Before the Independent Commissioner Hearing Panel

Under	the Resource Management Act 1991 (**RMA**)
In the matter of	an application by **Dunedin City Council** to develop a landfill at Smooth Hill, Dunedin.

Statement of evidence of Karin Amy Sievwright

29 April 2022

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Qualifications and experience

1 My name is **Karin Amy Sievwright**.

2 I am employed as an Ecologist at Boffa Miskell Limited (BML).

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.

4 I have worked for BML for six years. My primary expertise is in ornithology. I mainly work in the area of ecological impact assessment and the determination of ecological values and significance.

5 I have undertaken bird survey and / or assessment work for a number of proposed and consented developments including, but not limited to, Seaview Wharf renewal, Lyttelton Port Cruise Berth development, Manawatu Gorge Road replacement, Summerset Village development (Waikanae), Te Ara Tupua shared pathway, Transmission Gully expressway, Mackays to Peka Peka expressway, and various wind farms (Waverley / Waipipi, Mount Munro, Kapuni and Kaiwera Downs).

6 I undertook the avifauna field investigations for the proposed Smooth Hill Landfill Project (hereafter referred to as "the Project") and authored the avifauna section of the "Smooth Hill Landfill Ecological Impact Assessment" (EcIA), dated 19 August 2020, which supported an initial application that included a larger landfill footprint. I authored the same sections of the subsequent updated assessment, dated 28 May 2021[1], in response to the reduced landfill extent to which the current application relates. I also authored the "Smooth Hill Landfill Draft Falcon / Kārearea Management Plan"[2].

7 I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2014. This evidence has been prepared in accordance with it and I agree to comply with it. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

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[1] Boffa Miskell Ltd. (2021). Smooth Hill landfill ecological impact assessment (Report No. BM200252). Prepared by Boffa Miskell Ltd for Dunedin City Council.

[2] Boffa Miskell Ltd. (2021). Smooth Hill landfill draft falcon / kārearea management plan (pp. 1–11). Prepared by Boffa Miskell Ltd for Dunedin City Council.

Scope of evidence

8 I have been asked to prepare evidence in relation to Avifauna Ecology. This includes:

(a) An overview of the Project's effects on avifauna based on a summary of the Smooth Hill Landfill Ecological Impact Assessment (EcIA)[3];

(b) Any additional / new information relating to the Project that has arisen since preparation of the EcIA;

(c) A response to the external technical review of the EcIA[4] prepared for Otago Regional Council's s95 report, including additional matters raised in a separate document dated 2 March 2022[5];

(d) A response to Otago Regional Council's section 42A report[6]; and

(e) A response to submissions received in response to public notification of the resource consent applications (LUC-2020-405 and RM20.280).

Executive summary

9 As determined by a desktop review and site surveys, the proposed landfill site is largely dominated by recently re-planted exotic production pine forest and provides foraging, roosting and nesting opportunities for a number of exotic and Not Threatened indigenous bird species as well as eastern falcon.

10 At the time the EcIA was prepared, the ecological value of eastern falcon was moderate based on its At Risk – Recovering conservation status.

11 My EcIA for avifauna ecology concluded potential construction and operational effects of the proposed landfill on avifauna would include:

(a) Direct effects of habitat loss during construction;

(b) Direct effects of mortality during construction;

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[3] Boffa Miskell Ltd. (2021). Smooth Hill landfill ecological impact assessment (Report No. BM200252). Prepared by Boffa Miskell Ltd for Dunedin City Council.

[4] "Technical Review to Inform Notification Decision: Smooth Hill Landfill – Appendix 11 – Ecology Assessment".

[5] "220302 Matters for further discussion Part 2.

[6] "Otago Regional Council Section 42A Staff Recommending Report Application RM20.280 Dunedin City Council".

(c) Indirect effects of disturbance during construction and operation;

(d) Indirect effects of increased mortality (via predation) during operation; and

(e) Indirect effects on bird strike with aircraft during operation (from a bird / ecological perspective rather than a human risk perspective).

12 I assessed that all effects on avifauna would be very low without mitigation, with the exception of potential construction-associated disturbance, displacement and mortality of nesting falcon (if found on site), which would be low without mitigation; but these effects could be managed to a very low level of effect with mitigation (through adherence to management actions as prescribed in a Falcon Management Plan).

13 Given that the ecological value of eastern falcon has increased from moderate to very high since preparation of the EcIA (as a result of an increase in conservation status from At Risk – Recovering to Threatened – Nationally Vulnerable in December 2021), in my evidence I have re-assessed potential effects of the Project on this species.

14 I have concluded that the magnitudes of potential effects of the proposed landfill on eastern falcon remain the same, however, with application of the Environmental Institute of Australia and New Zealand's ecological impact assessment (EIANZ EcIA) effects assessment matrix, the overall levels of effect of the Project on this species have increased from very low to low for all effects. The only exception to this is potential construction-associated disturbance (i.e., displacement and mortality of nesting birds (if found on site)), which has increased from a low to moderate level of effect without mitigation. With mitigation this effect can be managed to a low level of effect.

15 Despite these increased levels of effect, I have concluded that impacts on the avifauna values within the designation are low. Further, the measures outlined in the draft Falcon Management Plan are still deemed appropriate and adequate to mitigate the potential effects, and offsetting is not required.

16 I note that the EIANZ EcIA guidelines state "Low and Very Low levels should not normally be of concern, although normal design, construction and operational care should be exercised to minimise adverse effects".

17 I also note that when using the EIANZ EcIA guidelines for a very high value species, such as eastern falcon, the lowest level of effect that can be achieved with a negligible magnitude of effect is a low level of effect. So even with rigorous use of the effects management hierarchy and the best

possible management in place, this is the lowest possible assessment score other than for positive effects. Avoidance of works during the falcon breeding season, if possible, or erection of a 200 m buffer zone around any active nests with monitoring is proposed to manage ecological effects of construction on nesting falcon, if found on site. This is a very conservative management approach based on best practise and will avoid or sufficiently mitigate potential effects on this species to a level where no residual adverse effects are anticipated.

18 I have considered and responded to Otago Regional Council's external peer review comments contained in ORC's s95 and s42a reports (including additional comments to the s95 report provided at a later date) as well as the submissions that relate to avifauna ecology.

19 The key issues that have arisen for avifauna ecology from the reports and the submissions include the following:

(a) That the magnitude and level of ecological effect pre-mitigation which is set at the Ecological District (ED) and National level may result in the underestimation of ecological effect on site;

(b) That specifically for eastern falcon, the level of effect I have assessed for falcon if they are breeding on site is an underestimation if breeding habitat is restricted in the surrounding environment;

(c) That a residual effects assessment using a biodiversity offsetting accounting model (BOAM) or a biodiversity compensation model (BCM) should be in the Falcon Management Plan as well as offsetting and compensation outcomes; and

(d) Concern that ecological monitoring is not proposed to ensure effects will be as low as predicted.

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

(a) I have followed the EIANZ EcIA guidelines when considering the scale at which to assess magnitude of effect (and resultant ecological effects). The guidelines state that "*"assessing magnitude of effect at the spatial scale of the effect is not recommended, since it does not assist in developing impact management options. For many activities, this is a narrow perspective on the effect on ecological value and provides no information about the impact of the effect in the context of the local ecosystems, or in the context of the site's value".* As such, my assessment has been conducted in an appropriate manner and in accordance with the EIANZ EcIA guidelines.

(b) As well as assessing effects on nesting falcon at the site scale being inappropriate, I also do not consider that falcon breeding habitat is restricted in the wider area given that the wider landscape has a large mosaic of plantation pine (150,000+ ha) and conservation estate that provides habitat for eastern falcon, including recently felled pine plantation adjacent to the Project site (pine slash provides habitat for falcon for up to four years post-felling). As such I consider that the level of effect I have assessed for nesting falcon is appropriate.

(c) I do not consider that the levels of effect on eastern falcon require offsetting or compensation as mitigation measures noted in the draft Falcon Management Plan, including a 200 m buffer around nesting birds if found at the Project site (which is a very conservative measure) will sufficiently reduce potential impacts on them, if not avoid them completely. Accordingly, it is not necessary to include a residual effects assessment or offsetting or compensation outcomes in the Plan from the outset.

(d) However, to be conservative and as a safeguard if unexpected falcon mortality occurs on site, a new clause has been added to the Eastern Falcon Management Plan draft condition. This updated draft condition now requires that if mortality of nesting falcon occurs on site during Project-related construction works, and this can be attributed to the construction works, then a suitable remedial, offset or compensatory action will be determined and implemented to account for the loss/es.

(e) With regards to monitoring, pre- and during-construction, falcon monitoring is proposed in the draft Falcon Management Plan and is a component of the consent condition for preparation of this Plan.

21 In summary, I have conducted my assessment as per the EIANZ EcIA guidelines and believe that it is robust, adequately assesses potential effects on avifauna ecology and provides appropriate mitigation measures.

22 As stated in paragraph 20, to alleviate reviewer and submitter concerns, the Eastern Falcon Management Plan condition now also includes a conservative safeguard to undertake a remedial, offset or compensatory action in the case of an unexpected construction-caused adverse effect on falcon if nesting on site.

Methodology (Section 2.5 of the EcIA)

23 I conducted a desktop review of published and unpublished literature to collect information on avifauna present at the Project site and surrounding

habitats (including Dunedin Airport, the Taieri Plains and the Lake Waihola-Waipori and Sinclair wetland complex).

24 I designed and undertook the avifauna-related field surveys for the Project as described below. I included temporal and seasonal considerations in my survey design to account for the possibility of temporary and seasonal variability in bird species presence and abundance.

25 I conducted thirty-minute point count surveys over four seasons (autumn, winter, spring and summer) at six locations between May 2019 and February 2020. Two of the locations were at the Project site and four were around Dunedin Airport. Each of the surveys were conducted over two consecutive days and each site was surveyed twice (once in the morning and once in the afternoon). Data collected included: species, abundances, distance from the observer (m), direction of bird movement, maximum flight height (m), average flight height (m), minimum flight height (m), behaviour displayed, time of observation and habitat. I also drew approximate flight paths for each observation.

26 I conducted a survey for nesting eastern falcon at the Project site on 30 October 2019. I timed this survey to fall within the eastern falcon breeding season (broadly, this spans between 1 August and 31 May[7], i.e. approximately spring to autumn). The survey involved playing pre-recorded falcon calls at different locations around the site and looking and listening for any responses.

27 I conducted twenty-minute water bird count surveys at Lake Waihola in spring and summer (two surveys each season) to obtain an understanding of the bird assemblage at this location. Each survey was conducted over two consecutive days and each site was surveyed twice, once in the morning and once in the afternoon. Data collected included species, abundances, direction observed from the observer, direction of bird movement, behaviour, location, time.

28 I also recorded incidental observations of other birds observed at each survey site between formal survey times.

29 I then conducted an ecological impact assessment in accordance with the Environmental Institute of Australia and New Zealand's Ecological Impact

[7] Seaton, R.; Hyde, N. 2013 [updated 2017]. New Zealand falcon. *In* Miskelly, C.M. (ed.) *New Zealand Birds Online*. www.nzbirdsonline.org.nz.

Assessment guidelines[8] (EIANZ EcIA guidelines). In summary, this method requires ecological values to be assigned to species present (or potentially present) at the Project site[9] and the magnitude of effects to be identified (as per criteria in the guidelines)[10] in order to determine the overall levels of ecological effect of the proposal (as per a matrix in the guidelines)[11].

30 I subsequently used the EIANZ EcIA guidelines to guide the extent and nature of the ecological management response required (including the need for biodiversity offsetting) as per the following:

(a) **'Very high'** represents a level of effect that is unlikely to be acceptable on ecological grounds alone (even with compensation proposals). Activities having very high adverse effects should be avoided;

(b) **'High' and 'Moderate'** represents a level of effect that requires careful assessment and analysis of the individual case. Such an effect could be managed through avoidance, design, or extensive offset or compensation actions;

(c) **'Low'** and **'Very low'** should not normally be of concern, although normal design, construction and operational care should be exercised to minimise adverse effects. If effects are assessed taking impact management measures developed during project shaping into consideration, then it is essential that prescribed impact management is carried out to ensure low or very low-level effects; and

(d) **'Very low'** level effects can generally be classed as 'not more than minor' effects.

Existing environment (Section 3.3 of the EcIA)

31 In summary, the habitats available for avifauna at the proposed landfill site include recently re-planted exotic production pine forest, exotic grasslands,

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[8] Roper-Lindsay, J., Fuller, S. A., Hooson, S., Sanders, M. D., & Ussher, G. T. (2018). Ecological impact assessment (EcIA). EIANZ guidelines for use in New Zealand: Terrestrial and freshwater ecosystems (2nd ed.). Environment Institute of Australia and New Zealand.

[9] This is shown in Table 5 of the updated EcIA (May 2021 version).

[10] This is shown in Table 6 of the updated EcIA (May 2021 version).

[11] This is shown in Table 7 of the updated EcIA (May 2021 version).

weeds and scrub, four regenerating native forest gullies and a small wetland area with associated waterways.

32 These habitats provide foraging, roosting and nesting opportunities for a number of exotic and Not Threatened indigenous bird species and one At Risk (Recovering) species; eastern falcon (*Falco novaeseelandiae "eastern"*). I note that since preparing the EcIA, the conservation status of eastern falcon has increased to Threatened, Nationally Vulnerable[12]; this occurred in December 2021). This is discussed further in my evidence in paragraphs 44-50.

33 During the surveys conducted on site I recorded (saw and heard) one falcon on two occasions (May 2019 and July 2019). Outside of formal survey periods, I also incidentally observed two falcon briefly arrive at the site in October 2019 before departing together and flying over an adjacent pine forest block to the south of the site. I did not detect any breeding falcon on site during the breeding season survey I conducted in October 2019. However, I have been informed that a falcon pair was observed breeding on site during the 2018 breeding season[13] and four falcon pairs have been recorded at, and / or in, the vicinity of the Smooth Hill area[14].

34 The wider landscape that the proposed landfill and designation site sits within is diverse and includes: Taieri Plain (pre-dominantly agricultural land and includes Dunedin Airport); Lake Waihola – Lake Waipori and Sinclair wetland complex; Green Island landfill, production pine forestry; and coastline (a section of the Otago coast is east of the proposed site). This landscape, particularly the wetland complex, provides extensive habitat for a high diversity and abundance of bird species (including At Risk and Threatened species) and puts into context potential effects of the Project in light of habitat availability (and quantity) and bird species present in the wider area.

[12] 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 New Zealand birds, 2021 (New Zealand Threat Classification Series No. 36). Department of Conservation.

[13] Fulton Hogan, personal communication, 2019.

[14] Graham Parker, personal communication, 2020.

Potential adverse effects of the Project on avifauna ecology (Section 5.2 of the EcIA)

35 The following potential construction and operational phase adverse effects of the Project on native avifauna ecology were considered in Section 5.2 of the EcIA:

(a) Direct effect of habitat loss during construction;

(b) Direct effect of mortality during construction;

(c) Indirect effect of disturbance and displacement during construction and operation;

(d) Indirect effect of increased mortality (via predation) during operation; and

(e) Indirect effect of bird strike with aircraft during operation.

36 Of note is that with respect to bird strike, I assessed the potential effect on birds of strike with aircraft (i.e. a bird / ecological perspective), rather than assessing bird strike risk to aircraft (i.e. a human perspective). This approach is appropriate given I was undertaking an ecological effects assessment, not an assessment of the risk to people from bird strike. Matters relating to aviation risk of bird strike are discussed in Phil Shaw's evidence.

37 In lieu of known and scientifically published regional population sizes and conservation statuses of bird species utilising the site, I conducted my assessment of effects at the scale of national population sizes and associated conservation statuses of bird species. I note that national population sizes are not known or published for all bird species, however, the Department of Conservation's 2017[15] "Conservation status of New Zealand birds"[16] publication provides an indication of population size brackets (e.g. 1000-5000 mature individuals for eastern falcon (and assigns conservation status accordingly)), and I used this as the basis of my assessment.

[15] This was the most recent publication at the time the EcIA was prepared. In December 2021 a new edition was released with updated conservation statuses of New Zealand bird species. My assessment has been revisited in light of this as discussed in paragraphs 44-50.

[16] Robertson, H. A., Baird, K., Dowding, J. E., Elliott, G. P., Hitchmough, R. A., Miskelly, C. M., McArthur, N., O'Donnell, C. F. J., Sagar, P. M., Scofield, R. P., & Taylor, G. A. (2017). Conservation status of New Zealand birds, 2016 (New Zealand Threat Classification Series No. 19). Department of Conservation.

38 Upon consideration of these potential effects, I concluded the following:

39 Eastern falcon (Sections 5.2.1.1 – 5.2.2.2 of the EcIA):

(a) A moderate avifauna ecological value along with negligible magnitudes of effect of habitat loss, operational and construction-related disturbance and displacement during the non-breeding season, and increased egg and chick predation will result in very low overall levels of ecological effect on eastern falcon (without mitigation).

(b) These conclusions were based on the fact that only a small proportion of the extensive territories / home ranges of falcon using the Project site will be lost; 0.338 km^2 (33.8 ha) of re-planted pine habitat will be lost (which when put into context of reported falcon home ranges of 9 km^2 at Kaingaroa Forest[17] and up to 75 km^2 in indigenous forest[18], respectively represents a potential very small-scale loss of 3.8% and 0.45% of these reported home ranges). This loss was considered in tandem with the highly mobile nature of falcon that will enable them to use and disperse to other part of their territories / home range when this habitat is lost and if disturbed or displaced during construction.

(c) Predation risk from potentially increased local rodent populations (as a result of increased food supplies at the landfill) was considered negligible given that the active tip face will be compacted daily and covered with soil, and the volume of putrescible waste received at Smooth Hill will be low. This will reduce food availability for rodents and therefore prevent or minimise population increases. I also note that the proposed predator control programme will also further control rodents and reduce predation risk.

(d) A moderate avifauna ecological value along with a negligible (if not nesting on site) or low (if nesting on site) magnitude of effect of disturbance and displacement during the breeding season will respectively result in a very low or low overall level of ecological effect (without mitigation).

(e) This conclusion is based on the fact that one pair of falcon has previously been observed nesting on site (i.e. only a small proportion

[17] Seaton, R. (2007). The ecological requirements of the New Zealand falcon (Falco novaeseelandiae) in plantation forestry. Unpublished thesis, Massey University.

[18] Fox, N. C. (1977). The biology of the New Zealand falcon (Falco novaeseelandiae Gmelin 1788). Unpublished PhD thesis. University of Canterbury.

of the national falcon population which is estimated at 1000-5000 mature adults), the site would likely only provide nesting habitat for one falcon pair based on the large territories falcon hold, and that if egg and / or chick mortality occurred this would result in a minor effect on the known falcon population. This risk can be managed to a negligible magnitude of effect (and very low overall level of ecological effect) by the precautionary approach[19] of avoiding undertaking construction works during the falcon breeding season, or if this is not practicable implementing methods outlined in an Eastern Falcon Management Plan. These methods may include conducting pre-construction nesting falcon surveys, establishing construction-free exclusion zones around nests (if detected) until nesting activities are completed, monitoring nesting success and undertaking adaptive management as required.

40 Native, Not Threatened species (Sections 5.2.1.1 – 5.2.2.2 of the EcIA):

(a) Low avifauna ecological values along with negligible magnitudes of effect of habitat loss, construction and operational disturbance and displacement during the breeding and non-breeding seasons, and increased nesting bird, egg and chick predation will result in very low overall levels of effect on native, Not Threatened species (without mitigation).

(b) The negligible magnitudes of effect were concluded based on the very small proportion of habitats that will be lost relative to what will be retained on site and the abundance of alternative habitats available in the wider area. The bird species present on site are all highly mobile and will be able to disperse to these alternative habitats when habitat is lost or upon disturbance or displacement. These species will also benefit in the long term from the vegetation re-planting mitigation required for this proposal as well as proposed pest plant control, fencing of vegetation, in-fill planting and predator control (as outlined in Section 6.0 of the EcIA).

(c) Predation risk from potentially increased local rodent populations (as a result of increased food supplies at the landfill) was considered negligible given that the active tip face will be compacted daily and covered with soil and the volume of putrescible waste received at Smooth Hill will be low. This will reduce food availability for rodents and therefore prevent or minimise population increases. I also note

[19] Assuming that eastern falcon is breeding within the site.

that the proposed predator control programme will also further control rodents and reduce predation risk.

41 Bird strike with aircraft during operation (Sections 5.2.2.3 and 5.2.2.3.1 of the EcIA):

(a) Birds that pose a strike risk to aircraft, and as such are at risk from strike themselves, are already currently common in the local and wider landscape surrounding Dunedin Airport. Of the species recorded at the Project site, only southern black-backed gull is both attracted to landfills and at risk from strike with aircraft (due to their flight behaviours). This species was observed traversing to or from the Taieri Plains and may be attracted to the landfill. This could increase the risk to this species of being struck by aircraft, however, in my opinion, with the implementation of good landfill operational techniques and bird management, monitoring and control (as outlined in the Bird Management Plan)[20], the magnitude of effect of the landfill adding to the possibility of strike with aircraft will be negligible, resulting in a very low overall level of effect on that species.

(b) The stormwater attenuation basin on site, which has the capacity to store up to approximately 5,000 m^3 in a 1% AEP (annual exceedance probability) storm event (GHD, 2021a), could attract waterfowl and shag species to the site. I understand this basin is likely to hold some water most of the time except during extended dry periods and will be covered with a net or an array of closely spaced wires. Use of nets or closely spaced wires to cover the attenuation basin will prevent birds from being attracted to the basin, particularly in light of the attractiveness of the extremely large wetland complex in the Taieri Plains that they are preferentially likely to utilise. As such, I consider the magnitude of effect of the Project adding to the possibility of strike with aircraft will be negligible for waterfowl and shag species, resulting in a very low overall level of ecological effect on these low and moderate value species.

Recommendations to avoid, minimise and mitigate potential adverse effects (Section 6.0 of the EcIA)

42 In the EcIA, I recommended preparing an Eastern Falcon Management Plan for the Project (currently in draft). This has also been included in the draft conditions of consent. The management plan must detail the times of

[20] The Bird Management Plan requires on site management of black-backed gulls to zero densities, and outlines an escalating management procedure to follow to manage bird numbers,

the year to avoid construction (falcon breeding season), measures to minimise effects on potentially nesting birds where avoiding the breeding season is not possible (e.g. conducting pre-construction falcon surveys, establishing exclusion zones around nests (if identified) whereby construction activities cannot occur until nesting activities are completed), monitoring nesting birds, and if disturbed, extending the size of the exclusion zone/s.

43 Based on overall levels of effects of the Project on avifauna being very low without mitigation, or in the case of potential construction-induced disturbance, displacement and mortality during the falcon breeding season (if falcon were nesting on site) being very low level with mitigation, I concluded that biodiversity offsetting was not required given that there are no residual effects to address.

Additional / new information relating to the Project that has arisen since preparation of the EcIA

44 Since preparation of the EcIA, DOC has recently (December 2021) updated their national threat classification for birds[21], in which the national conservation status of eastern falcon has increased from At Risk, Recovering to Threatened, Nationally Vulnerable. The population size still remains within the qualifier B(1), 1000-5000 mature individuals; the increased conservation status is a result of the population no longer increasing at 10% but now being stable at +/- 10%.

45 In accordance with the 2018 EIANZ EcIA guidelines[22], this change in conservation status elevates the ecological value of eastern falcon to very high. This has implications for the ecological value assigned to this species (increasing from moderate to very high) and consequently my assessment of the level of effect of the proposal on eastern falcon.

46 In light of this increased ecological value of eastern falcon (from moderate to very high), I have reconsidered the magnitude of potential adverse effects of the Project on eastern falcon in my evidence. I have concluded

[21] 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 New Zealand birds, 2021 (New Zealand Threat Classification Series No. 36). Department of Conservation.

[22] Roper-Lindsay, J., Fuller, S. A., Hooson, S., Sanders, M. D., & Ussher, G. T. (2018). Ecological impact assessment (EcIA). EIANZ guidelines for use in New Zealand: Terrestrial and freshwater ecosystems (2nd ed.). Environment Institute of Australia and New Zealand.

that my assessment as detailed in the EcIA is still appropriate as per the following rationale:

(a) Habitat loss: irrespective of conservation status, the fact remains that only a very small proportion of the territory / home range of falcon using the site will be lost. As a highly mobile species they will be able to utilise other areas in the wider area (including the remainder of their extensive home range) upon habitat loss. Magnitude of effect of habitat loss on eastern falcon remains negligible *(i.e. Having a negligible effect on the known population or range of the element/feature)*.

(b) Construction and operational disturbance and displacement during the non-breeding season: as per rationale above for habitat loss. Associated magnitude of effect eastern falcon remains negligible *(i.e. Having a negligible effect on the known population or range of the element/feature)*.

(c) Construction-induced disturbance, displacement and mortality of eastern falcon during the breeding season: despite the increase in conservation status of eastern falcon, the population size still remains 1000-5000 mature individuals and as such the potential magnitude of effect of egg and /or chick mortality of one nesting pair (if they nest on site) would still be low on the known falcon population without mitigation *(i.e. Having a minor effect on the known population or range of the element/feature)*.

(d) Increased egg and chick predation: predator trapping and standard landfill waste management practises that will be implemented such as good compaction and application of cover soil will help control rodent numbers and as such minimise potential predation risk to a negligible level. Magnitude of effect of potential increased egg and chick predation on eastern falcon remains negligible *(i.e. Having a negligible effect on the known population or range of the element/feature)*.

47 I have also reassessed the level of ecological effect, based on increased ecological value (given the increased conservation status) but unchanged magnitude of effect (as detailed in paragraph 46 above). The following provides my revised assessment of level of effect on the eastern falcon, following the EIANZ EcIA guidelines:

Table 1. Original and revised assessments of levels of effects of the Project on eastern falcon (without mitigation).

Eastern falcon potential effects	Ecological value		Magnitude of effect		Level of effect	
	Original	Updated	Original	Updated	Original	Updated
Habitat loss	Moderate	Very high	Negligible	Negligible	Very Low	Low
Disturbance and displacement during the non-breeding season (construction)	Moderate	Very high	Negligible	Negligible	Very Low	Low
Disturbance, displacement and mortality during the breeding season (construction)	Moderate	Very high	Negligible or Low[23]	Negligible or Low[24]	Very Low or Low[25]	Low or Moderate[26]
Disturbance and displacement (operation)	Moderate	Very high	Negligible	Negligible	Very Low	Low
Increased egg and chick predation	Moderate	Very High	Negligible	Negligible	Very Low	Low

48 As shown in Table 1, the levels of effect of habitat loss, disturbance and displacement during the non-breeding season (construction and operation), and increased egg and chick predation have increased from Very Low to Low as a result of the increased ecological value of eastern falcon. Despite this increase, I do not consider that a low level of effect requires offsetting as per the EIANZ EcIA guidelines and paragraph 30 of my evidence.

[23] The magnitude of effect is only low if birds are nesting on site. If they are not nesting on site, the magnitude of effect would be negligible.

[24] The magnitude of effect is only low if birds are nesting on site. If they are not nesting on site, the magnitude of effect would be negligible.

[25] The level of effect is only low if birds are nesting on site. If they are not nesting on site, the level of effect would be very low.

[26] The level of effect is only moderate if birds are nesting on site. If they are not nesting on site, the level of effect would be low.

49 As shown in Table 1, if falcon are breeding on site, the level of effect of disturbance, displacement and mortality during the breeding season is moderate. With the implementation of mitigation (pre-construction surveys for nesting birds, erecting 200 m construction-free exclusion zones around active nests and monitoring nesting success as outlined in the draft Eastern Falcon Management Plan that I prepared for the Project), I consider that the level of effect would be low and offsetting is not required as per the EIANZ EcIA guidelines and paragraph 30 of my evidence.

50 Based on this re-assessment of potential adverse effects of the Project on eastern falcon in light of the increased conservation status of this species since the original EcIA was prepared, I consider that the mitigation proposed in the EcIA and draft Eastern Falcon Management Plan still adequately ameliorates potential adverse effects on eastern falcon and offsetting is not deemed necessary.

51 I do note that a 200 m buffer zone around an active nest, as proposed in the draft Eastern Falcon Management Plan, is very conservative and should reduce effects, if not avoid them entirely. However, I have considered the s42a report (discussed in paragraphs 62 to 68 below), and have included a safeguard in case of an unexpected effect on nesting falcon. The safeguard is the addition of a new clause to the draft Eastern Falcon Management Plan consent condition requiring that if mortality of nesting falcon (including nest contents) occurs on site during Project-related construction works, and this can be attributed to the construction works, then a suitable remedial, offset or compensatory action will be determined by a suitably qualified and experienced ecologist and implemented to account for the loss/es. For example, if a falcon chick dies, then a suitable action (following the effects management hierarchy) may be conducting predator control in another local area where falcon are nesting to help increase fledging success or providing a financial contribution to an appropriate research project on Eastern Falcon). This action will be discussed with Te Rūnanga o Ōtākou and the peer review panel prior to implementation.

Response to Otago Regional Council's s95 report, including additional matters raised in a document dated 3 March 2022

52 In a technical review of the EcIA prepared for ORC's s95 report, Mr Markham considered that the ecological effects assessment and subsequent s92 responses have not been clear, resulting in confusion regarding the magnitude of effects.

53 In response to this comment, I note that the magnitudes of effect presented in the effects assessment for avifauna (Section 5.2 of the EcIA) are without mitigation. For the potential effect of construction-associated disturbance, displacement and mortality during the falcon breeding season, an assessment both without and with mitigation is provided (as stated in Section 5.2.1.3 of the EcIA), given that potential adverse effects can be avoided by not conducting construction works during the falcon breeding season, or reduced through the implementation of mitigation (adherence to an Eastern Falcon Management Plan).

54 In the technical review of the EcIA, with regards to avifauna ecology, Mr Markham stated that the magnitude and level of ecological effect pre-mitigation, which is set at the Ecological District (ED) and National level, may result in the underestimation of ecological effect on site. Further, Mr Markham stated specifically that the low level of effect assessed for falcon, if they are breeding on site, seemed to be an underestimation if viewed at the site scale. Mr Markham agreed that an Eastern Falcon Management Plan is standard practise and will reduce the level of effect, but if falcon are found to be breeding on site and available breeding habitat is restricted in the surrounding environment, he considers that there would be a level of residual effect that would need to be accounted for by offsetting. This viewpoint was again stated in a follow-up document noting additional matters subsequently raised.

55 In response to magnitudes of effect and resultant ecological effects pre-mitigation potentially underestimating ecological effects on site, I note that I have followed the EIANZ EcIA guidelines[27] when considering the scale at which to assess magnitude of effect. The guidelines state that *"assessing magnitude of effect at the spatial scale of the effect is not recommended, since it does not assist in developing impact management options. For many activities, this is a narrow perspective on the effect on ecological value and provides no information about the impact of the effect in the context of the local ecosystems, or in the context of the site's value. For example, removal of 10m^2 of kanuka at the edge of a 20m^2 stand for an access road may reduce the site's kanuka cover by 50%; but if the surrounding land supports extensive kanuka, and the species is common in the ED, the wider context of that clearance needs to be considered*". As such, I think my assessment has been conducted in an appropriate manner and in accordance with the EIANZ EcIA guidelines.

[27] Roper-Lindsay, J., Fuller, S. A., Hooson, S., Sanders, M. D., & Ussher, G. T. (2018). Ecological impact assessment (EcIA). EIANZ guidelines for use in New Zealand: Terrestrial and freshwater ecosystems (2nd ed.). Environment Institute of Australia and New Zealand.

56 With regards to falcon specifically and Mr Markham's consideration that effects being considered low if they are breeding on site and breeding habitat is restricted in the surrounding environment is an underestimation; I note that in addition to assessing effects at the site level being inappropriate, breeding habitat is not restricted in the wider area. The surrounding landscape has a large mosaic of plantation pine (150,000+ hectares) and conservation estate that provides habitat for eastern falcon. Not all of this habitat is suitable for breeding, particularly mature pine stands, however, given that it is production forestry, cyclic harvesting occurs; post-harvesting, the pine slash provides suitable habitat for falcon to breed in as does re-planted pine for up to four years post-planting. As such, it is my opinion that breeding habitat is not restricted in the area and no residual effect remains that requires offsetting.

57 The ORC s95 follow-up document also proposed a revised consent condition for the Eastern Falcon Management Plan. I generally accept what was proposed but do not consider that the levels of effect on eastern falcon require offsetting or compensation. Mitigation measures noted in the draft Eastern Falcon Management Plan, including a 200 m buffer around nesting birds if found at the Project site (which is a very conservative measure) will sufficiently reduce potential impacts on them, if not avoid them completely. I note that this follows the EIANZ EcIA guidelines which state that "*Low and Very Low levels should not normally be of concern, although normal design, construction and operational care should be exercised to minimise adverse effects*".

58 In my view, very low level of effects do not necessarily imply there are measurable residual adverse effects; in my assessment it means that a possible effect has been considered and found to be essentially inconsequential or below any reasonably discernible level. I think this is also the case for the low levels of effect assessed for falcon. Very low levels of effect could not be achieved, as when using the EIANZ EcIA guidelines for a species with a very high ecological value, such as eastern falcon, the lowest level of effect that can be achieved with a negligible (i.e., the lowest) magnitude of effect is a low level of effect. Even with rigorous implementation of the effects management hierarchy and the best possible management in place, this is the lowest possible assessment score other than for positive effects. In the case of what is proposed to manage nesting falcon (if found on site), avoidance of works during the falcon breeding season, if possible, or erection of a 200 m buffer zone around any active nests and monitoring provides a very conservative management approach based on best practise and will sufficiently reduce potential effects on them, if not avoid them entirely.

59 Accordingly, it is not necessary to include offsetting or compensation outcomes in the Plan. I note, however, that upon consideration of the s42a report comments (paragraphs 62 to 68), which again expressed concern that effects on falcon if found to be nesting on site may be too low, this consent condition has been further revised to include a conservative safeguard against unexpected mortality on site. This clause requires that if mortality of nesting falcon occurs on site during Project-related construction works, and this can be attributed to the construction works, then in this instance a suitable remedial, offset or compensatory action will be determined and implemented. Any offset or compensatory actions will use methodologies that are transparent and logical, and that use accepted ecological principles to derive the related offset / compensation type and quantum.

60 Furthermore, although I agree that pre- and during- construction surveys for falcon are required, and that methodologies for these surveys should be included in the Eastern Falcon Management Plan, I do not believe that post-construction monitoring for the duration of the consent is required. This is because the potential effect being monitored for is mortality of eggs / chicks during construction; this has subsequently been resolved in the draft conditions provided in the s42a report (i.e. post-construction monitoring of falcon has not been included in the draft consent conditions).

61 Accordingly, a new consent condition has been proposed for the Eastern Falcon Management Plan and is included as part of the updated conditions attached to Mr Dale's evidence.

Response to any issues in section 42A report

62 As per ORC's s95 report, ORC's s42a report again questioned the scale of ecological effects for terrestrial ecology and Mr Markham notes "that even if the current ecological values are combined with a greater magnitude of effect, the overall level of ecological effects will still be manageable and able to be offset or compensated for".

63 Mr Markham also states that a BOAM (biodiversity offset accounting model) was not provided for potential effects on ecology (including avifauna) and recommends that the Eastern Falcon Management Plan (amongst other ecology plans) includes a residual effects assessment using BOAM or BCM (biodiversity compensation model) modelling.

64 With regards to the first comment, I note that given this is a general comment about the terrestrial ecology assessment, with regards to avifauna ecology, I assume that as per the s95 report Mr Markham's concerns still relate to levels of effect being set at the Ecological District

(ED) and National level potentially resulting in the underestimation of ecological effects on site, and that specifically for falcon, that the level of effect assessed for falcon if they are breeding on site is an underestimation if viewed at the site scale. On this basis my response is the same as per paragraphs 55-59 of my evidence.

65 Likewise, with regards to residual effects and offsetting, my response is the same as per paragraphs 57-59 of my evidence.

66 Accordingly, a new consent condition has been proposed for the Eastern Falcon Management Plan and is included as part of the updated conditions attached to Mr Dale's evidence.

67 I also note that the s42a report states that the advice note provided by the Applicant (in response to the s95 report) on the application of offsetting or compensation measures for general ecological matters may result in some uncertainty regarding when/where offsetting or compensation is required.

68 With regards to falcon, the addition of the clause to condition 57 regarding the immediate development and implementation of remedial, offset or compensatory actions if mortality of nesting falcon (including nest contents) occurs on site, provides certainty regarding when it is appropriate to implement such actions.

Response to matters raised in submissions

69 I have read the submissions on the Project that relate to avifauna ecology.

70 A & M Granger noted that "*rubbish should be covered at the end of the day*" with the concern that there could be an influx of birds resulting in potential contamination of roofwater, drinking supplies or solar panels.

71 I note that daily cover will occur, the guidelines of which are provided in the draft Smooth Hill Landfill Management Plan (draft LMP). In brief, daily cover will involve spreading / grading and thorough compaction of waste at the active tip face at the end of operation each day. The cover will consist of a 150 mm layer of soil or a suitable artificial cover that is compacted to seal and stabilise it. This will result in no food being exposed at the end of the day, thereby denying birds a food source and minimising bird numbers at the site.

72 S&A Ramsey from Big Stone Forest Ltd were concerned about the ecological effects conclusions and noted that with regards to avifauna, effects on falcon have potentially been underestimated. They also

expressed concern that ecological monitoring is not proposed to ensure effects will be as low as predicted.

73 In response to this I note that my effects assessment was based on field surveys and observations made at the Project site as well as consideration of potential effects at a national scale. I have followed the EIANZ guidelines when conducting my effects assessment and believe my conclusions are appropriate, well justified (in the EcIA and reiterated in my evidence) and adequately assess potential impacts on eastern falcon. I also note that as discussed in paragraph 51 a new clause has been added to the condition requiring an Eastern Falcon Management Plan to be prepared that requires a suitable remedial, offset or compensatory action to be implemented if falcon mortality occurs on the Project site during the breeding season and this can be attributed to construction works.

74 With regards to monitoring, I note that weekly monitoring of any active falcon nests found on site during construction works is proposed in Section 3.2.2.1 of the draft Eastern Falcon Management Plan. This would be conducted by a suitably qualified and experienced ecologist and would help inform whether management techniques being implemented are effective or whether additional measures are required to manage effects on falcon.

75 A Hutchison expressed concern that the Eastern Falcon Management Plan concentrates on allowing any current nesting activity to complete before ongoing disturbance drives the birds elsewhere and that by allowing mobile species to leave at their own convenience does not address the reduction in what is currently suitable nesting habitat.

76 I note that habitat loss for nesting eastern falcon was considered in Section 5.2.1.1 of the Ecological Impact Assessment (EcIA) and is again considered / re-assessed in paragraphs 44-50 of my evidence. As stated in these sections only one pair has been recorded nesting on site and the amount of suitable nesting habitat on site that will be lost (33.88 ha of plantation pine) is considered to be negligible relative to the large abundance of alternative pine plantation and native forest nesting habitat available in the wider area that falcon, which are a highly mobile species, will be able to move to nest in.

77 The South Coast Neighbourhood Society Inc (SCNS) also expressed concern about potential effects on falcon and quoted a comment from Mr Markham's peer review report regarding potential underestimations of effect on site, particularly if falcon are breeding on site.

78 My response to this comment is as per that provided in paragraphs 54- 56 of my evidence where I address this comment from Mr Markham.

79 The Department of Conservation (DOC) state that although adverse effects on conservation values have been assessed as low, they are concerned that there remains some risk and uncertainty, exacerbated by a reliance on management plans which are yet to be finalised. DOC states that if consents are granted, appropriate consent conditions are required to ensure that the activity and effects are as outlined in the application, that management plans are effective, and that there is adequate monitoring to detect and respond to any adverse effects that arise.

80 In response to this, with regards to avifauna ecology, a draft Eastern Falcon Management Plan has been prepared and this will be updated based on requirements listed in the associated proposed resource consent condition included as part of the updated conditions attached to Mr Dale's evidence. As it stands, the draft management plan outlines methods to manage potential adverse effects if falcon are nesting on site pre- or during-construction, as well as documenting monitoring and reporting requirements. The draft plan has been prepared as a dynamic document and in Section 4.0 it is proposed that it will be updated annually during construction and reviewed by a suitably qualified and experienced ecologist to determine if management actions are sufficient and effective in managing falcon. If necessary, adaptive management actions will be recommended and incorporated into the plan; the plan would subsequently be provided to Te Rūnanga o Ōtākou, the independent peer review panel and Otago Regional Council for review and comment prior to implementation. This will ensure potential adverse effects on eastern falcon are avoided or appropriately mitigated. I also note that a new clause has been added to the consent condition requiring an Eastern Falcon Management Plan to be prepared that requires a suitable remedial, offset or compensatory action to be implemented if falcon mortality occurs on the Project site during the breeding season and this can be attributed to construction works.

81 General concern about effects of the Project on eastern falcon is expressed by the Otokia Creek and Marsh Habitat Trust and the Saddle Hill Community Board.

82 In response to this I note that potential effects of the Project on eastern falcon have been carefully considered in the EcIA and re-assessed in my evidence in light of the increase of threat status of eastern falcon since preparation of the EcIA; the conclusion I made in my re-assessment (discussed in paragraphs 44 to 50) is that overall effects on falcon will be low for all effects without mitigation, with the exception of potential mortality effects during construction if nesting birds are present on site, whereby effects will be moderate without mitigation and low with the implementation of mitigation. I also note that a new clause has been added to the consent

condition requiring an Eastern Falcon Management Plan to be prepared that requires a suitable remedial, offset or compensatory action to be implemented if falcon mortality occurs on the Project site during the breeding season and this can be attributed to construction works.

83 S Hart expressed concern that some of the site investigations were inadequate given that they were based on one day's observation, whereas the area has a yearly cycle.

84 In response to this, with respect to avifauna, I note that surveys were conducted at the landfill and wider area over two days each season and as such incorporate seasonal and temporal variation in bird species presence and abundances.

85 The Saddle Hill Community Board also stated that there are large seagull breeding colonies at Green Island and Moturata Island, and they are concerned that methods to manage bird numbers at the landfill may potentially result in mortality of endangered endemic gulls.

86 This potential issue was considered and taken into account during preparation of the Smooth Hill Interim Bird Management Plan (prepared by myself and Phil Shaw). Section 3.3.1 of the Plan states that "*prior to a shooting operation commencing, the Bird Control Officer will confirm that the shooter can correctly identify black-billed gulls, red-billed gulls, harrier hawks, eastern falcon and paradise ducks*" as these "*are protected native species that may be present at, or near the landfill, and must not be shot*". A species identification guide is provided in Appendix 3 of the Plan and it is noted that it is highly unlikely that black-billed gulls will be present at the landfill as they generally not attracted to landfills, however they are an At Risk - Declining species therefore positive identification is necessary prior to shooting operations.

87 Section 3.3.2 of the Plan also states that "Poison will only be set if no black-billed gulls and red-billed gulls have been observed at the landfill for the past three to four days. If poison is set at dusk and left overnight, the Bird Control Officer, and / or a small team of trained personnel, will monitor and deter non-target species (e.g. red-billed gulls, harrier hawks) until dark and again from first light until the bread (with the poison in it) has been consumed; this is to prevent potential poisoning of these non-target species".

88 Furthermore, Section 3.3.3 of the Plan states that "culling (colony control) is only appropriate for black-backed gulls; it is not appropriate for the protected red-billed gulls or black-billed gulls".

89 In summary, I consider that these management efforts will prevent accidental mortality of black-billed gulls and red-billed gulls at the landfill.

Conclusion

90 My original assessment in the EcIA prepared for the Project concluded that effects on eastern falcon would be very low without mitigation, with the exception of potential construction-associated disturbance, displacement and mortality of nesting birds (if found on site) which would be low without mitigation but could be managed to a very low level of effect with mitigation (adherence to management actions as prescribed in an Eastern Falcon Management Plan).

91 Given that the ecological value of eastern falcon has increased from moderate to very high since preparation of the EcIA (as a result of an increase in conservation status from At Risk – Recovering to Threatened – Nationally Vulnerable), I re-assessed potential effects of the Project on this species.

92 I conclude that magnitudes of potential effects of the Project on eastern falcon remain the same, however with application of the EIANZ effects assessment matrix, overall levels of effect of the Project on this species have increased from very low to low for all effects except potential construction-associated disturbance, displacement and mortality of nesting birds (if found on site) which has increased from low to moderate without mitigation. With mitigation this effect can be managed to a low overall level of effect.

93 Despite these increases in levels of effect, low impacts still remain, the mitigation measures outlined in the draft Eastern Falcon Management Plan are still deemed appropriate and adequate to manage potential effects, and offsetting is not required.

94 The level of effect on all other bird species present, or potentially present at the site is assessed as very low without mitigation.

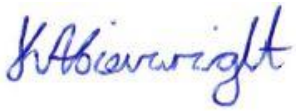
95 I have considered and responded to Otago Regional Council's external peer review comments contained in ORC's s95 and s42a reports (including additional comments to the s95 report provided at a later date) as well as the submissions that relate to avifauna ecology and my conclusions have not changed.

96 To be conservative, as a safeguard if unexpected falcon mortality occurs on site, a new clause has been added to the condition requiring an Eastern Falcon Management Plan to be prepared that requires that if mortality of

nesting falcon occurs on site during Project-related construction works, and this can be attributed to the construction works, then in such an instance a suitable remedial, offset or compensatory action will be determined and implemented to account for the loss/es.

97 I have conducted my assessment as per the EIANZ guidelines and believe that it is robust, adequately assesses potential effects on avifauna ecology and provides appropriate mitigation measures.

98 To alleviate reviewer and submitter concerns, the Eastern Falcon Management Plan condition now also includes a conservative safeguard to undertake a remedial, offset or compensatory action in the case of an unexpected construction-caused adverse effect on falcon if nesting on site.



Karin Sievwright

29 April 2022