

**BEFORE THE INDEPENDENT COMMISSIONER  
OF CENTRAL OTAGO DISTRICT COUNCIL**

**IN THE MATTER** of the Resource Management Act 1991 ("**RMA**")

**AND**

**IN THE MATTER** of an application for resource consent by Helios OTA  
OP LP ("**Helios**") to construct, operate and maintain a  
photovoltaic solar farm and associated infrastructure  
including a substation and transmission line  
infrastructure for renewable electricity generation at  
48 Ranfurly-Naseby Road, Naseby ("**Project**")

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**STATEMENT OF EVIDENCE OF KARIN SIEVWRIGHT  
ON BEHALF OF HELIOS**

**21 JULY 2025**

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## 1. EXECUTIVE SUMMARY

- 1.1 This evidence is given in respect of the resource consent application by Helios for the proposed new solar farm at 48 Ranfurly-Naseby Road, Naseby ("Site"). My evidence addresses the potential effects of the Project on avifauna.
- 1.2 The proposed Project Site is dominated by grazed pasture and short rotation cropland. Other habitats on Site include exotic shelterbelts, wetlands, constructed stock ponds and small areas of indigenous shrubland.
- 1.3 These habitats provide foraging, roosting and / or nesting opportunities for indigenous avifauna, including 15 Not Threatened species, five at Risk species and one Threatened species.
- 1.4 The ecological value of these species' ranges from Low (Not Threatened species) to Very High (Threatened species).
- 1.5 In the Ecological Impact Assessment ("EcIA") that I co-authored for the Project, I concluded that, without effects management, all potential effects<sup>1</sup> on avifauna would be either Very Low or Very Low to Low.
- 1.6 Although effects were assessed as Very Low for nesting birds, to further manage effects I recommended that if works commence during the main bird breeding season, a pre-construction nesting bird survey is conducted, and exclusion zones established around active nests, in which works cannot occur until nesting activities are complete.
- 1.7 Although effects were assessed as Very Low to Low for bird strike, given our understanding that if the Project was granted consent, construction would not commence for a number of years, I also recommended conducting a literature review report summarising the current state of knowledge on bird collision with ground-mounted, photovoltaic solar arrays at least six months prior to the commissioning of the solar farm. The outcome of this literature review would inform the need for bird strike monitoring at the Site.
- 1.8 I have considered and responded to Central Otago District Council's ("CODC") Section 42A Report, including CODC's technical peer review report of the EcIA that was prepared by Mr Andrew Wells and colleagues from Wildlands

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<sup>1</sup> Permanent habitat loss / modification, disturbance and temporary displacement, impacts on nesting birds and bird strike with solar panel arrays.

Consultants<sup>2</sup>. I have also considered and responded to submissions that relate to avifauna.

1.9 The key avifauna-related issues that have arisen from the reports and the submissions include the following:

- (a) That the EclA has not considered potential effects of the Project on Australasian bittern (a Threatened, Nationally Critical species).
- (b) That the EclA may have underestimated the potential risk of bird collision with the solar arrays for migratory shorebirds.
- (c) That the period in which pre-works nesting bird surveys are conducted should be 1 September to 31 March, rather than 1 September to 28/29 February as recommended in the EclA.
- (d) That consent conditions should specifically address monitoring and mitigation of adverse effects from bird strike.
- (e) That any updated consent conditions based on discussions had with the Department of Conservation (“DOC”) are provided to CODC prior to the hearing as they may warrant reconsideration of the conclusion of Section 62 of the Section 42A Report.
- (f) That management plans are certified by CODC, must be complied with, and must include objectives, intervention thresholds, monitoring provisions and performance standards.

1.10 I have considered all matters, and my key responses are as follows:

- (a) Based on data provided by DOC<sup>3</sup> following preparation of the EclA (the data is attached as Appendix 1 of my evidence), in my evidence I have assessed potential effects of the Project on Australasian bittern and consider that all effects will be Low.
- (b) Based on the same DOC data, in my evidence I have re-assessed collision risk for migratory shorebirds and have conservatively increased the overall level of effect from Very Low to Low.
- (c) I consider that the main bird breeding season for the species that may nest on Site has been appropriately stated in the EclA, however

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<sup>2</sup> Wildland Consultants (2025). Review of Helios Solar Farm Ecological Assessment. *Wildland Consultants Contract Report No. 7661*. Prepared for Central Otago District Council. 16pp.

<sup>3</sup> Unpublished data provided by Dr Colin O'Donnell, Department of Conservation Principal Science Advisor (Ecosystems and Species) on 23 May 2025.

taking a conservative approach I agree with extending this to 31 March as recommended in the Section 42A Report; this is reflected in the updated consent conditions attached to the evidence of Ms Banhidi.

- (d) I have been involved in a meeting with representatives from DOC regarding their submission and have subsequently been involved in updating the proposed draft consent conditions for avifauna. Helios and DOC have reached agreement on the proposed conditions of consent for avifauna. The agreed conditions are provided in Section 9 of my evidence and are attached to the evidence of Ms Banhidi. The proposed conditions now provide certainty that three years of avifauna collision monitoring will occur on Site as per methods to be outlined in a Bird Monitoring Plan (“**BMP**”) prepared for the Project. Mortality thresholds have been developed, which if triggered, require the development and implementation of a Bird Collision Management Plan (“**BCMP**”). The BMP and if required, the BCMP, will be prepared in consultation with relevant stakeholders and will require certification by CODC prior to implementation.

- 1.11 Accordingly, I consider that the issues raised have been appropriately addressed and contribute to a robust assessment of the Project as it relates to potential effects on avifauna.

## **2. INTRODUCTION**

- 2.1 My full name is Karin Amy Sievwright.
- 2.2 I am a Senior Ecologist at Boffa Miskell. I have been in this position since 2015.
- 2.3 I have a Bachelor of Science in Ecology and Zoology and a Master of Science in Conservation Biology (First Class Honours), both from Massey University, Palmerston North.
- 2.4 I am a Certified Environmental Practitioner (Ecology) with the Environment Institute of Australia and New Zealand.
- 2.5 My primary area of expertise is in ornithology / avifauna (birds).
- 2.6 I mainly work in avifauna ecological impact assessment and management.
- 2.7 I have conducted bird surveys, prepared ecological impact assessments and / or management plans for a number of proposed and consented infrastructure,

energy, and housing developments. This includes, but is not limited to, Transmission Gully expressway, Mackays to Peka Peka expressway, Manawatu Gorge Road Replacement, Seaview wharf renewal, Lyttelton Port Cruise Berth development, Summerset Village development (Waikanae), and various wind farms (Waverley / Waipipi, Mount Munro, Kapuni, Harapaki, Kaiwera Downs).

### **Involvement in the Project**

- 2.8 I led and undertook the avifauna field investigations for the Project (as described further in Paragraphs 5.2 to 5.3 of my evidence).
- 2.9 I authored the avifauna sections of the EclA prepared for the Project (dated 18 December 2023) that accompanied the resource consent application.
- 2.10 I was involved in a meeting with DOC on 9 May 2025 regarding their submission on the Project and was subsequently involved in updating the proposed avifauna-related consent conditions for the Project. DOC has reviewed the updated consent conditions and agreement on conditions has been reached with DOC.

### **Code of conduct**

- 2.11 I confirm that I have read the Expert Witness Code of Conduct set out in the Environment Court's Practice Note 2023. I have complied with the Code of Conduct in preparing this evidence and will continue to comply with it while giving oral evidence before the Hearing Commissioners. Except where I state that I am relying on the evidence of another person, this written evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in this evidence.

## **3. SCOPE**

- 3.1 This evidence is given in respect of the resource consent application by Helios for the proposed new solar farm at 48 Ranfurly-Naseby Road, Naseby ("Site"). In my evidence I will:
  - (a) Provide an overview of the existing environment;
  - (b) Explain the assessment methodology;

- (c) Provide an overview of the Project's effects on avifauna<sup>4</sup>;
- (d) Respond to the Section 42A Report<sup>5</sup>; and
- (e) Respond to submissions.

#### **4. EXISTING ENVIRONMENT**

- 4.1 The Site is located on the Mānīatoto Plain between Naseby and Ranfurly in Central Otago. It is situated between the Waitaki River (~45 km northeast of the Site) and the Clutha River (~60 km southwest of the Site) and is surrounded by many mountain ranges. The main Naseby Forest block (plantation pine) is approximately 2 km north of the Site and the Taieri River and wetland complex is approximately 12 km south of the Site.
- 4.2 As outlined in Section 5.3.2 of the EclA, habitats available for birds at the Site include exotic grazed pasture and short rotation cropland (c.95% of the Site), exotic shelterbelts, wetlands, constructed stock ponds and small areas of indigenous shrubland.
- 4.3 The avifauna assemblage on Site is dominated by exotic bird species, however these habitats also provide, or potentially provide, foraging, roosting and / or nesting opportunities<sup>6</sup> for 21 indigenous bird species (see Appendix 1). Overall, this includes one Threatened species (eastern falcon), five At Risk species (New Zealand pipit, SIPO, banded dotterel, little shag, black shag) and 15 Not Threatened species.
- 4.4 The ecological value of these species' ranges from Low (Not Threatened species) to Very High (Threatened species).

#### **5. ASSESSMENT METHODOLOGY AND ANALYSIS**

- 5.1 I conducted a desktop review of published and unpublished literature to collect information on birds present at, and in the vicinity of, the Site.

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<sup>4</sup> Boffa Miskell Ltd. (2023). *Mānīatoto solar farm ecological impact assessment* (pp. 1–106).

<sup>5</sup> Central Otago District Council Report of Planning Officer, RC 240065: 48 Ranfurly-Naseby Road, Naseby. (2025).

<sup>6</sup> Wetland and grassland habitats on Site provide potential nesting habitat for SIPO, pied stilt, pukeko and spur-winged plover. Exotic shelterbelts and indigenous shrubs on Site, and a pond directly adjacent to the south-eastern margin of the Site, provide potential nesting habitat for some Not Threatened species (e.g. grey warbler, silvereye). From the surveys conducted it was concluded that the Site does not provide suitable nesting habitat for banded dotterel or New Zealand pipit.

- 5.2 As outlined in Section 4.3.2 of the EclA, I conducted bird surveys at the Site between 16 and 19 October 2023, including a nesting bird survey, 20-minute point counts, and five-minute bird counts.
- 5.3 I also recorded bird species incidentally observed on Site outside of the formal bird survey periods, including observations of any nesting indigenous birds.
- 5.4 I then conducted an ecological impact assessment for birds in accordance with the Environmental Institute of Australia and New Zealand's Ecological Impact Assessment guidelines<sup>7</sup> ("**EclA Guidelines**").
- 5.5 The overall level of ecological effect (Very High, High, Moderate, Low, Very Low) for each potential effect considered was subsequently used to guide the extent and nature of the ecological management response required, as per the EclA Guidelines. This is described further in Section 4.7 of the EclA.

## **6. ASSESSMENT OF EFFECTS**

- 6.1 In the EclA I considered potential effects of the Project on the 21 indigenous avifauna species that use, or potentially use the Site, as summarised in Section 6 of my evidence below.
- 6.2 I note that in response to DOC's submission on the Project and additional data provided by DOC following preparation of the EclA, in Paragraphs 7.11 to 7.19 of my evidence I have assessed potential effects of the proposal on Australasian bittern (bittern were not assessed in the EclA) and re-assessed potential collision risk for migratory shorebirds.

### **Permanent habitat loss / modification**

- 6.3 Construction of the solar farm will result in permanent loss of ~15 ha of grassland habitat across the Site<sup>8</sup>. It will also result in permanent habitat modification as exotic grassland will be covered / shaded by the solar panels. This may make the habitat less desirable for some species and result in functional habitat loss.
- 6.4 As detailed in Section 7.2.1 of the EclA, this will result in loss of foraging and roosting habitat for some species on Site, as well as potential nesting habitat

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<sup>7</sup> Roper-Lindsay, J., Fuller, S. A., Hooson, S., Sanders, M. D., & Ussher, G. T. (2018). *Ecological impact assessment (EclA). EIANZ guidelines for use in New Zealand: Terrestrial and freshwater ecosystems* (2nd ed.). Environment Institute of Australia and New Zealand.

<sup>8</sup> This is discussed in Sections 2.2 and 7.2.1 of the EclA.

for a very small proportion of the SIPO population<sup>9</sup>. The species affected are all highly mobile and can disperse into and use the abundant alternative grassland habitat in the surrounding area upon loss or modification of exotic grassland habitat on Site.

- 6.5 Approximately 500 indigenous shrubs used by Not Threatened species for foraging, roosting and nesting (e.g. grey warbler, silvereye) will also be temporarily removed to facilitate construction, but will be re-planted at a 2:1 ratio post-construction.
- 6.6 Accordingly, I assessed permanent habitat loss and modification as having a Negligible magnitude of effect on Low to Very High value avifauna species, resulting in a Very Low to Low overall level of effect.

### **Disturbance and temporary displacement**

- 6.7 Construction<sup>10</sup> of the Project may temporarily disturb foraging, roosting and traversing birds and displace them from the Site<sup>11</sup>.
- 6.8 As discussed in Section 7.2.2 of the EclA, the species potentially affected are highly mobile and can access other suitable habitats on Site, and in the wider area, if disturbed. These species are also regularly exposed to farming activities on Site and as such may have a higher tolerance to construction-induced disturbances.
- 6.9 Accordingly, I assessed construction-induced disturbance and displacement as having a Negligible magnitude of effect on Low to Very High value avifauna species, resulting in a Very Low to Low overall level of effect.

### **Impacts on nesting birds**

- 6.10 As discussed in Section 7.2.3 of the EclA, if construction activities occur during the main avifauna breeding season (broadly September to the end of February), there is the potential for nesting birds (and nest contents) to be disturbed, displaced, injured or killed.
- 6.11 Only a small number of indigenous birds nest, or potentially nest, at the Site, and nesting success is likely low due to frequent disturbance as a result of current Site use (farming). The Site does not provide core nesting habitat for

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<sup>9</sup> Seven pairs / 14 birds were observed on Site during the survey conducted in the 2023 breeding season and the national population size is estimated to be ~100,000 birds.

<sup>10</sup> Operational disturbance was not assessed, as activity levels post-construction are expected to be comparable to existing farming activities.

<sup>11</sup> Effects on nesting birds are assessed in Paragraphs 6.10 to 6.14 of my evidence.

any species, and ample alternative nesting habitat is present in the wider area if birds are displaced by the solar farm.

- 6.12 Accordingly, I assessed potential impacts on nesting birds as having a Negligible magnitude of effect on Low to High value avifauna species, resulting in a Very Low overall level of effect.
- 6.13 Nonetheless, if works commence during the breeding season (broadly, 1 September to 28/29 February), or are paused for eight successive days or more and then resumed during the breeding season, I recommend that a pre-construction check for nesting indigenous birds should be conducted. This would need to be undertaken by a suitably qualified and experienced ecologist to ensure that nesting birds are absent prior to construction or that setbacks (of 100 m radius, or a lesser distance, being no less than 25 m, as deemed appropriate by a suitably qualified and experienced ecologist) from any nesting areas are applied until nesting activities are completed.
- 6.14 I note that as discussed in Paragraph 8.5 of my evidence, I am happy to revise the breeding season period during which pre-works nesting bird surveys are required, to 1 September to 31 March, as recommended in the Section 42A Report. This is reflected in the updated consent conditions (refer to Section 9 of my evidence).

#### **Bird strike with solar panel arrays**

- 6.15 There is some evidence in international scientific literature, albeit limited, that bird injury and mortality can occur as a result of collision with large-scale solar panel arrays, potentially as a result of the hypothesised “lake effect” (although evidence is scarce and inconclusive).
- 6.16 At the time the EclA was prepared for the Project (2023), no large-scale solar farms had been built in New Zealand and monitored for bird strike. Currently, a small number of large-scale solar farms have been built or are in construction in New Zealand, however bird strike monitoring has yet to be conducted. As such, there is no research in a New Zealand context on which to base a precise assessment of the potential lake effect on New Zealand water and wetland bird species. Consequently, the assessment was conservative and considers this effect as best as possible, based on available data and known bird behaviours.
- 6.17 As discussed in Section 7.2.4 of the EclA, I consider that the Site may be traversed by indigenous water and wetland birds moving between wetland habitats in the wider landscape (e.g. SIPO, banded dotterel, pied stilt, paradise shelduck), however in terms of a potential lake effect, many factors relating to

the design of the solar farm and Site location are likely to mitigate this potential effect, including:

- (a) There are no large water bodies on the Site so it is unlikely to attract large concentrations of water and wetland birds.
- (b) The Site is not close to any main rivers (likely to be the main flight corridors for many water and wetland birds), therefore it is not expected that large numbers of these species will traverse the Site.
- (c) The Site is not on the predicted migration route for national migrant water and wetland birds, therefore it is considered unlikely that the Site would be traversed by high numbers of migratory species. I note that in response to DOC's submission on the Project and associated data provided since preparation of the EclA, this point is discussed and considered further in Paragraph 7.19 of my evidence.
- (d) There is visual interruption of the Site so it looks less like a lake, by way of panels only covering ~36% of the Site, panels being clustered in blocks and some blocks being separated by existing and newly planted shelterbelts, and existing wetlands remaining on Site and increased in size by buffer planting.
- (e) The panels are mounted on single axis tracking systems that allow the panels to track the sun and thereby generate less glare than fixed tilt arrays.

6.18 Considering these factors, in the EclA I assessed the potential impact of the lake effect as having a negligible magnitude of effect on low to high value water and wetland avifauna species that may traverse the Site, resulting in a very low overall level of effect.

6.19 Although effects were assessed as being very low, I recommended that at least six months prior to commissioning of the solar farm a bird strike literature review be conducted by a suitably qualified ornithologist / ecologist to review any further information in the literature about this effect. The outcome of this literature review would determine if post-construction monitoring is required at the Site or not. Monitoring would be required if research suggests there is indeed an effect, or a need for further data in the local context.

6.20 In response to DOC's submission on the Project, this recommendation and associated proposed draft consent conditions prepared for the Project have been updated in consultation with DOC. The draft conditions now include a

requirement for bird collision monitoring at the Site, including a minimum 36-month period from the commencement of installation of solar panels and ancillary infrastructure within the Site. Monitoring methods would be informed by the literature review and developed in consultation with DOC and Ka Rūnaka. This is reflected in the updated consent conditions provided in Section 9 of my evidence.

## **7. RESPONSE TO RELEVANT SUBMITTERS**

- 7.1 I have read the submissions on the Project that relate to avifauna.
- 7.2 Ms N Barton<sup>12</sup> and Ms S Dunckley<sup>13</sup> are concerned about the effects that glare from reflections of the solar panels may have on wildlife.
- 7.3 In response to this concern, I note that to limit reflection, solar panels are constructed from dark, light absorbing material, generally absorbing ~98% of the light received. The Glint and Glare Report states that the reflectivity of a solar panel is significantly less than snow (absorbs 20% of light received), or bare soil (absorbs 70% of light received)<sup>14</sup>. The panels that would be used on Site would be mounted on a tracking system and would rotate to follow the sun; this would reduce glare. These factors will minimise reflective conditions and minimise potential effects on wildlife.
- 7.4 Ms K Munro's submission<sup>15</sup> questions "what systems in the application are in place for the lake effect" with regards to waterfowl.
- 7.5 In response to this concern, I note that bird collision monitoring is now proposed at the Site for a minimum of 36 months from the commencement of installation of solar panels and ancillary infrastructure within the Site commissioning, as outlined in the updated consent conditions (refer to Section 9 of my evidence). The purpose of this monitoring is to detect mortalities of indigenous birds, and if pre-determined mortality thresholds are met, a management response will be triggered. This response includes developing and implementing collision prevention / deterrent measures, conducting additional monitoring and reporting on the success of the measures implemented. This process will manage potential collision effects on indigenous birds, including waterfowl (e.g. paradise shelduck, Australasian

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<sup>12</sup> Submission Number 5.

<sup>13</sup> Submission Number 165.

<sup>14</sup> ITP Renewables (2023). *Naseby solar farm – glint and glare study* (pp.9).

<sup>15</sup> Submission Number 60.

shoveler), irrespective of whether the lake effect is the causal mechanism or not.

- 7.6 Ms K Wills submission<sup>16</sup> notes that “solar farms can disrupt native habitats, particularly in rural or undeveloped areas, and have the potential to harm local flora and fauna” and that “the disturbance to wildlife, especially to migratory and native species, has not been adequately assessed in the proposal”.
- 7.7 Mr G Hore’s submission<sup>17</sup> states that “wildlife will be affected”.
- 7.8 In response to Ms K Wills and Mr G Hore’s concerns, I note effects of the Project on indigenous flora and fauna / wildlife, including disturbance effects on migratory species, have been considered and assessed in the Ecological Impact Assessment prepared for the Project and within this evidence<sup>18</sup>. Regarding avifauna, all effects are assessed as being Very Low to Low, and where necessary management and monitoring are recommended to avoid and / or minimise effects further.
- 7.9 DOC’s submission<sup>19</sup> on the Project expresses interest in the ecological effects of the Project and notes the following:
- (a) The EclA has not considered impacts on Australasian bittern, a Threatened – Nationally Critical species, and that records held by DOC and in the public domain indicate bittern are present in the Mānīatoto Basin and are likely using the surrounding area.
  - (b) DOC holds records of migratory bird species such as SIPO transiting the Mānīatoto Basin, and that the risk of bird collision with solar arrays due to the “lake effect” may have been underestimated. DOC wishes to share the data they hold and to contribute to the design of any mitigation and monitoring requirements.
  - (c) DOC has interest in any proposed consent conditions to manage and better understand potential bird strike effects.
- 7.10 DOC’s submission requests that if the consent authority is minded to grant the application, that it imposes the following:
- (a) Effects of the proposal on Australasian bittern are assessed.

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<sup>16</sup> Submission Number 74.

<sup>17</sup> Submission Number 106.

<sup>18</sup> Boffa Miskell Ltd. (2023). *Mānīatoto solar farm ecological impact assessment* (pp. 1–106).

<sup>19</sup> Submission Number 166.

- (b) Collision risk effects on migratory birds are adequately understood and assessed.
- (c) Conditions and management plan provisions are imposed to manage adverse effects.
- (d) Conditions specifically address monitoring and mitigation of adverse effects from bird strike.
- (e) Management plans are subject to clear adaptive management conditions (if appropriate), objectives, intervention thresholds, monitoring provisions, and performance standards.
- (f) A condition is included requiring certification of management plans by the Regulatory Manager at CODC prior to exercising the consent.
- (g) A condition is included requiring compliance with all certified management plans.

7.11 In response to the DOC submission, I was involved in a meeting with Dr Colin O'Donnell (DOC)<sup>20</sup>, Jesse Gooding (DOC)<sup>21</sup>, Dr Jaz Morris (BML)<sup>22</sup>, Sarah Brooks (Helios Energy)<sup>23</sup> and Mishka Banhidi (The Property Group)<sup>24</sup> on 9 May 2025 to discuss DOC's submission. I requested a copy of the Australasian bittern and migratory bird data DOC had for the area (as had been proffered). This was provided, and in the next paragraphs of my evidence I assess potential effects of the Project on Australasian bittern and reassess potential collision risk for migratory shorebirds.

7.12 With regards to Australasian bittern, publicly available records on eBird and the New Zealand Bird Atlas show only two records within 20 km of the Site, one from 1988 (~2.5 km from the Site) and one from 1970 (~18 km from the Site). Based on these very limited and historical records, I did not consider them a key species that required consideration in the EclA.

7.13 The Australasian bittern records provided by DOC (which were not publicly available when the EclA was prepared) show scattered records of individual birds across the landscape around the proposed solar farm Site (refer Appendix 2 of my evidence). Twelve of the records are within ~10 km of the Site. Five of these records are from 1908-1988, five are from 2005-2009, one

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<sup>20</sup> Principal Science Advisor (Ecosystems and Species).

<sup>21</sup> Senior RMA Planner.

<sup>22</sup> Boffa Miskell Ecologist and co-author of the EclA.

<sup>23</sup> Helios Energy Senior Environmental Planner.

<sup>24</sup> The Property Group Senior Planner.

is from 2015, and one is from 2023. There have only been two sightings within a few kilometres of the proposed Site over the past 16 years. These data suggest that the local bittern population is very small and that the birds move between wetland habitats in the landscape. With regards to the Project, the Site contains wetland habitats within grazed farmland. The two larger wetlands on Site ('Central wetland', 8.49 ha and 'Southwest wetland', 4.61 ha) are dominated by low stature exotic rushland and grassland, with occasional native species. The 'small wetlands' on Site (44 across the Site, ranging in size from 0.008 ha to 0.69 ha) are dominated by exotic grassland. I consider that these wetlands could provide very occasional (not core) foraging habitat, and potentially roosting habitat, for bittern as part of a wider network of wetlands in the area that they traverse between and utilise. Given the low stature and limited complexity of the vegetation, I do not consider that the wetlands on Site provide suitable nesting habitat for bittern. With regards to potential effects of the Project on bittern, there will be no loss of wetland habitat on Site or impacts on nesting birds. If present during construction, bittern could be disturbed by works, however works are temporary, and bittern are highly mobile so they can disperse to alternative habitats if disturbed. Accordingly, I consider that habitat loss, impacts on nesting birds (and nest contents) and disturbance effects will have a negligible magnitude of effect on bittern. A Negligible magnitude of effect on a Very High value species results in a Low overall level of effect.

- 7.14 With respect to potential collision risk, I have only found one published record of a bittern carcass being detected during post-construction monitoring at photovoltaic (PV) solar farms. The carcass was found at Campo Verde solar farm and was from monitoring conducted between 1982 to 2018 at thirteen<sup>25</sup> PV solar farms in California (United States of America), in which bird mortality records were presented as supporting data to a scientific article<sup>26</sup>. The cause of death was unknown, however as the carcass was found near a PV panel, it could have been due to collision with a solar panel. I note that of the few post-construction studies conducted at PV solar farms, many have been in arid environments, which do not provide habitat for bittern.
- 7.15 Based on bittern habitat preference and behaviour, I consider that it is unlikely that bitterns would collide with solar panels as a result of the hypothesised lake effect. This is because large, open waterbodies are not a preferred habitat of bitterns, they are not diving or dabbling birds and they are not obligate water birds that require water to take off and land. Australasian bitterns are instead

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<sup>25</sup> There were links to supporting data for 14 solar farms, however one link was not working, and the data could not be accessed and reviewed.

<sup>26</sup> Smallwood, K. S. (2022). Utility-scale solar impacts to volant wildlife. *The Journal of Wildlife Management*, 86(4), e22216.

generally secretive, wading birds that forage in shallow wetland margins (and occasionally farm drains), often amongst reeds and rushland, and nest in dense wetland vegetation. Accordingly, I think it is unlikely that if a bittern mistook solar panel reflections (including at nighttime from moonlight reflections) as a lake / large waterbody that it would be drawn to it and be at risk of collision.

- 7.16 A factor that could put Australasian bitterns at risk of collision with solar panels is that they are large, not particularly agile birds that generally fly low to the ground. During daylight hours I assume bitterns would be able to detect and navigate around solar panels, and that daytime collision risk would be minimal. With regard to night-time movements and the potential for collision risk, I note that given that bitterns are capable of flying at night-time, they must have adequate night vision to navigate through the landscape, and as such would be able to detect and navigate around solar panels, in much the same way that they detect trees and other obstacles.
- 7.17 Considering the aforementioned factors, together with the very small local population (two bittern records over the past 16 years) and the fact that the Site does not provide core or permanent habitat for bittern, I consider that collision risk is likely to be very low for this species. As such, I consider that this potential effect is likely to have a Negligible magnitude of effect on the national bittern population (~1000 birds)<sup>27</sup>. A Negligible magnitude of effect on a Very High value species results in a Low overall level of effect.
- 7.18 I note that bird collision monitoring proposed in the updated draft consent conditions (refer to Section 9 of my evidence) will help to detect any bird mortalities at the Site. The mortality threshold for Australasian bittern is one carcass. If this is triggered a BCMP will be prepared which will require an investigation and management response to be implemented, followed by monitoring to evaluate success of the response.
- 7.19 The migratory shorebird data provided by DOC (which were not publicly available when the EclA was prepared) includes GPS tracks for ten SIPO moving through the landscape around the proposed solar farm Site, a couple of which pass close to the Site (refer Appendix 3 of my evidence). In the EclA I noted observing small numbers of SIPO foraging on Site (and that the Site provided likely nesting habitat for a few pairs of SIPO) but I considered it unlikely that the Site would be traversed by high numbers of migratory water

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I note that in lieu of known and scientifically published regional and / or Ecological District population sizes of Australasian bittern, I have assessed this effect at the scale of the estimated national population size.

and wetland birds (e.g. SIPO) as it is not on the migration route predicted by Southey (2009)<sup>28</sup>. The data from DOC suggests that some birds do pass the Site and surrounding area while migrating, although it is unknown if this is a main migration route. In terms of potential collision risk, the other mitigating factors outlined in the EclA are still in effect. Given that SIPO may traverse the site in higher numbers than initially thought, but taking into account the factors that may mitigate potential collision risk, I have conservatively re-assessed the magnitude of effect to be Low for migratory bird species (was assessed as Negligible in the EclA). A Low magnitude of effect on Low to High value species results in a Very Low to Low overall level of effects (was assessed as Very Low in the EclA). This does not change the effects management outcomes and as stated in the updated draft consent conditions for the Project (refer to Section 9 of my evidence), post-construction collision monitoring will be conducted at the Site for a minimum of 36 months from the commencement of installation of solar panels and ancillary infrastructure within the Site, with management responses required if mortality thresholds are triggered.

- 7.20 Following the meeting with DOC I have assisted Helios with updating the draft avifauna-related consent conditions for the Project so that they are more robust and take into account feedback received; these conditions were provided to DOC for comment and agreement on conditions has been reached. The updated conditions are provided in Section 9 of my evidence.

## **8. RESPONSE TO SECTION 42A REPORT**

- 8.1 I have reviewed the sections of the Section 42A Report that relate to avifauna.
- 8.2 The Section 42A Report and the Wildlands peer review are largely in agreement with the EclA on many important aspects. For example, the Wildlands review states that the avifauna surveys have been undertaken thoroughly, using appropriate industry-standard methods, that the assessment of effects is comprehensive and that they agree with the assessment of residual effects for avifauna. The Wildlands review considers that overall the avifauna assessment was well considered with appropriate management actions recommended.
- 8.3 There were differences in opinion regarding a few aspects of the EclA, and a few comments that warranted a response; these are outlined and discussed in the following paragraphs.

- 8.4 In Paragraph 60 of the Section 42A Report, management of nesting birds is discussed. The Wildlands peer reviewer recommended that construction works are set back 50 m from active nests, whereas I recommended that works are set back at least 25 m from active nests, and up to 100 m, as determined by a suitably qualified and experienced ecologist. The Planning Officer agreed with my recommendation.
- 8.5 In Paragraph 195 of the Section 42A Report, the period during which pre-works nesting bird surveys must be conducted is discussed. In the EclA I recommended that the surveys occur between 1 September to 28/29 February. The Wildlands review stated that this should be extended to 31 March as the breeding season of some species such as little shag could extend into May, but extending to March would capture the breeding season for most species. The Section 42A Report states that pinning down exact breeding seasons can be difficult and concludes that it is appropriate that the specified breeding season be extended to the end of March. In response to this, I note that the Site does not provide breeding habitat for little shag (or any shag species) as the wetlands lack structural complexity and suitable nesting habitat (as stated in Table 6 of the EclA). However, taking a conservative approach, I can agree to incorporate this suggestion; this is reflected in the updated consent conditions (refer to Section 9 of my evidence).
- 8.6 In Paragraph 62 of the Section 42A Report, the Reporting Officer states that they consider that the risk of bird strike is not unacceptably high, provided any learnings from the construction and operation of the facility are applied to other solar farms in the area and around the country. In response to this, I note that a requirement of the updated consent conditions is to make the results of bird collision monitoring conducted at the Site publicly accessible (refer to Section 9 of my evidence).
- 8.7 In Paragraph 63 of the Section 42A Report, the Reporting Officer states they anticipate that the results of any discussions with DOC would be provided prior to the hearing and could warrant reconsideration of the conclusion of Paragraph 62 of the Section 42A Report. I note that such discussions have occurred and agreement on conditions has been reached with DOC as stated above in my evidence. Updated consent conditions are provided in Ms Banhidi's planning evidence and addressed in Section 9 of my evidence.
- 8.8 Paragraph 66 of the Section 42A Report discusses the distance works / infrastructure should be set back from wetlands to manage potential effects on these features. The Wildlands peer reviewer suggests that a 10 m setback

would minimise the 'lake effect'. Dr Morris provides his rationale for the recommended setbacks in his Terrestrial Ecology evidence<sup>29</sup>.

- 8.9 In addition to this, and in direct response to the comment from the Wildlands peer reviewer that the application of a 10 m setback to the 'small wetlands' would "minimise the lake effect", I do not consider that an increased setback (of more than 5 m) around the small wetlands would reduce this effect further, as in my opinion the currently proposed 5 m setbacks already break up the Site sufficiently to manage any potential lake effect. I also note that the lake effect is a hypothesised causal mechanism of mortality, so there is no guarantee that this additional mitigation would reduce collision risk further. In summary, from an avifauna perspective, I do not consider that increasing the size of the setbacks around the small wetlands would materially reduce potential collision risk to avifauna.

## **9. RECOMMENDED CONDITIONS**

- 9.1 As discussed above, I have assisted Helios with updating the draft avifauna-related consent conditions for the Project; the proposed amendments to the wording of conditions from the Section 42A Report have been agreed with DOC and are listed below and are attached to Ms Banhidi's planning evidence as part of the full updated set.

Condition 24 (previously 25 in the Section 42A Report): I agree with the change to condition 24 in relation to the bird breeding season (to 31 March).

Condition 25 (previously 26 in the Section 42A Report) wording has been agreed with DOC and replaces condition number 26 in the Section 42A Report (and is shown as a new condition for ease given the large number of changes to it):

*At least six months prior to commencement of construction of the solar farm (excluding any enabling works such as piling tests, site surveys or testing), the consent holder must engage a suitably qualified and experienced ornithologist / ecologist to prepare a Literature Review Report. This report shall summarise the current state of knowledge on bird collision with ground-mounted, photovoltaic solar arrays.*

*The purpose of the Literature Review Report is to:*

- 1. Provide an up-to-date evaluation of bird collision risk with equivalent technology projects both internationally and within New Zealand.*
- 2. Recommend appropriate timing, methods (including methods for carcass detection / persistence trials), frequency, and duration for bird collision monitoring that would enable effective detection and response to collision events in accordance with best practice.*

*The Literature Review Report shall generally inform the development of, and shall be appended to, the Bird Monitoring Plan (BMP) required under Condition 26.*

*Advice Note:*

*The Literature Review Report shall be prepared by a suitably qualified and experienced ornithologist / ecologist with input from a mātauraka Māori expert identified by Kā Rūnaka. Where available, the Report should incorporate monitoring data from other ground-mounted, solar photovoltaic farms that becomes publicly available between the granting and first exercise of this consent.*

*Advice Note:*

*Carcass detection / persistence trials refer to methods developed to account for bird carcass detection and loss (via scavenging, decomposition) probability when estimating rates of bird mortality.*

Condition 26: This proposed condition replaces the previous recommended condition 27 in the Section 42A Report. This condition is shown as a new condition for ease given the large number of changes to it (as agreed with DOC):

*A Bird Monitoring Plan (BMP) shall be prepared by a suitably qualified and experienced ornithologist / ecologist and with input from a biostatistician, in consultation with the Department of Conservation (DoC) and Kā Rūnaka.*

*A draft BMP must be provided to DoC and Kā Rūnaka for comment at least 60 working days prior to the commencement of construction of the solar farm. Following 20 working days, or receipt of comment from DoC (whichever is sooner), the BMP shall be finalised and provided to Central Otago District Council (CODC) for certification, no later than 20 working days prior to commencement of construction. The Consent Holder shall not commence construction prior to obtaining certification of the BMP.*

*Any review comments from DoC and Kā Rūnaka, including any response to comments, shall be appended to the BMP.*

*The objectives of the BMP are to:*

- 1. Enable detection of bird collision with the solar arrays and ancillary infrastructure within the Site;*
- 2. Guide an appropriate management response in the event of collisions of indigenous bird species with the solar arrays and ancillary infrastructure within the Site, particularly those classified as nationally Threatened or At Risk to reduce the ongoing risk of exceeding the thresholds of unacceptable adverse effect in Table 1; and*
- 3. Ensure any effects on indigenous birds arising from the operation of the solar farm do not exceed the thresholds of unacceptable adverse effect in Table 1.*

*The BMP must incorporate best practice as determined through Condition 25 above.*

*The BMP must include, but not be limited to, the following:*

- 1. Monitoring Design:*
  - Frequency, duration (including a minimum of 36 months from commencement of installation of solar panels and ancillary infrastructure within the Site), timing, and site coverage of bird collision monitoring surveys that is adequate to ensure carcasses are detected.*
- 2. Methodology:*
  - Statistically robust methods for bird collision surveys.*
  - Methods for carcass detection and removal trials (to be informed by the Literature Review Report if addressed in the literature, otherwise that is of an adequate standard to ensure carcasses are detected).*
  - Methods for record keeping and data analysis, including statistical methods to derive annual mortality estimates.*
- 3. Mortality Thresholds and Management Response:*

- *Thresholds in Table 1 for indigenous bird species that trigger a management response in accordance with Condition 27 below.*

*Table 1. Indigenous bird mortality thresholds that trigger a management response. The thresholds are for individual species (i.e. are not collective for each threat classification).*

| <i>National Threat Classification</i>             | <i>Threshold to Trigger a Management Response</i>                                                                                  |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <i>Threatened – Nationally Critical species</i>   | <i>One carcass detected at any time during the monitoring period.</i>                                                              |
| <i>Threatened – Nationally Endangered species</i> |                                                                                                                                    |
| <i>Threatened – Nationally Vulnerable species</i> | <i>Two carcasses detected within any one survey; or three carcasses detected cumulatively in any consecutive 12-month period.</i>  |
| <i>Threatened – Nationally Increasing species</i> |                                                                                                                                    |
| <i>At Risk species</i>                            | <i>Three carcasses detected within any one survey; or five carcasses detected cumulatively in any consecutive 12-month period.</i> |
| <i>Not Threatened indigenous species</i>          | <i>Five carcasses detected within any one survey; or 15 carcasses detected cumulatively in any consecutive 12-month period.</i>    |

- Twenty working days after the 1, 2 and 3 year anniversary of the monitoring required by Condition 26, an independent suitably qualified and experienced ecologist/ornithologist is to submit a report to CODC and DOC setting out the results of the monitoring.*

*Advice Note:*

*The meaning of ‘Threatened and At Risk’ and national threat classifications for indigenous bird species are based on the most recent available assessment under the New Zealand Threat Classification System administered by DoC (Rolfe et al. 2022; available at <https://nztns.org.nz/>).*

*Condition 27: This is a new condition as agreed with DOC:*

*Within 5 working days of exceeding a threshold in Table 1 at any time prior to the conclusion of the monitoring period, an independent suitably qualified and experienced ecologist/ornithologist is to advise CODC setting out:*

- The details of the mortality threshold breach; and*

2. *Notice of the preparation and recommendations on the content of an on-going Bird Collision Management Plan (BCMP) to ensure mortality of avifauna does not continue to exceed the thresholds in Table 1, in Condition 26.*

*If a BCMP is required, as a result of a Table 1 threshold being breached, this must be provided to DoC and Kā Rūnaka for comment no later than 20 working days from the notification of a mortality exceedance outlined within Condition 26. Following 20 working days, or receipt of comment from DoC (whichever is sooner), the BCMP shall be finalised and provided to Central Otago District Council (CODC) for certification, no later than a further 20 working days following the conclusion of the comment period*

*The BCMP shall include:*

1. *Details of ongoing monitoring to be undertaken; and*
2. *Details of collision prevention/deterrent measures that are to be developed in consultation with the Department of Conservation and must be implemented at the Site which may include (as relevant to the nature of the impacts identified by the monitoring provided for under Condition 26) but are not limited to:*
  - *Bird-sensitive anti-reflective coatings and/or applications to the panels;*
  - *Use of deterrent devices or visual warning devices/markings (flags, streamers, or visually distinctive markings on panels) to deter attempted landing on panels; and*
  - *Limitations on angle or orientation of solar panels over defined spatial, temporal scales, or environmental conditions if collisions were able to be attributed to certain spatial temporal or environmental patterns.*
3. *Further monitoring, at an appropriate time scale, to test the effectiveness of proposed mitigation responses.*

Condition 29: This proposed condition replaces the previous recommended condition 28 in the Section 42A Report. This condition is shown as a new condition for ease given the large number of changes to it (as agreed with DOC):

*The consent holder must comply with the certified Management Plan(s) or report(s) at all times. Including by undertaking bird collision monitoring,*

*management and reporting in accordance with the methodologies within the certified BMP and BCMP (if development of such a plan is triggered).*

- 9.2 With the implementation of these proposed consent conditions, I consider that potential mortality or injury of nesting birds (and nest contents) will be sufficiently managed, if not avoided, and that potential collision risk will be appropriately managed. Furthermore, by making the collision monitoring results publicly available, knowledge will be shared which will contribute to a better understanding of collision risk, particularly in a New Zealand context.

## **10. CONCLUSION**

- 10.1 In the EclA prepared for the Project I assessed potential effects of the proposal as having Very Low to Low overall levels of effect on indigenous birds.
- 10.2 I have considered and responded to CODC's Section 42A Report, and the associated EclA peer review report prepared by Wildlands Consultants. I have also considered and responded to submissions that relate to avifauna.
- 10.3 I was involved in a meeting that discussed DOC's submission on the Project and have worked with them to refine and reach agreement on the consent conditions.
- 10.4 Following DOC's submission, I have assessed potential effects of the Project on Australasian bittern and re-assessed potential collision risk on migratory shorebirds, based on unpublished records provided by DOC following preparation of the EclA. Effects on bittern are assessed as Low. The effect of collision risk on migratory shorebirds has been re-assessed as Very Low to Low (this was assessed as Very Low in the EclA).
- 10.5 To address reviewer and submitter concerns, the draft avifauna-related consent conditions for the Project have been updated with DOC (and provided to CODC ahead of the hearing as attached to the evidence of Ms Banhidi) to give certainty that bird collision monitoring will be conducted at the Site, and mortality thresholds have been provided, that if triggered require the development and implementation of a management response.
- 10.6 The consent conditions have also been revised to extend the period during which pre-works nesting bird surveys are required to 31 March (instead of 28/29 February).

10.7 Accordingly, I consider that, from an avifauna perspective, all issues have been resolved, and potential effects of the Project can be appropriately mitigated through implementation of the consent conditions.

**KARIN AMY SIEVWRIGHT**

**21 JULY 2025**

**APPENDIX 1 – KEY INDIGENOUS BIRD SPECIES FOR THE SITE THAT WERE CONSIDERED IN THE ECOLOGICAL IMPACT ASSESSMENT**

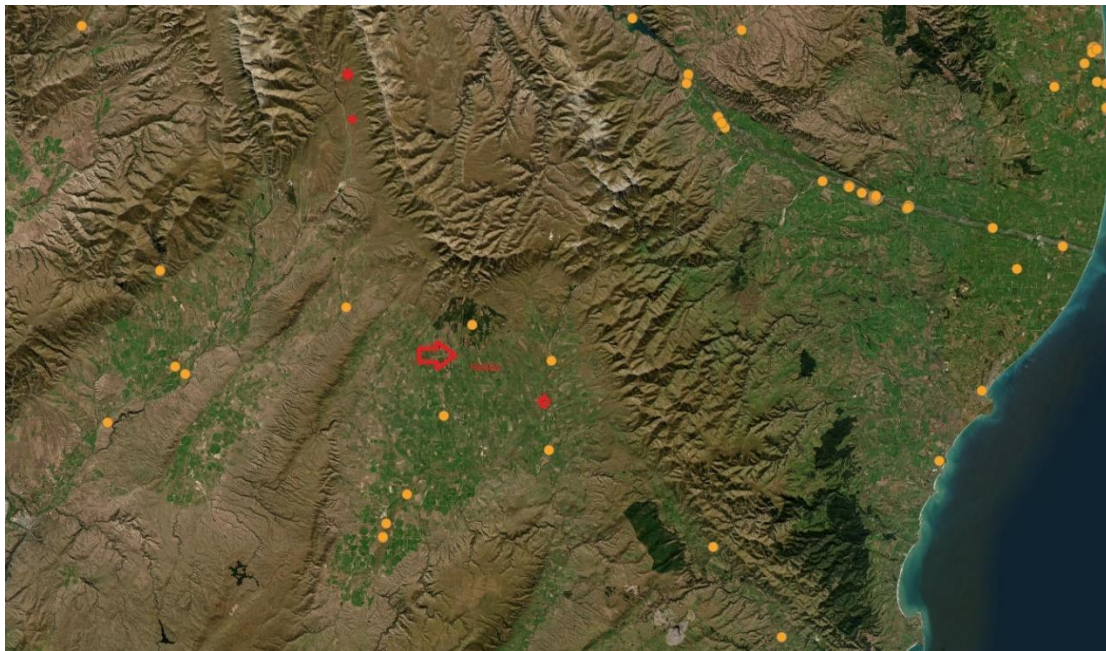
| SPECIES                                 |                                                | CONSERVATION STATUS <sup>30</sup>  |
|-----------------------------------------|------------------------------------------------|------------------------------------|
| Eastern falcon / Kārearea               | <i>Falco n. novaeseelandiae</i>                | Threatened – Nationally Vulnerable |
| NZ pipit / Pīhoihoi                     | <i>Anthus n. novaeseelandiae</i>               | At Risk – Declining                |
| Banded dotterel / Tūturiwhatu           | <i>Charadrius b. bicinctus</i>                 | At Risk – Declining                |
| South Island pied oystercatcher / Tōrea | <i>Haematopus finschi</i>                      | At Risk – Declining                |
| Little shag / Kawaupaka                 | <i>Phalacrocorax melanoleucos brevirostris</i> | At Risk – Relict                   |
| Black shag / Māpunga                    | <i>Phalacrocorax carbo novaehollandiae</i>     | At Risk – Relict                   |
| South Island fantail / Pīwakawaka       | <i>Rhipidura f. fuliginosa</i>                 | Not Threatened                     |
| Bellbird / Korimako                     | <i>Anthornis m. melanura</i>                   | Not Threatened                     |
| Kingfisher / Kotare                     | <i>Todiramphus sanctus vagans</i>              | Not Threatened                     |
| Silveryeye / Tauhou                     | <i>Zosterops lateralis lateralis</i>           | Not Threatened                     |
| Grey warbler / Riroriro                 | <i>Gerygone igata</i>                          | Not Threatened                     |
| Spur-winged plover                      | <i>Vanellus miles novaehollandiae</i>          | Not Threatened                     |
| Swamp harrier / Kāhu                    | <i>Circus approximans</i>                      | Not Threatened                     |
| Welcome swallow / Warou                 | <i>Hirundo n. neoxena</i>                      | Not Threatened                     |
| Australasian shoveler / Kuruwhengu      | <i>Anas rhynchos</i>                           | Not Threatened                     |
| Grey teal / Tete                        | <i>Anas gracilis</i>                           | Not Threatened                     |
| Pied stilt / Poaka                      | <i>Himantopus h. leucocephalus</i>             | Not Threatened                     |
| Pukeko                                  | <i>Porphyrio m. melanotus</i>                  | Not Threatened                     |
| Paradise shelduck / Pūtangitangi        | <i>Tadorna variegata</i>                       | Not Threatened                     |
| White-faced heron / Matuku              | <i>Egretta novaehollandiae</i>                 | Not Threatened                     |
| Black-backed gull / Karoro              | <i>Larus d. dominicanus</i>                    | Not Threatened                     |

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Robertson, H. A., Baird, K. A., Elliott, G. P., Hitchmough, R. A., McArthur, N., Makan, T. D., Miskelly, C. M., Sagar, P. M., Scofield, R. P., Taylor, G. A., & Michel, P. (2021). *Conservation status of birds in Aotearoa New Zealand, 2021* (New Zealand Threat Classification Series 36). Department of Conservation.

**APPENDIX 2 – RECORDS PROVIDED BY THE DEPARTMENT OF CONSERVATION OF AUSTRALASIAN BITTERN IN THE VICINITY OF THE SITE**

The red arrow represents the approximate location of the Site. The red dots are eBird records and the orange dots are DOC records. A summary of timeframes for the observations was provided by DOC, however the year of each observation was not provided.



The red arrow indicates the approximate location of the Site. Each colour represents a different bird, and each circle is a GPS location fix. The lines extrapolate the path between fixes.

