetation to 20 metres where this is feasible</u>.*
- *Adjacent to State Highway One, a vegetated bank will be formed and maintained….* – my understanding was that a vegetated bank will be retained rather than formed.
- Also, in addition to the underground gas main, there are water mains that traverse several of the lots.
- Under rehabilitation and treatment of stripped areas, provisions need to be made to either retain topsoil or import clean, and pest plant free, topsoil to ensure that there is enough soil to establish and maintain plants and trees in the long term on rehabilitation sites.

9 RESPONSE TO ISSUES RAISED IN SUBMISSIONS

9.1 The following submissions were made with consideration to the Proposed District Plan Change 83 document, and the original

assessment of ecological effects. The reptile and mitigation options plans were written following commencement of public consultation.

9.2 Greater Wellington Regional Council (GWRC; submission number 28) conditionally supports the Proposed District Plan Change 83 with considerations, including the need to further determine effects on freshwater fish and reptile fauna. Surveys for lizards were carried out in December 2017 and assessment of lizard retreats was undertaken in March and April 2018. No lizards were found during this assessment, indicating that lizards are either in low numbers or are only sparsely distributed across the site. We have suggested mitigation options to compensate for the loss of lizard habitat. We have not done any assessment of freshwater fish values and can therefore not comment on these, however the mitigation options report now includes suggested mitigation activities for the Waitohi Stream, and its tributaries and floodplain within the wider quarry site.

9.3 GWRC and Submitter 7 (Anthony Norton) are concerned that adequate mitigation options have not been identified. The mitigation options report has outlined potential mitigation options, including the location and duration of different combinations of pest plant control, restoration planting, enhancement planting, and pest animal control. Secure stock fencing and methods to secure genetic material from key plant species have also been proposed. The mitigation options report plan can be used to inform the Quarry Management Plan that is likely to be required as a condition of the Resource Consent.

9.4 GWRC also seeks further information on the operational and post-operational phase impacts, as well as what monitoring regime will be followed once remediation of this area is complete, and the monitoring and maintenance of plantings. This should all be specified in the Quarry Management Plan that is likely to be required as a condition of the Resource Consent.

9.5 GWRC also identified that it will be necessary to ensure there is ongoing protection of mitigation sites. All the land identified in the mitigation options report is owned by Wellington City Council and, other than the Waitohi Stream, zoned as Open Space B in the District Plan. There are no current plans to develop these Open Space B

areas, and future developments would require both a plan change and a resource consent.

9.6 Finally, the preference of GWRC is to have a mitigation ratio of at least three times the size of the affected area. The mitigation options plan has identified a number of mitigation options, which can achieve an overall ratio of 1:3.8 (vegetation restoration and rodent control) for the loss of indigenous vegetation and habitat, plus additional but not easily quantifiable benefits of stock fencing and propagation of local genetic plant material. Provided that appropriate quarry mitigation activities are undertaken, in my opinion, this mitigation ratio is sufficient to address the adverse effects of the proposal.

9.7 Submitters 8 (Jan Brydges-Jones), 20 (Brad and Nicola Young), 26 (Sarah Pennel), 29 (Silvia Rudzki and John Savage), and 36 (Angela Kethleen Garty) have raised concerns that the Proposed Plan Change will have adverse environmental effects, including the loss of indigenous forest vegetation, and reduced habitat for birds, lizards, and other wildlife. Whilst we cannot comment on all environmental impacts, we have addressed all potential ecological effects and have suggested appropriate mitigation options.

9.8 Submission 14 supports the proposed plan change, including the development of some area of 'green belt', provided that it doesn't prohibit the ability to fully develop the quarry. The proposed mitigation options have been developed to mitigate the ecological effects with the assumption that the quarry will be developed fully within the proposed footprint.

9.9 Submitter 26 suggests that the existing quarry should be closed and replanted, but this is beyond the scope of work that I have done to date.

10 CONCLUSION

10.1 Proposed Plan Change 83 proposes rezoning part of the Open Space B land in the Ngauranga Gorge to Business 2 to enable expansion of the Kiwi Point Quarry. I have assessed the ecological values at the proposed Kiwi Point Quarry extension site and the potential ecological effects of the potential quarrying activity. I have identified mitigation

options to mitigate the potential ecological effects associated with further development of this quarry.

10.2 In total 4.15 hectares of indigenous vegetation may be removed out of 4.91 hectares of indigenous vegetation within the site and a total development footprint of 12.32 hectares. Potential ecological effects of this clearance include the loss of indigenous vegetation including the representative and ecologically significant areas of indigenous forest, the loss of some key plant species (and their genetic diversity), the loss of habitat for bird and reptile species, and potential effects on the Waitohi Stream and its tributaries and floodplain.

10.3 Mitigation for potential terrestrial vegetation and habitat losses has been identified within the Kiwi Point Quarry and at nearby sites that have features similar to the areas affected and would benefit from additional conservation actions. A range of conservation options have been proposed including weed control, restoration planting, direct transfer of vegetation and soil, enhancement planting, increased pest animal control, secure stock fencing and securing genetic material from key plant species. These options can achieve at least a 1:3 ratio on Wellington City Council-owned land close to the quarry.

10.4 Although outside the scope of the Plan Change and the jurisdiction of Wellington City Council a range of suggestions have been provided to manage potential ecological effects on the Waitohi Stream. These include retention, maintenance and progressive enhancement of existing riparian areas, and various options to improve the stream condition and floodplain that should be explored, such as removing confining bunds, access ways, and infrastructure, increasing the width of the riparian vegetation where this is practicable, and investigating the daylighting of a *c*.150 m reach of stream.

10.5 Submitters have raised concerns about the loss of indigenous vegetation and habitat for birds, reptiles, and other fauna, as well as concerns regarding the lack of any reptile and freshwater fish surveys. Potential effects on lizard populations were addressed in a subsequent report and options have been provided to mitigate for the loss of indigenous vegetation and fauna habitat. The stream restoration options noted in 10.4 would also improve stream habitat.

10.6 Other concerns raised by submitters includes the lack of an adequate mitigation plan, as well as further information on the operational and post operational phase impacts, and what monitoring regime will be followed once remediation of this area is complete. A Quarry Management Plan will likely be required as a condition of the Resource Consent and should address these matters.

10.7 Taking into account the above considerations, I consider that the proposed clearance of indigenous vegetation and fauna habitats would result in significant ecological effects. However on the basis of the mitigation options identified, I consider that there are sufficient mitigation options to address the ecological effects associated with the plan change and the proposed quarrying activities to occur at the Kiwi Point Quarry extension site.

Dr Astrid Cora Van Meeuwen-Dijkgraaf
November 2018

10.8 Appendix A – Experience

1. My doctoral research focussed on the interactions between native birds, mainly the kereru (*Hemiphaga novaeseelandiae*), with large fruited indigenous tree species and introduced mammals such as possums and rats. I have undertaken extensive field work throughout the North Island and parts of the South Island and most of these projects also included bird surveys. I've lead the surveys to determine potential effects on avifauna from proposed wind farms for the Turitea, Long Gully, Castle Hill, and Puketoi Wind Farms, as well as preliminary site investigations for a number of other wind farm sites. Recently I was asked to provide evidence on potential effects of outdoor music festivals on avifauna at Spectacle Lake and surrounding lakes, as well as a smaller venue in the Bethell's Beach area.

2. Prior to working for Wildland Consultants Ltd, I was employed as National Services Manager with the Queen Elizabeth II National Trust, with previous experience as a Conservancy Advisory Scientist and Ecologist with the Department of Conservation in Wanganui. I have been employed in the ecological field since 1998.

3. I have considerable experience in New Zealand ecology which I studied during both my Masters degree and Doctoral research. I have produced numerous reports on ecological aspects whilst working for the Department of Conservation and Wildland Consultants Ltd. Clients have included private individuals and organisations and various government agencies in both the North and South Islands. I have also presented aspects of my research at national and international scientific conferences and other forums.

4. Memberships include the New Zealand Ornithological Society, the New Zealand Ecological Society, and the New Zealand Plant Conservation Network.

10.9 Appendix B – References.

Wildland Consultants 2017: Assessment of ecological effects for proposed expansion of the Kiwi Point quarry, Ngauranga Gorge, Wellington. Prepared for Wellington City Council, Wellington, *Wildland Consultants Ltd Contract Report, No. 4378*: 31 pp.

Wildland Consultants 2018a: Assessment of lizards for a proposed expansion of the Kiwi Point Quarry, Ngauranga Gorge, Wellington. Prepared for Wellington City Council, Wellington, *Wildland Consultants Ltd Contract Report, No. 4378b*: 13 pp.

Wildland Consultants 2018b: Mitigation options for the potential loss of indigenous vegetation and habitat at the proposed Kiwi Point Quarry, Wellington. November revised version 2018. Prepared for Wellington City Council, Wellington, *Wildland Consultants Ltd Contract Report, No. 4378d*: 33 pp.

10.10 Appendix C – Report: MITIGATION OPTIONS FOR THE POTENTIAL LOSS OF INDIGENOUS VEGETATION AND HABITAT AT THE PROPOSED KIWI POINT QUARRY, WELLINGTON.