BEFORE THE CANTERBURY REGIONAL COUNCIL
AND THE ASHBURTON DISTRICT COUNCIL

IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	of resource consent applications by Rangitata Diversion Race Management Limited to the Canterbury Regional Council and Ashburton District Council for resource consents for the construction, operation and maintenance of the Klondyke Water Storage Facility, its associated water takes from and discharges to the Rangitata River, and all associated activities.

SUMMARY OF EVIDENCE AND SUPPLEMENTARY COMMENTS OF MARK DAVID SANDERS

DATED 26 APRIL 2018

Introduction

1. My name is Mark David Sanders. I prepared a statement of evidence for the Rangitata Water Storage Facility Proposal dated 13 March 2018. My qualifications and experience are set out in that statement of evidence and I reiterate my confirmation of the expert witness code of conduct in preparing this summary and supplementary comments.
2. This statement addresses:
    (a) The key points of my evidence.
    (b) My comments on the s42A reports prepared by the Ashburton District Council (ADC) and the Canterbury Regional Council (ECan).
3. I understand that RDRML is no longer pursuing a sluicing regime. This does not affect my evidence.

4. I endeavoured to participate in expert conferencing with the ECan terrestrial ecologist, Dr Philip Grove, but we were unable to find a date on which we were both available. I understand from RDRML's legal counsel that ECan did not consider that expert witness conferencing was required.

Summary of evidence

5. In my evidence I consider actual and potential effects of the proposed Klondyke Water Storage Facility (i.e. reservoir) on vegetation, birds and lizards. I address effects of the proposed:

   a) modifications to the Rangitata Diversion Race (RDR).

   b) replacement fish screen and by-pass.

   c) construction and operation of the proposed reservoir.

   d) creation of a six-hectare ecological refuge adjacent to the Rangitata River.

   e) increase in the maximum rate of take from the Rangitata River by up to 10 m^3/s during flows greater than 132.6 m^3/s[1].

6. I completed various site investigations between 2012 and 2017, including surveys of vegetation, birds and lizards, the latter with the assistance of Mr Scott Hooson, a consultant ecologist with Boffa Miskell[2].

7. I have worked with other technical experts to assist RDRML in shaping earlier design iterations into the final proposal. In this capacity I have recommended measures to avoid, remedy and mitigate adverse effects on terrestrial ecology.

8. I have also participated in public information days and consultation to assist in informing stakeholders and to identify and resolve potential concerns about terrestrial ecological matters.

[1] The full 10 m^3/s could be taken at flows greater than 142.6 m^3/s.
[2] Mr Hooson has an M.Sc. in Ecology. He held the necessary Wildlife Act (1953) authorisation to carry out lizard surveys.

9. I developed, with input from other technical experts[3] and project engineers[4], a concept plan to develop a six-hectare ecological refuge between the proposed reservoir and the Rangitata River.

Ecological context and significance

10. The site is located within the Ashburton District. The Ashburton District Plan identifies no Areas of Significant Conservation Value (ASCV) within the proposed reservoir site. However, the Upper and Lower Rangitata River are both recognised as ASCVs (48 & 49), with values including braided river birds.

11. The Rangitata River is subject to the Water Conservation (Rangitata River) Order 2006, which recognises, among other values, the value of the river above the gorge and below State Highway 72 (Arundel) as aquatic bird habitat.

12. I assessed all sites potentially affected by the proposal against the ecological significance criteria set out in the Canterbury Regional Policy Statement. Under these criteria, large stone piles on the pasture within the proposed reservoir site constitute significant habitat of indigenous lizards on the Canterbury Plains.

Vegetation

13. The vegetation of the proposed reservoir site comprises almost entirely pasture and cropland, with a number of exotic shelterbelts or plantings, mainly of pine and/or eucalyptus trees. Native plants within the site are present as scattered individuals of common species mainly under some older and larger areas of pines in the east of the site, and along fencelines and canal edges. Examples of native species present are mingimingi[5], tree tutu, toe toe, NZ 'flax', bracken and other ferns, and various native sedges and rushes along canal and pond edges.

14. The vegetation along the section of the RDR canal for which modifications are proposed consists almost entirely of rough pasture, with some areas of exotic plantation and shelter belts. The vegetation at the location of the proposed fish screen site including the re-

[3] Dr Ryder, Mr Callendar, Mr Brown,
[4] Mr Woods, Mr Peters.
[5] Scientific names are listed in Appendix D.

aligned canal and by-pass consists of dense broom and gorse with some more open patches of rank exotic grasses and weeds.

15. My assessment of the vegetation of the reservoir, canal, and fish screen sites is that it has low ecological value because it comprises almost entirely exotic vegetation, with no intact native vegetation, and only scattered, common native species present.

Birds

16. All birds observed at the reservoir, canal, and fish screen sites were common introduced and native species, typical of Canterbury Plains farmland and shrubland near rivers. I observed nine native bird species in or near the site, including grey warbler, Australasian harrier, spur-winged plover, black-backed gull, and paradise shelduck.

17. The Rangitata River is an important habitat for a diversity and abundance of birds. Several species classified as Threatened or At Risk under the New Zealand Threat Classification System[6] are present on the Rangitata River, including black-billed gull (*Threatened: Nationally Critical*); black-fronted tern (*Threatened: Nationally Endangered*); wrybill, banded dotterel and Caspian tern (all *Threatened: Nationally Vulnerable*), and pied oystercatcher (*At Risk: Declining*). Most birds are found on the wider, more braided reaches of the river, above the gorge and below the State Highway 72 bridge at Arundel.

Lizards

18. Approximately 150 stone piles are located on farmland within the construction footprint of the proposed reservoir. Some of these provide suitable habitat for native lizards. Rocky parts of a gully in the south-west of the site also provide habitat for lizards. Our surveys confirmed the presence of Canterbury grass skinks[7] and geckos, most likely the Southern Alps gecko[8], at the reservoir site. Other lizard species could also be present. Although the stone piles are not ideal as lizard habitat because of the limited food sources and lack of

[6] Robertson, H.A.; Baird, K.; Dowding, J.E.; Elliott, G.P.; Hitchmough, R.A.; Miskelly, C.M.; McArthur, N.; O'Donnell, C.J.F.; Sagar, P.M.; Scofield, R.P.; Taylor, G.A. 2017: Conservation status of New Zealand birds, 2016. *New Zealand Threat Classification Series 19.* Department of Conservation, Wellington. 23 p.
[7] *Oligosoma* aff. *polychroma* Clade 4, previously known as common skink.
[8] *Woodworthia* 'Southern Alps', one of four taxa in the taxonomically-indeterminate *Woodworthia* complex.

open matrix habitat at many of the piles, they nonetheless represent valuable habitat for lizards.

The proposed ecological refuge

19. RDRML propose an ecological refuge to mitigate adverse on-site ecological effects, discussed below, and to enhance local ecological values. The objectives for the refuge are set out in proposed condition 12.0 of the working drafts of the ADC consents and proposed condition 19 of CRC170651, CRC170652 (as provided by RDRML on 24 April 2018):

    a. To establish a permanent ecological refuge comprising six hectares of wetland, native plantings, and lizard habitat; and

    b. To provide receptor habitat for lizards to assist in meeting the objectives of the LMP. [Lizard Management Plan]

20. A draft *Ecological Refuge Planting and Management Plan* is presented in Appendix B of my evidence-in-chief.

21. The refuge will be created on an area of existing pasture and pine forest to the south of the emergency sluice channel, adjacent to the Rangitata River. Creation of the refuge will entail plantings of several types of native vegetation, removal of some existing exotic trees (pines and grey willows), relocation of all stone piles from the reservoir site as lizard habitat, and construction of a 2-ha wetland, as follows.

22. Lizards from the existing stone piles will be re-located. This will require a Wildlife Act (1953) Authority from the Department of Conservation (DOC). A separate *Lizard Management Plan* will be prepared and implemented and will form part of the authority application and permit. A draft *Lizard Management Plan* is presented in Appendix C of my evidence-in-chief. This provides for a staged approach to the re-location of stone piles, establishment of plantings, and translocation of lizards so that suitable habitat is available for lizards as they are relocated to new habitat.

Assessment of Effects

23. The proposal will result in the loss of 286 ha of existing pasture/cropland and 7 ha of exotic shelterbelts, which will be replaced by 245 ha of open water, 41 ha of grass embankment, 4.8 ha of native vegetation, and 2 ha of constructed wetland. The native vegetation would

comprise 3.0 ha of plantings within the proposed ecological refuge, and 1.8 ha of plantings along the Ealing-Montalto and Montalto Roads.

24. The loss of existing farmland as a result of the construction of the reservoir will be of little ecological consequence with regard to vegetation at the site because this comprises almost entirely exotic pasture and trees, with only a few scattered individual native plants. In any case, a total of 4.8 ha of native vegetation will be planted, representing a substantial increase in local biodiversity.

25. Similarly, the conversion of farmland to a reservoir will have little consequence for birds. Birds will benefit from the improved habitat provided by the proposed ecological refuge and landscape plantings, and to some extent by the reservoir itself. The constructed wetland will benefit birds by providing additional and alternative roosting and/or foraging and/or breeding habitat for water birds, including braided river birds.

26. Relocation of stone piles and lizards will inevitably result in a loss of some lizards because not all lizards will be able to be captured and re-located. However, in the long term, the refuge will result in overall net benefits for lizards in the form of an increase in the area and quality of physical stone pile habitat set within 3 ha of native plantings, which will provide further lizard habitat.

27. The Rangitata River could see increased abstraction of up to 10 m^3/s at flows greater than 132.6 m^3/s. These changes would not adversely affect river birds because they would occur for short durations during freshes/floods, whereas it is low flow conditions that potentially present increased risk to river birds. Low flows will not be affected.

28. The RDR canal modifications and construction of a new fish screen and by-pass will have no adverse ecological effects because of the very low ecological value of the existing vegetation at these locations, and the proposed re-instatement of them to a condition similar to the present.

29. In the context of the RMA, the proposal, including the mitigation and enhancement measures described above, will, in my opinion, have less than minor adverse effects on terrestrial ecology. Indeed, I am confident that it will have a net positive effect on local biodiversity as a result of the establishment and ongoing management of the ecological refuge.

Comments on the s42A reports

30. In regard to terrestrial ecology, the ADC and ECan s42A reports both rely on the *Terrestrial Ecology Peer Review* prepared by Dr Grove, a Land Resources Scientist (terrestrial ecologist) employed by ECan. Dr Grove's report constitutes Appendix 7 of the ADC s42A report and Appendix 2 of the ECan s42A report.

31. As I read Dr Grove's report, our points of agreement and disagreement are, in brief:

    a) We agree that the proposal will have no adverse effects on, and a net benefit to, native vegetation.

    b) We agree that the proposal will have a net benefit for lizards.

    c) We agree that the conversion of farmland to aquatic habitat will be of little consequence to indigenous birds.

    d) Dr Grove comments that predator control at the proposed ecological refuge would benefit birds and lizards. It is not clear whether he considers this necessary. I consider it is not necessary.

    e) We agree that immediate effects of changes to river flows and river form during flood events when the new abstraction would take place are unlikely to affect river birds.

    f) However, in relation to the last point, Dr Grove considers that long-term cumulative impacts on birds of the Rangitata River, including effects on roosting, foraging and breeding habitats have not been assessed in sufficient detail.

32. I will now address these points in more detail.

33. Dr Grove discusses terrestrial vegetation in three paragraphs in section 4 of his report and, as I read his report, he agrees with my assessment. Specifically, Dr Grove states that he agrees '*that vegetation clearance for KSP construction would result in the loss of scattered native plants currently present, but that these do not constitute 'native vegetation'. Therefore, the proposed plantings, if successfully established, will result in a net post-construction increase in native vegetation cover (Terrestrial Ecology AEE Section 7.1; Table 7.1)*.

34. Dr Grove also states that he agrees *'that vegetation clearance will also remove extensive areas of invasive weeds, but do not consider this will have any wider environmental benefit, given these weeds are also well-established in the surrounding area (Terrestrial Ecology AEE p35; para 3)'.* This is probably correct at the landscape scale (kilometres), although some local benefit from removal of weed seed sources is possible, in my experience. This is not a critical point, however, because weed monitoring and control will be required, regardless, as is proposed in ADC conditions 12.1(d) – (h) CRC and proposed conditions 20.d-h of CRC170651 and CRC170652 (numbering per the working drafts provided by RDRML on 24 April 2018).

35. Dr Grove also states that he agrees *'that modifications to the RDR and construction of new fish bypass will have no adverse effects on indigenous terrestrial vegetation (Terrestrial Ecology AEE p36, para 1).'*

36. Dr Grove discusses lizards in section 4 and 5 of his report, and notes, as I have already discussed, that authorisation under the Wildlife Act (1953) is required for lizard translocation. Dr Grove expresses his opinion that creation of more than 1 ha of lizard habitat within the proposed ecological refuge may be required. This in fact is what is proposed in ADC conditions 12.0-13.1.i. and CRC170651 and CRC170652 conditions 19-23.i. and in the draft *Lizard Management Plan*. The lizard habitat within the refuge will consist of all the existing stones from the Klondyke reservoir which will be sorted and arranged so as to provide a larger area (at least 120% of the existing area) and better quality (e.g. more open) of lizard habitat. Further, habitat will be set within a wider area of 3 ha of native plantings which will provide food and habitat for lizards. This will be in marked contrast to the current situation where almost all of the existing stone piles are set within cropland or pasture, which is regularly cultivated, and where many of the stones are embedded in soil, greatly diminishing their potential as lizard habitat.

37. Dr Grove considers that '*the addition of a predator control program to the Ecological Refuge management plan would help ensure a net benefit for lizards, and would also benefit native birds using the refuge*.' In my view, predator control is not required to avoid remedy or mitigate potential adverse effects of this proposal, as I discuss at paragraph 103 of my evidence-in-chief. In brief, this is because, first, there is no reason to believe the proposal will result in increased predation pressure on native fauna. Second, with the

mitigation and enhancement proposed, the proposal will have a net benefit for vegetation and wildlife. And third, to be effective, predator control would need to be carried out at a landscape scale, over multiple neighbouring properties, and sustained over the long-term, in order to reduce predator densities to low levels. In my opinion, it would not be practical or reasonable to require the applicant to implement large-scale conservation measures such as these.

38. Dr Grove concludes in his section 6 that '*the proposal could have a net benefit to native vegetation and lizards by providing a single contiguous area of native vegetation interspersed with rock lizard habitat, especially if this has long-term protection through consent conditions and management plans*'.

39. With regard to birds of the Rangitata River, Dr Grove commented that the '*assessment of effects in this section of the terrestrial ecology AEE was focused only on immediate effects of changes to river flows and river form during flood events when the new abstraction would take place (Terrestrial Ecology AEE p.37, para 4). I* [i.e. Dr Grove] *agree these immediate changes are unlikely to affect river birds. However, potential effects, including longer-term and/or cumulative impacts, of the proposed new abstraction and sediment discharge on river ecology downstream of the take site were not described; nor were these effects assessed with respect to feeding habitat of river birds*'. He also states that he considers that a more comprehensive assessment of effects on roosting, foraging, and breeding habitats of indigenous birds is required.

40. Dr Grove's concern appears to relate to potential effects on aquatic invertebrate food supplies of birds caused by changes in flow regime, and potential effects on bird habitat as a result of changes in flow and sediment discharge. Potential effects of sediment discharge are no longer relevant because it is no longer proposed to flush sediment from the pond.

41. With regard to food supplies, I addressed this issue on page 37 of my assessment, and in paragraphs 79 – 83 of my evidence-in-chief. In brief, the *potential* for adverse effects of flow regime changes on the instream component of bird diets in rivers arises during very low flows, if these substantially reduce the quality of quantity of foraging habitat, or during

very high flows which typically displace birds from rivers to off-river foraging habitats, rather than at the intermediate flows that would be affected as a result of 'flood harvesting' as proposed here. In my experience, subtle differences to intermediate flow regimes such as will occur as a result of this proposal, are of little consequence to river birds, particularly given the existing highly dynamic nature of braided river flow regimes.

42. With regard to roosting and breeding habitats on the Rangitata River bed, these will not be affected by the changes in flow regime for the following reasons. Indigenous bird roosting and breeding habitat consists of terrestrial substrates except for some use of trees as roosting or nesting by shags and some waterfowl. Trees will not be affected by the proposed changes in flow regime. The largest areas of terrestrial substrates on the Rangitata River are found upstream of the Klondyke intake, and birds on these habitats will therefore not be affected. Downstream of the Klondyke intake, the river currently provides, and will continue to provide, a large area of terrestrial substrates, much of which is suitable as habitat for river birds. The area or quality of this terrestrial habitat as roosting or breeding habitat for birds will not be materially affected by the proposed changes in flow regime. Instead, the main influence on quality and quantity of bird roosting and breeding habitat will be, directly, the extent of invasive weeds on the river, and, indirectly but overwhelmingly, predation pressure by introduced mammalian predators and native avian predators.

Proposed changes to conditions

43. Apart from very minor changes to wording and numbering changes, all of the terrestrial ecology conditions proposed by ADC, except one, are near-identical to those originally proposed by RDRML, and achieve the same purpose. The exception is a new proposed condition 12.1.i from ADC (p72 of the ADC s42A report), which proposes:

> *i. A performance standard requirement for the planting to achieve 80% canopy cover by the end of the maintenance period so the success for the planting can be measured quantitively.*

44. Including a performance standard is sensible, (indeed, it is suggested in the draft *Ecological Refuge Planting and Management Plan*), but requiring 80% cover as proposed by ADC would be highly counterproductive for the proposed open grassland/shrubland

plantings because it is essential that open sunny habitat is retained for lizards. I propose the new condition is amended to read as follows.

> *i. A performance standard requirement for the planting to achieve established, live plant densities of 90% of the initial planting densities by the end of the maintenance period.*

45. This proposed condition is included as ADC condition 12.1.i in the working draft conditions circulated by RDRML on 24 April 2018.

46. As with the ADC proposed conditions, all except one of the CRC proposed conditions relating to terrestrial ecology are near-identical to those proposed by RDRML, and achieve the same purpose. The exception is that the CRC has proposed the addition of its standard river bird conditions to three consents, namely as conditions 4 and 5 of CRC170653, CRC182537, and CRC182539. These proposed conditions, in brief, require that, during the breeding season of river birds, surveys are carried out prior to machinery operating in river beds, and that machinery avoids any nesting birds found. The Rangitata River near to the proposed construction areas is generally unsuitable for river birds because of a lack of open small substrates and the relatively confined nature of the river, so it is unlikely that river birds will nest at these locations. Nevertheless, I agree that the addition of these conditions may help to avoid any potential adverse effects on river birds, should any be present at those sites.

Mark Sanders

26 April 2018