MT COOEE LANDFILL BIRD MANAGEMENT PLAN

For WSP

September 2022

REPORT INFORMATION AND QUALITY CONTROL

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Document Name	13135 Mt Cooee landfill bird management plan

Version History:	V3.0	7 September 2023

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EXECUTIVE SUMMARY

Clutha District Council (CDC) is applying for statutory approvals to authorise the continued operation of the Mt Cooee Landfill located on Kaitangata Highway approximately 1.2 km east of the Balclutha township. The landfill is located approximately 500 m from the Balclutha aerodrome. Landfills may attract birds, particularly if they have exposed putrescible waste, which may increase the risk of bird strike on aircraft.

Bird surveys and a risk assessment indicate that there is an existing high potential risk of bird strike at the Balclutha aerodrome from a range of species, including spur-winged plover (*Vanellus miles*), starling (*Sturnus vulgaris*), gulls, Australian magpie (*Gymnorhina tibicen*), Australasian harrier (*Circus approximans*), shags, waders, a range of waterfowl, and small passerines due to the proximity of the Clutha River, extensive grassed areas, and tall trees on aerodrome margins. This risk is largely independent of the landfill.

Bird surveys also indicate that the main species attracted to putrescible waste at the Mt Cooee landfill are southern black-backed gull (*Larus dominicanus*), starling, and house sparrow (*Passer domestica*). Approximately 100 black-backed gulls were recorded at the landfill or soaring above the landfill and passing through aircraft flight paths on the way to the landfill. Of the bird species attracted to the landfill, black-backed gulls therefore pose the greatest bird strike risk because of their size, abundance, and soaring flight behaviour, followed by starlings because they fly in large flocks. As house sparrow are not considered a significant threat to aircraft, any bird management at the landfill which may help reduce the risk of damaging bird strike on aircraft should concentrate on black-backed gull and starling.

Current operational practices at the landfill, such as minimising the extent of the active tip face, prompt compaction and covering of putrescible waste, mowing of grass, and prevention of nesting of birds, are not effective at deterring birds. Daily cover is not routinely applied.

Potential bird deterrence methods that could be implemented at the landfill include changing the cover type, thickness, density, or frequency of application, dumping putrescible waste into V-pits, use of mobile high wires, special kites, sonic bird scaring devices, shooting, and anti-roosting strips on buildings, and removal of old buildings near the proposed expansion that provide nesting habitat for starlings.

Potential bird exclusion methods that could be implemented at the landfill include baling of waste or erecting a bird net over the landfill. Netting is costly and requires high levels of maintenance due to the potential for it to rip. For baling, a bird-proof building would be required to dump, compact, and bale waste before disposal.

As birds are established in their scavenging behaviour at the landfill and deterring them from the site may prove difficult, exclusion methods are the most likely to be successful at reducing bird numbers and, of the two options presented, baling is our recommended option. However, CDC, in its Landfill Management Plan, currently only proposes to use the following bird deterrence methods:

- Cover (daily, intermediate) and compaction.
- Bird scaring (gas gun).
- Daily cover, bird poisoning and, as a last resort, a shooting.
- If lots of healthy birds, dispersal using bird scaring measures such walk up disturbance, shotguns, bird fright, lasers, electric fences, etc.

It is recommended that an adaptive approach to bird management is favoured, that allows adoption of alternative management options should targets not be met. Alternatively, CDC could choose to move directly to an exclusion option.

It is noted that the landfill has little or no ability to influence surrounding land use practices, such as quarrying and cropping that may influence bird strike risk at the aerodrome.

Bird management roles and responsibilities will need to be defined. This should include a bird control officer, bird observer(s), and bird deterrence personnel, and if lethal methods are chosen, a bird shooter and a poison handler with the relevant licencing, training, and expertise.

Bird monitoring would need to be undertaken to determine the effects of bird management at the Mt Cooee landfill. Linking reduction of bird numbers at the Mt Cooee landfill to a reduction in bird strike risk at the Balclutha aerodrome will also require monitoring of bird numbers at the aerodrome, regular assessments of bird strike risk by a qualified

individual, and long-term monitoring of bird strike data from the aerodrome. Minimum requirements for bird monitoring are described. Information gathered during bird monitoring and all bird management actions undertaken should be recorded and the information stored securely.

1 INTRODUCTION

1.1 Background

Clutha District Council is applying for statutory approvals to authorise the continued operation of the Mt Cooee Landfill located on Kaitangata Highway approximately 1.2 km east of the Balclutha township (Figure 1). The landfill accepts around 8,000 tonnes of refuse per year from Council's kerbside collection service, 10 waste transfer stations, and residential, commercial and some industrial customers. The existing resource consents expire on 1 October 2023. Clutha District Council is also considering expansion of the landfill by adding new cells and a recovery centre. The proposed landfill expansion will require several resource consents along with technical assessments to support the consent applications (WSP 2022).

The landfill is located approximately 500 m from the Balclutha aerodrome. Landfills may attract birds, particularly if they have exposed putrescible waste[1], which may increase the risk of bird strike on aircraft. While there have been no complaints about birds from the landfill affecting flights at the aerodrome, Clutha District Council considers it good neighbourly behaviour to manage this potential risk. As such, WSP has requested the preparation of a bird management plan for the Mt Cooee Landfill.

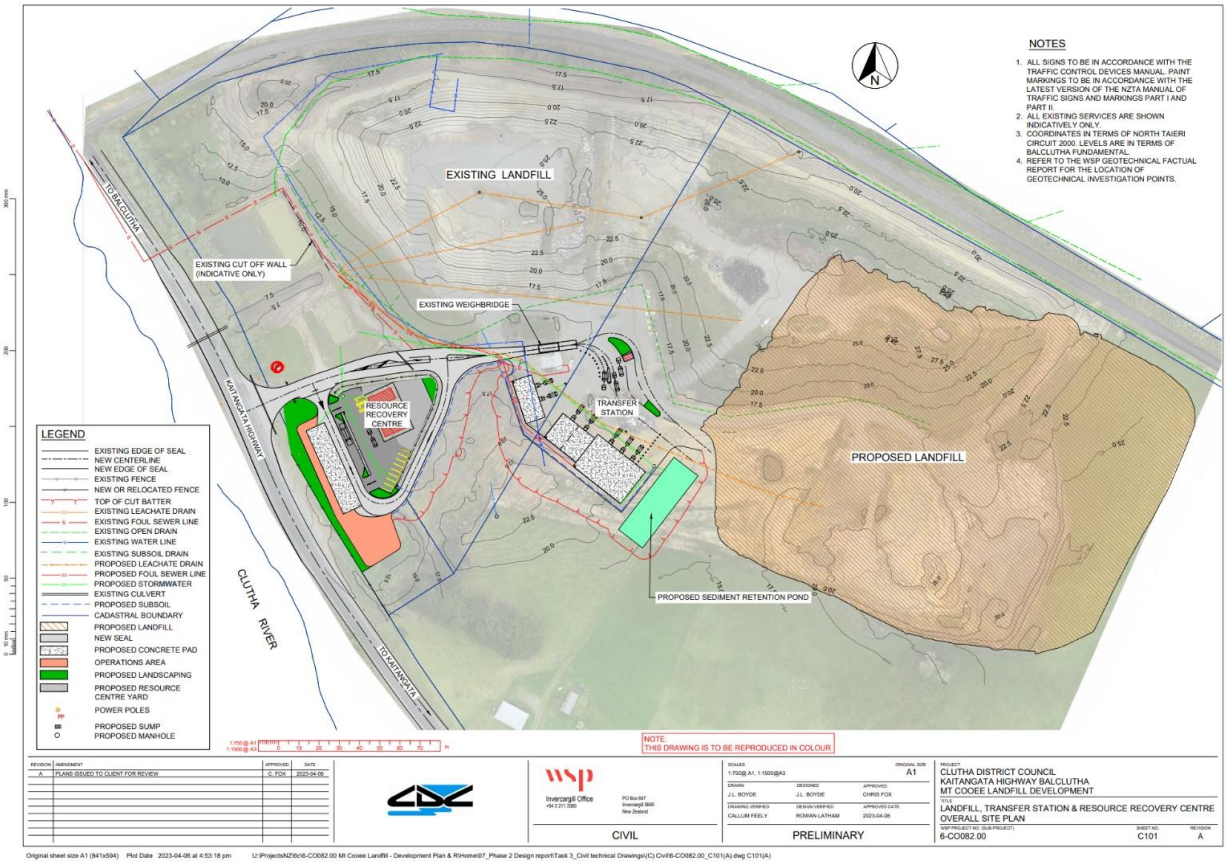

Figure 1: Site plan showing the proposed expansion of the Mt Cooee Landfill (WSP 2023).

[1] Putrescible waste includes organic material that is subject to decay, and includes household and commercial food wastes. It is capable of providing food for birds and other animals.

1.2 Objectives and scope

The objectives of this project are to prepare a bird management plan for the Mt Cooee landfill, including the proposed extension to the landfill, which provides an assessment of potential bird hazards posed to aircraft at Balclutha aerodrome from the landfill and identifies landfill management opportunities to mitigate any potential risks. This management plan does not cover management of bird strike risk at the aerodrome, which is primarily the responsibility of the South Otago Aero Club.

1.3 Mt Cooee landfill

Section 8 'Residual Waste Disposal Operations' of the Mount Cooee Management Plan: 2022 (Clutha District Council 2022) requires that the tip face is kept to the smallest practicable size and not exceed 30 m if possible and that refuse is compacted so that adequate control over nuisances (such as birds) is able to be maintained; however, daily cover is not routinely applied. Section 12 'Nuisance Control' of the plan lists refuse compaction and bird scaring (gas gun) as routine control methods used for birds.

Bird management activities currently undertaken at the landfill include:

- The landfill operator's contract specifying that putrescible waste is covered within 30 minutes of dumping.
- Areas of grass are mown, and no nesting of birds is permitted at the Mt Cooee landfill (Landfill staff, pers. comm. 4 November 2022).

1.4 Balclutha aerodrome

Balclutha aerodrome is operated by the South Otago Aero Club. The grass runway is 666 × 23 m and aircraft flight paths pass to the south of the Mt Cooee landfill (https://www.aip.net.nz/). The number of flights is low.

There have only been two or so reported bird strikes at the Balclutha aerodrome in the last few years, and these were from spur-winged plover (*Vanellus miles*) which sometimes nest on the edge of the runway (Israel Win, South Otago Aero Club, pers. comm. 4/11/2022).

The runways are mowed, and the remaining grassed areas are cut for baleage a couple of times per year (Israel Win, South Otago Aero Club, pers. comm. 4/11/2022). Grass around the South Otago Clay Target Club shooting range, which is located on the aerodrome, was cut during the 4 November 2022 site visits. It was also observed during the site visits that seeding grasses were present over the airfield and that birds appeared to be feeding on them.

1.5 Bird strike

Birds striking aircraft can destroy engines and windshields and cause significant damage to airframe components and leading-edge devices. Factors determining the consequences of bird strike are the number and mass of birds struck, the phase of aircraft flight (including speed and height), and the part of the aircraft hit (Shaw 2022).

Bird strikes are most likely when the aircraft are lower, i.e. during take-off and landing, as birds mostly fly at lower altitudes, and this risk is generally managed at the airport. However, sites near airports which attract birds may also increase the risk of bird strike if the birds fly through shared airspace. Therefore management of risk is recommended to extend beyond the airport (Shaw 2022).

The following species have been identified as the main species that present a risk to aircraft at Christchurch International Airport Limited (CIAL, undated). These species are also the species of potential concern at Dunedin Airport (Avisure 2018).

- Southern black-backed gull/karoro (1 kg)
- Red-billed gull/tarāpunga (240 – 320 g)
- Black-billed gull/tarāpuka (230 g)
- Australian magpie (350 g)
- Spur-winged plover (when breeding, may attack aircraft) (350 – 370 g).
- Australasian harrier/kahu (650 g (male), 850 g (female))

- Starlings (85 g)
- Other flocking passerines of open country (e.g. redpoll, goldfinch, greenfinch, chaffinch, yellowhammer, house sparrow) (12 – 30 g)
- Paradise shelduck/pūtangitangi (1.7 kg (male), 1.4 kg (female))
- Canada goose (4.5 - 5.5 kg)
- Black swan/ kakīānau (5 – 7 kg (male), 4 – 6 kg (female))
- Other waterfowl, such as mallard (1,050 – 1,300 g) and/or grey duck/pārera (900 – 1,200 g)[2]
- Shags and cormorants (400-2,500 g)
- Rock pigeon (265 – 432 g)
- South Island pied oystercatcher/tōrea (550 g)

1.6 Landfills and birds

Landfills with accessible putrescible waste provide a food resource to several bird species. Landfills can therefore increase the number of birds in the local area and, which can increase the risk of bird strike risk if airports are located nearby. Waste facilities that have nil or very low putrescible waste content tend not to attract birds in large numbers. Landfills may also contain waterbodies, trees and other features that can attract birds (Shaw 2022).

In New Zealand, the main bird species attracted to putrescible waste landfills include southern black-backed gull (*Larus dominicanus*), red-billed gull (*Larus novaehollandiae*), rock pigeon (*Columba livia*), common starling (*Sturnus vulgaris*), house sparrow (*Passer domesticus*), and various finch species, along with ducks and shags that can be attracted to landfill waterbodies such as retention ponds (Shaw 2022). The most significant bird hazard to aviation in New Zealand are considered to be gulls, particularly southern black-backed gull because of their size, flocking nature (Shaw 2022), and because they often soar at high elevations (>300 m) where they are more likely to encounter aircraft (Ryder Environmental Limited 2019).

2 METHODS

2.1 Bird presence and abundance

To establish the range and relative abundance of bird species present near the aerodrome, bird records from seven eBird sites within 13 km of the aerodrome were collated and reviewed (Figure 2). This distance is based on the International Bird Strike Committee's best practice standards (2006) which recommend the establishment of a 13 km circle from an airfield, within which an inventory of wildlife hazards should be established, and risk assessments completed, to determine the level of contribution to strike risk (Australian Airports Association 2016)[3]. The assessed eBird records were from 1963 to October 2022, although 87% of the 103 survey dates were from 2017 or later. Seventy-seven bird taxa were recorded over this period. The maximum number of each bird species recorded at each site during the surveys is presented in Appendix A.

Bird surveys were also undertaken three times on one day (morning, midday, and afternoon) at the landfill and aerodrome. Birds were observed using binoculars (10×42) and the number of each species, and their habitat and behaviour, were recorded. While these targeted surveys are only representative of the survey period, in combination with eBird records (that have occurred over a range of years and seasons) they provide a greater level of robustness to the assessment.

[2] Hybrids of the introduced mallard and native grey duck are common.

[3] CAA (2008) also notes that the International Civil Aviation Organisation (ICAO) Bird Control and Reduction Manual recommends that [municipal solid waste landfill] sites be located no closer than 13 kilometres from the airport property (Waste Management NZ Ltd. 2018).

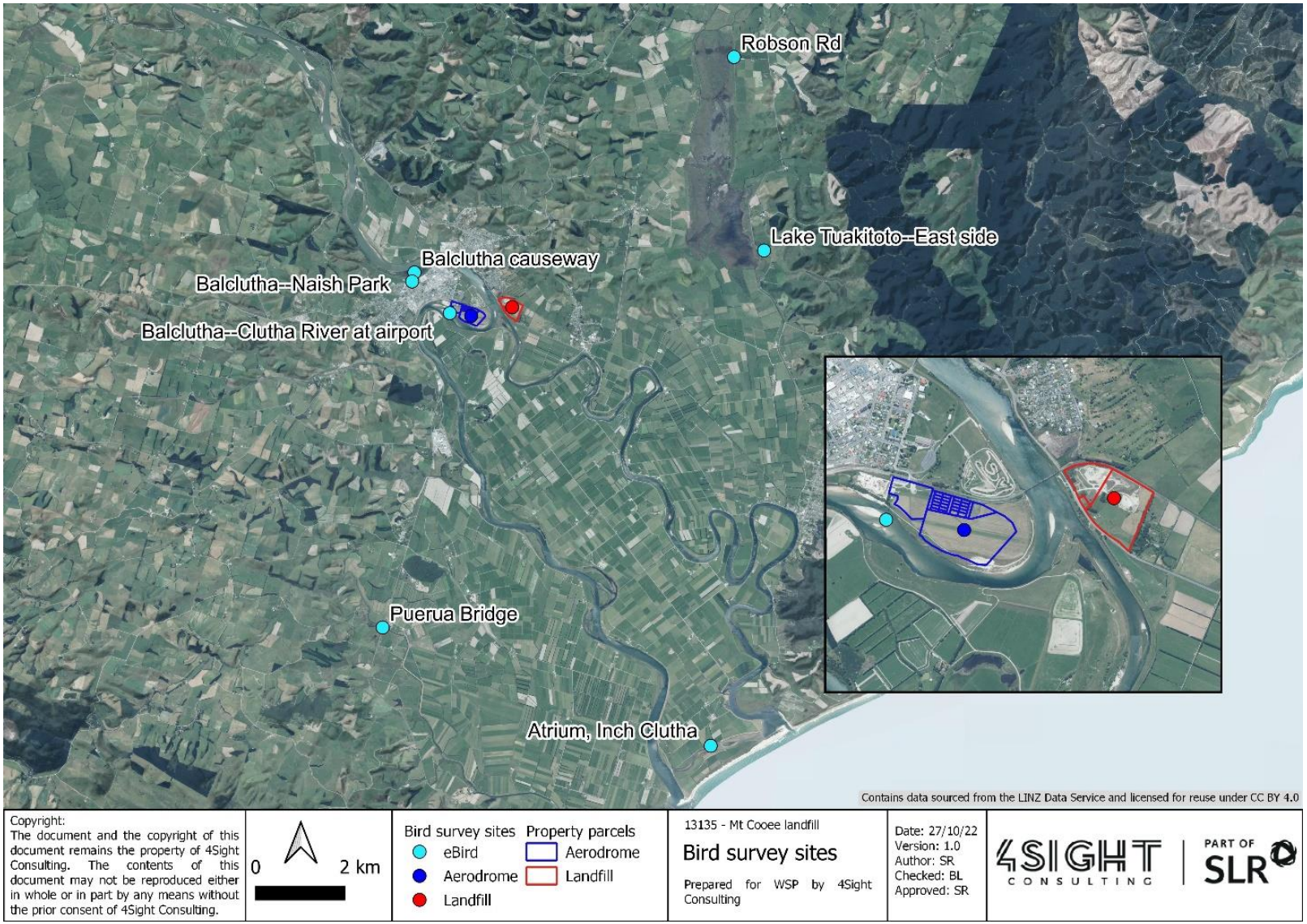

Figure 2: Bird survey sites.

Conditions were variable during the bird surveys, with a clear and relatively calm morning becoming windy and overcast in the afternoon, making birds more difficult to hear.

2.2 Risk assessment

To inform the assessment of risk the following was evaluated:

- Waste disposal methods at the landfill;
- Bird strike data from the aerodrome;
- Existing habitats present at the aerodrome and nearby sites that are attractive to birds;
- The risk of bird strike for each bird species based on weight, flight altitude, tendency to cluster, and type of activity.

3 BIRD SPECIES AND HABITATS

3.1 Survey results

3.1.1 Mt Cooee landfill

Birds recorded in and adjacent to the open landfill face included abundant black-backed gulls, and common starlings (*Sturnus vulgaris*) and house sparrows (*Passer domestica*) (Appendix A). Earlier in the morning, there were few black-backed gulls present, but when dumping and movement of waste was occurring, approximately 100 black-backed gulls were present competing for food scraps, soaring above the landfill, or waiting on gravel/bare earth for the next load of waste to arrive. Starlings and house sparrows were quick to access disturbed waste. One red-billed gull (*Larus novaehollandiae*) was seen resting on the edge of the dumping area, and one Australasian harrier (*Circus approximans*) was flying over the margins of the landfill. Trees adjacent to the fill site supported small passerines.

Only a few small passerines were seen in open areas such as the borrow pit and in grassed/weedy areas. The perimeter drain, which was dry during the site visit, did not appear to provide good habitat for birds. The settling ponds also did not provide good habitat for birds, with only one welcome swallow (*Hirundo neoxena*) observed briefly at the site. The other passerines present near the ponds were associated with adjacent trees and grassland.

Figure 3: Black-backed gulls at the Mt Cooee landfill competing for a piece of meat (left) and flocking above the landfill (right). 4 November 2022.

Figure 4: Settling ponds (left) and the borrow pit (right) provide low quality habitat for birds. 4 November 2022.

3.1.2 Mt Cooee proposed expansion area

Spur-winged plovers, starlings, and several other small passerine species were recorded in and adjacent to the proposed expansion area (Appendix A). Starlings were nesting in small buildings adjacent to the expansion area. A range of other species flew over the site, including black-backed gulls on route to the landfill. Extensive similar habitat is present nearby on farmland and the Balclutha Golf Club course. A wet area at the foot of the hillslope (dominated by rushes) and a small, muddy stream provided low quality habitat for wetland birds.

Figure 5: The proposed expansion area at the Mt Cooee landfill largely comprises pasture, with some trees and small buildings on its margins (left). Exotic grassland is also present on the adjacent Balclutha Golf Club course (right) and surrounding farmland. 4 November 2022.

3.1.3 Balclutha aerodrome

The commonest bird species observed on the aerodrome were starlings and house sparrows (Appendix A), which utilised buildings for perching and nesting and grassland for feeding. However, spur-winged plovers were observed on the runway, and several additional species were observed flying across the airfield at lower altitudes, including red-billed gulls, black-backed gull, Australasian harrier, mallards (*Anas platyrhynchos*), an oystercatcher (*Haematopus* sp.), a white-faced heron (*Egretta novaehollandiae*), paradise shelducks (*Tadorna variegata*), and pied stilts (*Himantopus himantopus*). Flight paths and height above ground level (1-50 m) were variable. A range of small passerines and an Australian magpie (*Gymnorhina tibicen*) were also recorded in trees on the margins of the aerodrome (Appendix A).

Spur-winged plovers are regularly seen on the airfield and black-backed gulls congregate on the Clutha River at the eastern end of the airfield (Israel Win, South Otago Aero Club, pers. comm. 4/11/2022).

Figure 6: Spur-winged plover on the runway (left) and hangers at the western end of the aerodrome (right). 4 November 2022.

3.1.4 Balclutha River adjacent to the aerodrome

Numerous black-backed gulls were observed floating and flying down the river. Mallards were observed in the river at the eastern end of the runway (Figure 7). Occasional oystercatchers could be heard flying along the river. Several rock pigeons (*Columba livia*) were perched on the railway bridge which passes over the Clutha River between the landfill and the aerodrome.

Figure 7: Black-backed gulls on the Balclutha River between the aerodrome and Kaitangata Highway (left) and the eastern end of the runway where it abuts the river (right). 4 November 2022.

3.2 eBird records from surrounding areas

eBird records from the Clutha River near Balclutha indicate that the river supports a large range of waterbirds including moderate to high numbers of black swan (*Cygnus atratus*), mallard, Australasian shoveler (*Spatula rhynchotis*), grey teal (*Anas gracilis*), Australian coot (*Fulica atra*), black-billed gull (*Larus bulleri*), and other gulls, and low numbers of waders and shags (Appendix B).

The regionally significant Lake Tuakitoto Wetland provides roosting, feeding, and breeding habitat for nationally or internationally rare or threatened species or communities (www.orc.govt.nz). A wide range of water birds have been recorded there (Appendix B), including moderate to high numbers of black swan, Australasian shoveler, mallard, grey teal, and New Zealand scaup (*Aythya novaeseelandiae*).

Coastal habitat near the mouth of the Clutha River supports moderate to high numbers of pied stilt, grey teal, black-billed gull, and black-backed gull, as well as a range of other species that are largely restricted to the coast (Appendix B).

These areas also support several species of smaller passerines (Appendix B).

4 BIRD STRIKE RISK ASSESSMENT

4.1 Existing risk

This qualitative bird strike risk assessment for the Balclutha Aerodrome is based on the species listed in Section 1.5, with herons and stilts combined with oystercatchers into a 'wader' category, and welcome swallow added.

The assessment ranks three types of bird strike risk:

- Site Risk: The risk to aircraft from birds soaring above the landfill.
- Flight Path Risk: The risk to aircraft from birds flying to and from the landfill (or from other nearby habitats).
- Spill Over Risk: The risk to aircraft due to increased numbers of birds in surrounding areas due to increased food supply from the landfill.

The risk assessment presented in Table 1 was conducted with the following factors in mind:

- The Balclutha aerodrome has a low number of flights and few reported bird strikes on aircraft. However, strike rate is a poor estimation of risk (Boffa Miskell and Avisure 2021).
- The flight path for aircraft passes to the east of the landfill, which is traversed by large numbers of black-backed gulls travelling to the landfill.
- River, lake and coastal habitats that provide habitat for bird species which have higher risk of airstrike (e.g. gulls, ducks, and shags) are widespread within the vicinity of the aerodrome and birds were observed flying over the runway and therefore likely to pose a risk to aircraft, independent of the landfill.
- When river levels are low, black-backed gulls roost on shingle within the Clutha River channel. Gulls also travel up and down the river. Flight paths of birds heading towards the landfill may therefore cross the path of aircraft using the aerodrome.
- The roosting site of black-backed gulls when river levels are high was not confirmed during this assessment, but large numbers of gulls were seen approaching the landfill from the east and eBird records indicate higher numbers of birds near the coast. It is therefore possible that the flight path between a coastal roost site and the landfill also crosses the path of aircraft using the aerodrome.
- The Mt Cooee landfill currently incorporates some waste disposal practices that minimise exposure of putrescible waste, but black-backed gull, red-billed gull, starlings, house sparrow, and other small passerines remain attracted to the landfill.
- Large trees, including shelterbelts, are common in the vicinity of the landfill and aerodrome, and may attract small passerines and other species such as Australian magpie.
- Pasture habitats are also widespread in the vicinity of the landfill and aerodrome and likely to attract species such as spur-winged plover.
- Small passerines such as house sparrows and finches are not regarded as a significant threat to aircraft.
- Spill over risk is considered low as there is unlikely to be a change in food supply as a result of landfill expansion (see section 4.2).

Table 1: Existing risk of bird species to aircraft at Balclutha Aerodrome. Species potentially attracted to the Mt Cooee landfill are in bold.

Common name	Species	Site risk[4]	Flight path risk[5]	Spill over risk[6]	Recorded at landfill	Recorded flying across runway	Notes
Southern black-backed gull	*Larus dominicanus*	High	High	Low	Yes	Yes	Observed flying across airfield
Red-billed gull	*Larus novaehollandiae*	Moderate	High	Low	Yes	Yes	Observed flying across airfield
Black-billed gull	*Chroicocephalus bulleri*	Low	High	Low			
Australian magpie	*Gymnorhina tibicen*	Low	High	Low			Heard in trees adjacent to airfield
Spur-winged plover	*Vanellus miles*	Low	Very high	Low		Yes	Existing bird strike records. Observed on runway
Australasian harrier	*Circus approximans*	Low	High	Low	Yes	Yes	Observed flying across airfield
Starling	*Sturnus vulgaris*	Moderate	High	Low	Yes	Yes	Observed flying across airfield
Welcome swallow	*Hirundo neoxena*	Low	High	Low			
Other flocking passerines (e.g. redpoll, finches, **house sparrow**)	Passeriformes sp.	Moderate	High	Low	Yes	Yes	House sparrow and other small passerines observed flying across airfield
Paradise shelduck	*Tadorna variegata*	Low	High	Low		Yes	Observed flying across airfield
Canada goose	*Branta canadensis*	Low	High	Low			Generally increasing in abundance across the country
Black swan	*Cygnus atratus*	Low	High	Low			
Other waterfowl (e.g. ducks, shoveler, scaup, and grey teal)	*Anas* sp., *Spatula rhynchotis*, *Aythya novaeseelandiae*	Low	High	Low		Yes	Mallards observed flying across airfield
Shags	*Phalacrocorax* sp., *Microcarbo* sp., *Leucocarbo* sp.	Low	High	Low			
Rock pigeon	*Columba livia*	Low	Moderate	Low			Observed on nearby rail bridge
Waders (e.g. oystercatchers, herons, and stilts)	*Haematopus* sp., *Egretta* sp., *Ardea* sp., *Himantopus* sp.	Low	High	Low		Yes	Heron, oystercatcher, and stilts observed flying across airfield

[4] Site Risk: The risk to aircraft from birds soaring above the landfill.

[5] Flight Path Risk: The risk to aircraft from birds flying to and from the landfill (or from other nearby habitats).

[6] Spill Over Risk: The risk to aircraft due to increased numbers of birds in surrounding areas due to increased food supply from the landfill.

4.2 Potential additional risk of landfill expansion

There are not expected to be any additional bird strike risks or increased bird numbers associated with landfill expansion, for the following reasons:

- The landfill expansion is not expected to result in more waste coming to the landfill, the proportion of putrescible waste is expected to remain the same, and the extent of the active tip face is not expected to increase, meaning attractiveness to birds and bird numbers are unlikely to increase.
- The proposed landfill expansion will result in clearance of pasture which may reduce the habitat available locally for species such as spur-winged plover. However, given the abundance of similar habitat nearby, this is not expected to reduce the bird strike risk from these species.
- One additional stormwater settlement pond is proposed to be constructed, but given its relatively small size, potential disturbance from operation of heavy vehicles, and the likely low quality of the habitats created, the landfill expansion is unlikely to attract waterbirds.
- Establishment of any screen plantings alongside the Kaitangata Highway may attract small passerines, but this is not expected to increase numbers significantly above current levels.

5 OVERVIEW OF OPERATIONAL PROCEDURES AT THE MT COOEE LANDFILL

5.1.1 Minimising birds establishing at the landfill

Waste Management NZ Ltd (2018) describes methods to minimise the attraction of birds to the landfill:

- *mowing and maintenance schedules;*
- *good litter control;*
- *minimising the uncovered working face (denying the food source);*
- *prompt and thorough compaction of waste;*
- *covering waste at the end of each day;*
- *special handling of highly organic waste; and*
- *minimising areas of exposed earthworks and related shallow pools and puddles of water.*

These methods appear to be currently used at the landfill (see Section 1.3). Compaction of waste occurred promptly following dumping during the site visit, the active tip face was relatively small, there were no pools of water apart from the settling ponds, and the Borrow Area contained exposed soils, but did not provide good habitat for birds, with only small passerines observed passing through (pers. obs. 4 November 2022).

However, daily cover is not routinely applied (Clutha District Council 2022) and black-backed gulls, starlings, and house sparrows are well established in their scavenging behaviours at the landfill.

5.1.2 Managing birds once they are established at a landfill

Waste Management NZ Ltd (2018) describes additional measures that can be implemented once birds have become established at a landfill:

- *increasing cover thickness;*
- *changing cover type, density, or frequency of application;*
- *use of mobile high wires;*
- *special kites, including realistic models of the birds' natural predators;*

- *sonic bird scaring devices;*
- *shooting of species not protected by law; and*
- *anti-roosting strips on buildings.*

None of these methods was observed to be used at the landfill, but Sections 11 and 12 of the Mount Cooee Management Plan: 2022 (Clutha District Council 2022) list bird scaring (gas gun) as a routine control method used for birds, and suggests that other methods such as poisoning, shooting, and disturbance measures such as walking up to birds, shotguns, bird fright, lasers, electric fences, and aeration of the ponds could be used to deter birds if numbers become high.

6 BIRD MANAGEMENT PLAN

6.1 Management approach and scope

Putrescible waste at the Mt Cooee landfill attracts birds which likely pose a risk to aircraft at the Balclutha aerodrome. Of particular concern is the attraction of large flocks of black-backed gulls which pass through aircraft flight paths on their way to the landfill.

Birds can be very difficult to disperse once they have become established and resident at a landfill (Boffa Miskell and Avisure 2021). Starlings are, and house sparrows are likely to be, breeding in and around the Mt Cooee landfill site. While black-backed gulls are not resident, their scavenging behaviour at the site is well-established, and this behaviour may prove difficult to change using deterrence methods alone.

It is therefore likely that exclusion methods are the most likely to be successful at reducing bird numbers at the landfill and, of the two options presented, baling is our recommended option due to cost. However, it is recognised that exclusion methods are expensive, and that CDC has indicated in the LMP that deterrence methods will be used to manage birds. Therefore, an adaptive approach to bird management is favoured, that allows adoption of alternative management options should targets not be met. Alternatively, CDC could choose to move directly to an exclusion option.

The bird management outlined in this plan is restricted to high-risk species that could be attracted to the landfill and can be actively managed at the landfill.

Doing nothing (maintaining bird numbers at current levels) is not considered a viable option as it does not reduce bird strike risk. Colony control[7] is not considered to be within the scope of this project, but should CDC wish to pursue this option, useful information may be available from Dunedin City Council on southern black-backed gull distribution in relation to the Smooth Hill landfill.

Bird control methods are listed below in the recommended order of priority.

6.2 Management goal

The goal of management is to prevent any bird species weighing >50 grams being attracted to the landfill.

[7] Lethal control of birds at breeding sites located away from the landfill to reduce the number of birds that may be attracted to the landfill.

6.3 Deterrence methods

6.3.1 Reducing putrescible / organic waste

The estimated proportion of "kitchen waste" in the waste stream at Mt Cooee is 11% (Clutha District Council 2018). Clutha District Council (2018) identifies much of the organics waste stream as potentially divertible from the landfill. Reducing the proportion of putrescible waste to landfill may help reduce numbers of black-backed gulls, starlings, house sparrows, and other species attracted to the landfill.

Reducing putrescible waste is a long term goal however is not proposed as part of bird management at this time.

6.3.2 V-pits

There may be some scope to reduce bird numbers by ensuring that dumping of putrescible waste occurs in "V-pits" formed by parallel lines of general waste, which are unsettling for birds to enter (as occurs at the Kate Valley Landfill, as described in Boffa Miskell and Avisure 2021).

6.3.3 Daily cover

Daily cover could be applied consistently after the waste has been placed, compacted, and formed to the proper grade to help reduce bird numbers by restricting access to putrescible waste (Waste Management NZ Ltd 2018). Variation in cover type, thickness, density, or frequency of application may be required to determine the most effective method.

6.3.4 Wires, kites, sonic devices

Wires, kites, anti-roosting strips, and sonic devices could be used to deter birds at the Mt Cooee landfill expansion site. Any bird control techniques used should be varied so that birds do not become accustomed to one particular control method (Management NZ Ltd 2018).

In addition to anti-roosting strips, old sheds adjacent to the proposed landfill expansion area could be removed to reduce available starling nesting habitat close to the landfill.

6.3.5 Lethal methods of control

Poisoning as well as shooting has been suggested for use at the proposed Dunedin City Council Smooth Hill landfill if other deterrence methods are ineffective (Boffa Miskell and Avisure 2021). However, poisoning may result in direct and indirect (through scavenging of carcasses) killing of non-target species, so is not recommended for Mt Cooee. Shooting may also not be appropriate given the location of the landfill near residential properties, a public road, and the golf course.

Note that under the Wildlife Act 1953, red-billed gull and black-billed gull are absolutely protected throughout New Zealand, and therefore it is important that anyone undertaking control of birds at the landfill can correctly identify these species and other protected wildlife so that they are not killed or injured.

6.3.6 Deterrence methods proposed in the Mt Cooee landfill management plan

The LMP proposes the following bird deterrence methods:

- Cover (daily, intermediate) and compaction (Section 8.5). Also refer to Section 6.33 above.
- Bird scaring (gas gun) (Table 12.1 Nuisance control).
- Daily cover, bird poisoning and, as a last resort, shooting (Section 12.1.1 Birds). Also refer Sections 6.33 and 6.35 above.
- Dispersal if lots of healthy birds using bird scaring measures such walk up disturbance, shotguns, bird fright, lasers, electric fences, etc. (12.1.3 Prevention [of avian botulism]).

Should additional measures be desired as part of bird deterrence V-pits (Section 6.3.2) and wires, kite and sonic devices (Section 6.3.4) are considered suitable options.

6.4 Exclusion methods

6.4.1 Baling of waste

Baling of waste could be used to deter birds. A bird-proof building would need to be constructed, into which the waste would be dumped, compressed, and baled. This method has the advantage of preventing birds accessing waste, while not requiring separation of putrescible waste from the waste stream.

6.4.2 Bird netting

A net which excludes birds could be installed over the landfill. While expensive, Mt Cooee has the benefit of small size, which would reduce costs. This method has been used successfully at other landfills, but requires high levels of maintenance due to the potential for the netting to rip.

Bird netting could also be placed over waterbodies such as settling ponds to exclude large birds.

6.4.3 Exclusion methods proposed in the Mt Cooee landfill management plan

The LMP does not propose any bird exclusion methods. However, should CDC wish to use these in future the above methods are considered suitable options to provide a much greater reduction in bird abundance at the site.

6.5 Threshold for additional bird management

Following initiation of a management method, if more than 10 birds weighing >50g are observed at the landfill tip face on any day, or if 5 or birds weighing >50g are observed at the landfill tip face for more than 4 days in any week, then a new method should be adopted, in the order of priority listed above. More than one method can be used at one time.

The weights of birds likely to be attracted to the landfill are provided in Section 1.5 and in Appendix B.

6.6 Bird monitoring

Bird monitoring would need to be undertaken to determine changes in bird species composition and numbers over time, for example to determine the effects of bird management at the Mt Cooee landfill. Linking reduction of bird numbers at the Mt Cooee landfill to a reduction in bird strike risk at the Balclutha aerodrome will require monitoring of bird numbers at the aerodrome, regular assessments of bird strike risk by a qualified individual, and long-term monitoring of bird strike data from the aerodrome.

Daily monitoring will be required to determine if a management method is working, and should also be used to inform decisions on modifying the bird management method. Bird strike risk assessments should be undertaken annually, or more frequently (for example 6-monthly) if determining the effects of a particular bird management method on bird strike risk is desired. Ongoing monitoring will be required for the length of the consent period.

Any bird monitoring would need to an undertaken by a surveyor with at least 5 years' bird surveying/monitoring experience and able to identify all the relevant bird species in the area.

Minimum requirements (Boffa Miskell and Avisure 2021, Dawson and Bull 1975) for bird monitoring include recording of:

- Site location.
- Observer's name.
- Date and time over which the survey is conducted.
- Number of each bird species observed.
- Bird behaviour (e.g. foraging, perching, passing through, breeding/nesting, any unusual bird activity).
- Habitat use (e.g. grass, building, tree, runway, tip face).

- Weather conditions, including noise, visibility, cloud cover, precipitation type and value, temperature (°C), and wind strength and direction.

6.7 Liaison with South Otago Aero Club

At a minimum, CDC should maintain open communications with the South Otago Aero Club regarding bird strikes on aircraft. Should the club raise concerns regarding increased levels of bird strike from species that could be attracted to landfills, then changes to the current levels of bird management at the landfill should be considered.

6.8 Record keeping

Secure records (e.g. emails, Excel workbooks) should be kept of:

- Any communications with South Otago Aero Club regarding bird strike/bird management.
- Data from all bird monitoring undertaken.
- Bird management activities.

6.9 Key roles and responsibilities for managing birds at the Mt Cooee landfill

Key roles for any bird management planned and undertaken at the landfill include:

- Bird control officer – oversees all aspects of bird management at the landfill, including training.
- Bird observer – trained and experienced bird surveyor who undertakes bird surveys.
- Bird deterrence personnel – staff trained in bird deterrence methods.

If lethal methods are chosen as a bird management tool, then the following roles would be required:

- Bird shooter – licenced and experienced, trained in recognition of different bird species, particularly gulls[8] (Appendix C).
- Poison handler – qualified Urban Pest Management (UPM) contractor.

The LMP identifies Landfill staff and the Water & Wastes Operations Manager (WWOM) as having responsibilities for bird monitoring.

7 REFERENCES

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[8] Black-billed gulls and red-billed gulls are protected species under the Wildlife Act (1953), and it is an offence to kill them.

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Appendix A:

Bird survey results

Bird species recorded on 4 November 2022 at six sites near the Mt Cooee landfill and Balclutha aerodrome. X= present. *= heard (distant).

Common name	Species	Weight (g)	A. Mt Cooee landfill (fill area)			B. Mt Cooee landfill (ponds)			C. Expansion area	D. Balclutha aerodrome			E. Clutha River between A/B/C and D	F. Clutha River down-stream of E
			9:30 AM	1:05 PM	3:30 PM	10:00 AM	1:15 PM	3:40 PM	10:15 AM	8:15 AM	1:35 PM	3:50 PM	1:55 PM	3:50 PM
Australasian harrier	*Circus approximans*	650 - 850	1								1	1		
Australian magpie	*Gymnorhina tibicen*	350				1			1	1				
Chaffinch	*Fringilla coelebs*	17.5 - 24.5	4	1		1			2					
Eurasian blackbird	*Turdus merula*	90				2	1		1	2	2			
European starling	*Sturnus vulgaris*	85	4	2	5	1			15	10	3	10		
Greenfinch	*Carduelis chloris*	28				1				1				
Grey warbler	*Gerygone igata*	5.5 - 6.5							1					
House sparrow	*Passer domesticus*	28	4	4	20	1		1		18	25	30		
Mallard	*Anas platyrhynchos*	1050 - 1300								1	2	1	2	1
New Zealand fantail	*Rhipidura fuliginosa*	8							1*					
Oystercatcher sp.	*Haematopus* sp.	550 -720							1	1		2	1	
Paradise shelduck	*Tadorna variegata*	1.4 - 1.7							2	2				
Pied stilt	*Himantopus himantopus*	190								5				
Red-billed gull	*Larus novaehollandiae*	240 - 320			2							3		
Redpoll	*Carduelis flammea*	12							1					
Rock pigeon	*Columba livia*	265 - 432											8	
Skylark	*Alauda arvensis*	38	1							5	5	2		
Small passerine sp.	Passerine sp.	12 - 30	X	X	X	X			X	X	X			
Song thrush	*Turdus philomelos*	70							1					
Southern black-backed gull	*Larus dominicanus*	1000	9	c.100	c.100				2		5	2	45	6
Spur-winged plover	*Vanellus miles*	350 - 370							2	4	2			
Welcome swallow	*Hirundo neoxena*	9 - 20					1			1				
White-faced heron	*Egretta novaehollandiae*	550									1			
Yellowhammer	*Emberiza citrinella*	18 - 30				1								

Appendix B:

eBird records for sites within 13 km of the Mt Cooee landfill

eBird records for sites within 13 km of the Mt Cooee landfill. Distances are from aerodrome to eBird site. Common and species names are those used in eBird. Counts are the maximum daily count from all sampling events. X = present.

Status	Common name	Species	Balclutha--Clutha River at airport	Balclutha causeway	Balclutha--Naish Park	Lake Tuakitoto--East side	Puerua Bridge	Robson Rd	Atrium, Inch Clutha
			0.5 km	1.6 km	1.6 km	6.7 km	7.3 km	8.3 km	11.1 km
Exotic	Australian magpie	*Gymnorhina tibicen*	1	1	2	1	1	1	
	Black swan	*Cygnus atratus*	2	8	8	25	2	12	X
	Canada goose	*Branta canadensis*	1	1	11	3	8	10	1
	Chaffinch	*Fringilla coelebs*	2	6	3	2	2	1	X
	Dunnock	*Prunella modularis*	1	2	7	1	1	2	X
	Eurasian blackbird	*Turdus merula*	5	3	18	2	2	2	X
	European goldfinch	*Carduelis carduelis*	1	1	1	1	3	1	X
	European greenfinch	*Chloris chloris*	1	1	3	2	1	4	X
	European starling	*Sturnus vulgaris*	1	2	2	3	3	9	X
	Greylag goose	*Anser anser*					2		
	House sparrow	*Passer domesticus*	2	4	6	X	1		X
	Lesser redpoll	*Acanthis cabaret*	1	2	1	2	1	3	X
	Little owl	*Athene noctua*		1			1	1	
	Mallard	*Anas platyrhynchos*	5	10	2	59	2	10	
	Mallard × grey duck (hybrid)	*Anas platyrhynchos × superciliosa*	2	1	2	2	3	2	X
	Rock pigeon	*Columba livia*	2	1	3		1	2	
	Skylark	*Alauda arvensis*	2	1	2	4	1	3	X
	Song thrush	*Turdus philomelos*	1	5	5	3	2	1	X
	Yellowhammer	*Emberiza citrinella*	1	1	1	1	1	2	X
Native	Australasian bittern	*Botaurus poiciloptilus*				1			
	Australasian harrier	*Circus approximans*	2	1	2	1	1	1	
	Australasian pipit	*Anthus novaeseelandiae*	1	1		1	1		
	Australian shoveler	*Spatula rhynchotis*	2	9	2	11	7	15	X
	Banded dotterel	*Charadrius bicinctus*							5
	Bar-tailed godwit	*Limosa lapponica*							3

Bellbird	*Anthornis melanura*	1	1	1		2	1	
Black shag	*Phalacrocorax carbo*	1	1	2	11		3	
Black-billed gull	*Chroicocephalus bulleri*	1	32	30	1			10
Black-billed/silver gull	*Chroicocephalus bulleri/novaehollandiae*							X
Black-fronted dotterel	*Elseyornis melanops*		1					
Black-fronted tern	*Chlidonias albostriatus*	5	1					
Brown creeper	*Mohoua novaeseelandiae*		1	1				
Caspian tern	*Hydroprogne caspia*	1						
Cattle egret	*Bubulcus ibis*					5		
Chestnut teal	*Anas castanea*		1	3				
Curlew sandpiper	*Calidris ferruginea*							5
Dabbling duck sp.	Anatidae sp. (dabbling duck sp.)	2						
Duck sp.	Anatidae (duck sp.)	3						
Eurasian coot	*Fulica atra*	1	9	8	15	2		
Glossy ibis	*Plegadis falcinellus*				1			
Great crested grebe	*Podiceps cristatus*		1					
Grey teal	*Anas gracilis*	1	61	2	5	6	80	15
Grey warbler	*Gerygone igata*	1	2	1	2	1	1	
Gull sp.	Larinae sp.		20					
Hudsonian godwit	*Limosa haemastica*							2
Little egret	*Egretta garzetta*		1					
Little pied shag	*Microcarbo melanoleucos*	1	3	2	1	1	2	
New Zealand falcon	*Falco novaeseelandiae*			1				
New Zealand fantail	*Rhipidura fuliginosa*	1	1	1	2	1	1	
New Zealand fernbird	*Poodytes punctatus*				1	2	3	
New Zealand pigeon	*Hemiphaga novaeseelandiae*			1	2	1		
New Zealand scaup	*Aythya novaeseelandiae*	2	19	14	37	8	1	
Pacific golden plover	*Pluvialis fulva*							3
Paradise shelduck	*Tadorna variegata*	2	1	2	2	4	13	
Passerine sp.	*Passeriformes* sp.	50		7		5		
Pied shag	*Phalacrocorax varius*				1			

	Pied stilt	*Himantopus leucocephalus*	1	2	5	2		4	187
	Pūkeko	*Porphyrio melanotus*		2	1	1	1	2	
	Red knot	*Calidris canutus*							1
	Red-capped plover	*Charadrius ruficapillus*				1			
	Royal spoonbill	*Platalea regia*	1	1	1	2			
	Ruddy turnstone	*Arenaria interpres*							1
	Sacred kingfisher	*Todiramphus sanctus*	1	1	1		1	1	
	Shining cuckoo	*Chrysococcyx lucidus*			1			1	
	Silver gull	*Chroicocephalus novaehollandiae*	5	1	2				X
	Silvereye	*Zosterops lateralis*	1	60	3		2	4	
	South Island pied oystercatcher	*Haematopus finschi*	1	3	1	3	1	1	6
	Southern black backed gull	*Larus dominicanus*	5	3	1	6	1	1	22
	Spotted shag	*Phalacrocorax punctatus*	1						
	Spur-winged plover	*Vanellus miles*	1	1	2	2	2	1	X
	Tūī	*Prosthemadera novaeseelandiae*	1	1	1		3		
	Variable oystercatcher	*Haematopus unicolor*		1					2
	Welcome swallow	*Hirundo neoxena*	1	9	4	2	21	2	
	Whiskered tern	*Chlidonias hybrida*	1						
	White heron	*Ardea alba*		1				1	
	White-faced heron	*Egretta novaehollandiae*	1	2	1	3	2	1	
	White-fronted tern	*Sterna striata*	2						6

Appendix C:

Gull identification

Black-backed gull

Photo credit: Steve Rate.

Red-billed gull

Photo credit: Steve Rate.

Black-billed gull

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