RM1651114 NRSBU application for resource consent for accidental and overflow discharges of untreated sewage to Waimea Inlet and wider marine and coastal area of Tasman Bay.

Statement outlining the ornithological values and significance of the Waimea estuary with regard to the potential effects from sewage overflow discharges. Prepared for Nelson City Council by Dr Paul Fisher, Science and Environment Team, Nelson City Council

Introduction

1. NRSBU is applying for resource consent to discharge untreated municipal sewage to land and run off to the coastal and marine area. The Saxton Pump Station includes a significant proportion of industrial wastewater. There is screening (of large solids) of the discharge at three of the four pump stations affected.

2. The discharges would occur either directly to the coastal marine area for the Airport and Songer Street pump stations, and for any accidental discharges from pipework ruptures. Discharges from the Whakatu and Saxton Street pump stations would occur over land and then the coastal marine area. The discharges to land occur to drainage ditches that drain in a relatively short distance directly to the coastal marine area. All discharges to the coastal marine area occur on the edge of the Waimea Inlet, in the intertidal zone.

3. The significant discharges that are the subject of this application mostly occur as a result of heavy rainfall and stormwater inundating the wastewater network and capacity of the pump stations. However the potential remains for discharges from pipework ruptures during dry weather.

4. Avoidance of all discharges from natural events is not practicable given the existing infrastructure requirements for Nelson-Richmond region. It is also recognised that overflows are treated as an emergency and therefore the NCC's emergency response is activated to remedy the discharges.

5. The Waimea Inlet is the largest enclosed estuary in the South Island and of international significance for migratory bird species and is of national significance for other endangered or threatened birds.

6. The Waimea Inlet estuary has an overall Vulnerability Rating of HIGH to identified stressors commonly found in New Zealand estuaries. The Estuary Vulnerability Assessment uses a combination of estuary physical characteristics, modelled estimates of nutrient, sediment and pathogen loads, State of Environment monitoring results using national monitoring protocols, and assessment criteria from established risk assessment frameworks and more recent tools like the NZ Estuary Trophic Index (ETI), (Robertson and Stevenson 2017; references therein).

7. The intertidal extent of the estuary covers ~3,400 ha, which includes a range of indigenous ecosystems and habitats that are only found in the coastal environment and are particularly vulnerable to modification, including saltmarsh, intertidal mud flats, sand flats, cobble field, freshwater-brackish channels, lagoons (low flushing saline pools), biogenic reefs (cockle and oyster beds), Sabellid field (area that is dominated by raised beds of Sabellid polychaete tubes) shell banks, macroalgal beds, sponge gardens and eelgrass that are exposed at low tide conditions.

Scope of the statement

1. Nelson City Council requested a statement outlining the ornithological values and significance of the Waimea estuary with regard to the potential effects from sewage overflow discharges. All of the consent application information was made available. This statement has focused on the most recent review of shorebirds for Tasman Bay (Schuckard and Melville 2017), the Waimea Inlet estuarine monitoring (WRIGGLE 2014, 2017) and NRSBU data bundle including the Cawthron Assessment of Environmental Effects Report 3091, NRSBU overflow following upgrade model, Quantitative microbial risk assessment for Waimea Inlet NIWA report, Waimea Inlet and microbiological water quality context NIWA report 2017333HN and discharge plume modelling by MetOcean.

Contents

Significant ornithological species and habitats of the Waimea Estuary

2. The following information is mainly summarised from Schuckard and Melville (2013; including references therin)[1]. For the purposes of this statement shorebirds (also known as waders) are defined as oystercatchers (Haematopodidae), stilts (Recurvirostridae), plovers (Charadriidae) and sandpipers (Scolopacidae). A total of 68 species of shorebirds are known from New Zealand (Checklist Committee OSNZ 2010), of which 38 species have been recorded from the Top of the South Island. A distinction is made between endemic and migratory shorebirds.

3. Endemic shorebirds breed in New Zealand and, if migratory, stay within New Zealand or, as in the case of Banded Dotterel *Charadrius bicinctus* stay within Australasia. Migratory shorebirds breed in the northern hemisphere and migrate to spend the non-breeding season in New Zealand; the broad migration route used by

[1] Schuckard and Melville 2013. Shorebirds of Farewell Spit, Golden Bay and Tasman Bay. Prepared for Nelson City Council, Tasman District Council and Department of Conservation by The Ornithological Society of New Zealand (inc.) 76pp.

these birds, together with the breeding and non-breeding areas, is known as the East Asian-Australasian Flyway.

4. Other coastal species of including gulls, terns and marshland birds have been considered in this review of significant ornithological values.

5. Two endemic shorebird species that regularly occur in the Waimea Inlet are categorised as Threatened under the NZ Threat Classification (Appendix 1)[2], including the Nationally Vulnerable Wrybill (*Anarhynchus frontalis*) and Banded dotterel (*Charadrius bicinctus bicinctus*).

6. There are additionally five estuarine bird species categorised as At Risk under the NZ Threat Classification that regularly occur in the Waimea Inlet, including Banded rail (*Gallirallus philippensis assimilis*), South Island pied oystercatcher (*Haematopus finschi;* endemic), Pied stilt (*Himantopus himantopus leucocephalus*) and Easter bar-tailed godwit (*Limosa lapponica baueri*) and Variable oystercatcher (*Haematopus unicolor;* endemic).

7. The Threatened terns, gulls and shags include the Nationally Endangered Black-fronted tern (*Childonias albostriatus;* endemic) breeds in the braided Waimea river delta and forages post-breeding in the coastal area, including the Waimea estuary. The Nationally Vulnerable Caspian tern (*Hydropogne caspia)* breeds on the Bell Island shell bank and the Red-billed gull (*Larus novaeholloandiae scopulinus*) occasionally occurs in the estuary. The Nationally Critical Black-billed gull (*Larus bulleri*) is the most endangered gull species in the world. The main breeding concentration is on Southland braided rivers, with post-breeding individuals occasionally recorded foraging in the Waimea Inlet. The Threatened Pied shag (*Phalacrocorax varius*) feeds in the estuary at high tide and breeds on Rough Island. Small numbers of At Risk Black shag (*Phalacrocorax carbo*) and Little black shag (*Phalacrocorax suicirostris*) feed in the estuary and associates with the Pied shag colony.

[2] Robertson, H.A.; Dowding, J.E.; Elliott, G.P.; Hitchmough, R.A.; Miskelly, C.M.; O'Donnell, C.F.J.; Powlesland, R.G.;Sagar, P.M.; Scofield, R.P.; Taylor, G.A. 2013: Conservation status of New Zealand birds, 2012. *New Zealand Threat Classification Series 4.* Department of Conservation, Wellington 22pp.

8. Several other Threatened and At Risk species occur in the Waimea Estuary, however their existence and status is limited by habitat availability and generally low numbers of individuals. These include the Nationally Endangered Australasian Bittern (*Botaurus poicilloptilus*), the At Risk Marsh crake (*Porzona pusilla affinis*), the At Risk Spotless crake (*Porzana tabuensis*) and South Island Fernbird (*Bowdleria punctate punctate*) occur in the marshland of the estuary. The Threatened White heron (*Ardea modesta*) and the At Risk Royal spoonbill (*Platalea regia*) feed in the estuary and roost on vegetated islands.

Tasman Bay – Top of the South Island shorebird counts

9. Counts of shorebirds in the Top of the South Island started at Farewell Spit in 1961 and have continued as a national project of the NZ Birds (formerly Ornithological Society of New Zealand) since 1983, when geographical coverage was expanded to include sites in Golden and Tasman Bays.

10. Endemic shorebirds account for about 47% and migratory shorebirds about 53% of the total. Historical records indicate that migrant shorebird numbers declined between the mid 1980s through the early/mid 2000s. Whilst there has been an increase in numbers of some resident and migratory shorebird species over the last decade, overall there has been a reduction in the total populations of Red Knot, Bar-tailed Godwits and Ruddy Turnstone across the Top of the South Island. Comparing summer (February) counts between 2001 and 2012, the total number of shorebirds in the Top of the South Island numbers approximately 55,000 individuals.

11. In Tasman Bay, there are 11 sites where regular shorebird counts have been carried out: Awaroa, Marahau, Motueka Sandspit, Moutere Inlet, West Waimea Inlet (Grossi Point/No-Mans Island), East Waimea Inlet (Rabbit Island, Bell Island Shellbank, Sand Island, and Nelson Airport area), Nelson Haven and Delaware Bay.

12. This statement summarises the shorebird counts between November 2001 and November 2012 occurring in West Waimea Inlet (including Grossi Point and No-Mans Island) and East Waimea Inlet (including Rabbit Island East, Bell Island Shellbank and Sand Island, Nelson Airport Area).

13. Tasman Bay – Waimea Inlet host an average of about 12,000 birds (maximum 15,000) in summer (February). The highest numbers in Tasman Bay in summer were recorded from Motueka Sandspit (about 5,000 on average; maximum of 7,500) and East Waimea Inlet (about 4,100 birds on average; maximum of 6,000). No site hosted more than 10,000 shorebirds.

Significant shorebird roosting and feeding sites

14. Waimea Inlet is part of a network of coastal sites in the Top of the South that holds internationally significant numbers of shorebirds, including Nationally Vulnerable and At Risk endemic species.

15. The East Waimea Inlet is an internationally significant habitat (presence of >1% world population) for three species, including the Variable Oystercatcher, South Island pied Oystercatcher and Wrybill. Nationally significant numbers of Red Knot and Bar-tailed Godwit also occur. The West Waimea Inlet is of International Significance for Variable Oystercatcher (Table 1).

		Of significance to number of shorebird species and/or number of shorebirds	Shorebirds	Red Knot	Bar-tailed Godwit	Ruddy Turnstone	Variable Oystercatcher	South Island Pied Oystercatcher	Pied Stilt	Banded Dotterel	Wrybill
			2001-2012	2001-2012	2001-2012	2001-2012	2001-2012	2001-2012	2001-2012	2001-2012	2001-2012
Farewell Spit		7									
Golden Bay	Westhaven Inlet	2								*	
	Taupota Creek										
	Pakawau	1									
	Totara Avenue										
	Collingwood	1									
	Parapara										
	Onekaka										
	Paton's Rock										
	Rototai	1									
	Pohara										
	Wainui Inlet										
Tasman Bay	Awaroa										
	Marahau										
	MotuekaSandspit	5								*	
	Moutere Inlet										
	West Waimea Inlet	1									
	East Waimea Inlet	5									
	Airport Area	1									
	Nelson Haven										
	Delawere Bay										

Table 1. Sites of International Importance (dark grey) and National Importance (dotted light grey) for shorebirds in the Top of South Island. *Assessed in accordance with *East Asian–Australasian Flyway Partnership* (EAAFP) 0.25% criterion for staging sites.

See Appendix 2 for criteria used to define national significance

NZ Shorebird populations and seasonal movements

16. Shorebirds utilise New Zealand tidal flats throughout the year, but the species composition changes. During the winter (June census) most shorebirds in the coastal area are endemic species like South Island pied oystercatcher, Variable oystercatcher, Pied stilt, Banded dotterel and Wrybill.

17. In spring (November census) most endemic species have moved inland to breed; those remaining on the coast are mostly long distance migrants like Red Knot *Calidris canutus,* Bar-tailed Godwit, Ruddy Turnstone *Arenaria interpres*, and Pacific Golden Plover *Pluvialis fulva*. During the late summer (February census), the coastal wetlands host long distance migrants as well as endemic species that have returned to the coast after breeding. Food demands on the tidal flats are highest during this summer period, when invertebrate biomass has to meet the needs of both endemic and migratory birds.

18. The most numerous shorebird species in New Zealand estuaries are Red Knot, Bar-tailed Godwit and South Island Pied Oystercatcher.

19. In Tasman Bay, during low spring tides Bar-tailed Godwits and other shorebirds roost at a number of sites such as the head of Nelson Haven, the Bell Island Shellbank and Sand Island, as well as Motueka Sandspit, but on 'king' tides the majority of the Waimea Inlet birds are forced to Motueka Sandspit as this is the last remaining site as the others become inundated.

Significant breeding shorebird populations

20. Waimea Inlet holds internationally significant numbers of breeding Variable Oystercatchers and the wider Tasman Bay coastal area is recognised as an important nursery (wintering area) for adult and juvenile Variable Oystercatchers.

21. Dowding & Moore (2006) assessed the breeding population of Variable oystercatchers to be 2,000 pairs (taking into account immature and non-breeding adults in the total population), thus 1% of the breeding population is 20 pairs. The wider Waimea estuary including Rabbit Is, Bell Island Shellbank, Waimea inlet, Saxton

Island, Pig Island, Sand Island and Airport area all hold between 1-10 breeding pairs of Variable Oystercatcher, holding a significant proportion (>1% breeding population).

22. Variable Oystercatchers are generally distributed along the entire coastline of Tasman Bay, with concentrations of pairs at sites with fast water flows, which appear to be associated with good foraging conditions, e.g. mussel beds. This is particularly apparent at Motueka Sandspit, for example, with high concentrations of pairs around the Raumanuka area at the base of the Spit and at the southern tip of the Spit; pairs are more dispersed along the remainder.

International agreements for conservation of migratory birds and their habitats

23. New Zealand is a party to two international conventions that relate to the conservation of migratory birds and their habitats.

24. *The Convention on Wetlands of International Importance Especially as Waterfowl Habitat*[3] (also known as the Ramsar Convention) promotes wetland conservation. The convention entered into force in New Zealand in 1976, at which time Farewell Spit was designated as a Wetland of International Importance. The Convention has established a set of criteria for the identification of wetlands of international importance and these are used in this report (see Section 1.5). The Convention requires (Art. 3.1) that 'The Contracting Parties shall formulate and implement their planning so as to promote the conservation of the wetlands included in the List [of Wetlands of International Importance], and as far as possible the wise use of wetlands in their territory'.

25. *The Convention on the Conservation of Migratory Species of Wild Animals*[4] (also known as the Bonn Convention), provides a multinational framework for the conservation of migratory species. The Convention entered into force in New Zealand in 2000. Far Eastern Curlew (*Numenius madagascariensis*) is the only species that occurs in the Top of the South Island that is listed as an 'endangered migratory species' in Appendix I of the Convention, thereby requiring New Zealand to endeavour 'to conserve and, where feasible and appropriate, restore those habitats of the species

[3] www.ramsar.org
[4] www.cms.int

which are of importance to removing the species from danger of extinction' (Art. III.4.a).

26. Additionally, in 2011, New Zealand joined the *East Asian–Australasian Flyway Partnership*[5] (EAAFP), which promotes the conservation of sites used by migratory shorebirds.The Partnership has criteria for identification of sites for nomination to the Flyway Site Network which are similar to those of the Ramsar Convention, but with additional criteria for staging sites used by migratory birds. Farewell Spit was designated an East Asian-Australasian Flyway Shorebird Network Site in 2000.

Significance of the Waimea Estuary and Tasman Bay for seabird populations

27. Tasman Bay (including the Waimea estuary) is also part of the Cook Strait Important Bird Area[6], which comprises a number of internationally important seabird species, including the Black-fronted tern, Black-billed gull and an assemblage of mainly pelagic seabirds. The IBA recognises the linkeages between estuarine, coastal and offshore habitats that are utilised by seabirds at various stages of their lives.

Potential ecological effects from aberrational discharges

28. Under certain conditions untreated sewage outfalls can provide direct and indirect food resources for the estuarine bird community[7]. Common and opportunistic pollution tolerant species, e.g ragworm *Hediste divesicolor* can increase in abundance and biomass in response to increased organic loading from sewage outfalls. Shorebirds are likely to forage mostly on abundant macrozoobenthic species that reside within the surface layer of the estuarine mud. Other foraging strategies include gulls and wildfowl feeding opportunistically on items present in sewage or on the benthic organisms. Spoonbills filter feed within the channels discharging from streams and rivers.

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[5] www.eaaflyway.net

[6] Forest & Bird (2014). New Zealand Seabirds: Important Areas for New Zealand Seabirds. Sites at sea: seaward extensions, pelagic areas. The Royal Forest & Bird Protection Society of New Zealand, Wellington, New Zealand. 90 pp.

[7] Alves et al., (2012). Will improving wastewater treatment impact shorebirds? Effects of sewage discharges on estuarine invertebrates and birds. *Animal Conservation* 15 (1), 44-52

29. The benthic macrozoobenthos is a food resource for marine and coastal species, including shorebirds, gulls, and predatory fish. Whilst these species are mobile and have the potential to forage in other areas (e.g. Nelson Haven) some shorebird species (resident and migratory) are less resilient and unable to shift to other prey resources. Species breeding within the estuary (e.g. Variable Oystercatcher and Banded rail) and transient species feeding to increase body condition prior to dispersal to other NZ estuaries or overseas migration will be most dependent on the estuary habitat and prey resource.

30. NRSBU and TDC/NCC have estuarine monitoring programmes that provide a broad scale and fine scale assessment of the estuarine receiving environment. The 2016 benthic monitoring survey indicates that under normal Bell Island treated wastewater discharges there is no evidence of abnormal sediment anoxia and no adverse cumulative enrichment effects due to the discharge were detected. However, the TDC/NCC and NRSBU consent monitoring programmes have monitoring site locations that were not designed to assess the effects of overflow discharges of untreated sewage to the entire estuary (e.g. there is no monitoring site representative of eastern arm of the estuary affected by the Airport and Songer St pump stations).

31. The TDC SoE estuarine broad scale monitoring[8] for Waimea Inlet has reported an Ecological Quality Rating of Moderate for Opportunistic Microalgae (mainly green alga *Ulva lactua* and red alga *Gracilaria chilensis*). Opportunistic macroalge utilise excess nitrogen present in eutrophic environments and rapidly grow to mats. 'Nuisance levels' occur where mats on the estuary surface have adverse effects on the underlying sediments and fauna. These adverse effects impact on the wider ecosystem including other algae, fish, birds, seagrass and saltmarsh communities Decaying macrolagae can also accumulate sub tidally and along shorelines causing oxygen depletion in sediments.

32. Overall the majority (94%) of the intertidal area of the Waimea estuary has <5% macroalgal cover. High density macroalgal areas occur with the presence of soft poorly oxygenated muds, particularly in the upper tidal reaches of both arms of the

[8] Stevens & Robertson 2014. Waimea Inlet 2014. Broad Scale Habitat Mapping. WRIGGLE Ltd prepared for Tasman District Council. 46pp

estuary but include areas adjacent to the MDF plant/Bark Processor's sites in the eastern arm and constricted embayments near Nelson Airport, between Best and Bell island and in settlement basins east of Best Island and Hoddy Peninsula.

33. Overflow discharges of untreated waste from multiple sources will increase nutrient loading to the estuary, which could result in an immediate stress on benthic communities from elevated biological oxygen demand, and increases in existing levels of nuisance algae over time, especially in low-flushed upper reaches of the estuary. Increases in macroalgae can reduce foraging opportunities for birds[9].

34. Fine suspended sediment input from waterways in the Nelson/Tasman region is considered to be the most significant pollutant affecting the structure and function of estuaries (Robertson and Stevens 2012 in Schuckard and Melville 2013). Deposition of fine sediment may smother some benthic habitats and make the prey resource less available for shorebirds and other bird species that forage in the estuary. No criteria Spills numbers

Cawthron report 3091 review of environmental effects

35. I attended an expert conferencing meeting on 13 October, to discuss the framework for determining the level of risk of adverse effects. The applicant has provided further information to characterise the extent of the mixing zone boundaries for each overflow location based on:

a. Five-day biological oxygen demand (BOD_5) concentrations from wastewater discharges

b. Maximum copper concentrations

36. Modelling has been undertaken by the applicant to characterise the potential discharge plume and the dilutions that dilutions that could occur under different wind and tide scenarios (MetOcean, 2017).

[9] Cabral, J.A.; Pardal, M.A.; Lopes, R.J.; Múrias, T. Marques, J.C. 1999. The impact of macroalgal blooms on the use of intertidal area and feeding behaviour of waders (Charadrii) in the Mondego estuary (west Portugal). *Acta Oecologica* 20: 417-427.

37. Copper was originally chosen to represent the highest risk of toxic contaminants because median concentration levels in wastewater discharges exceeded the ANZECC protection level for 95% aquatic biota for 95% of sampling occasions, with potential for long term (chronic) toxicity.

38. The maximum BOD_5 and dissolved copper concentrations were requested to be included in the modelling of discharge plumes to reflect the potential worst case (acute) toxicity effects, which had not been addressed in the original AEE by the applicant

39. The Cawthron original AEE defined aberrational discharge volumes using scenario-based calculations (flow rate and dilution of flow). Two-hour discharges were used to represent a conservative resolution time, based on the NRSBU response time is often within 30 minutes. Twenty-four hours discharge was used to represent a worst-case overflow scenario. The applicant further defines acute effects as short-term, occurring immediately following an aberrational discharge. These scenario based calculations are conservative for dry-weather aberrational discharges but potentially underestimate worst-case natural hazard scenarios, that can lead to simultaneous overflow discharges of wastewater and complete inundation of the storm water network including urban streams and rivers for the duration of the event.

40. The applicant has determined the magnitude of effects (Table 5, Report 3091) for aberrational discharges as Low/Minor. This is based on:

a. “the likelihood of overflows occurring is low and the timescale of the effects is highly intermittent for all the stations”, and

b. “there have been no observable signs of eutrophication or detectable sediment quality effects at any of the outfall location”.

41. The likelihood of overflows from system failures and breaks will be expected to be low, based improvements in management systems and upgrades to the wastewater network. The corresponding aberrational discharges for these scenarios will be localised and the magnitude of effects described as Low/Minor.

42. These assessment of ecological effects are based on a limited monitoring data set at the outfall locations and only reflect the recent status at these monitoring sites.

43. The acute effects represented by the maximum BOD_5 would require a mixing zone of 3.5km for aquatic protection and detected over an area of 2.34 km^2 (Table 14). These effects would be defined as "extensive" (Table 7, >2 km distance from discharge) and of Major consequence (Table 9, Regional medium term adverse effects), resulting in an overall score of 9, Medium risk (Table 10, Acceptable using measures to avoid, remedy and mitigate).

44. The assessment is weighted toward threatened species and does not fully recognise or appropriately value the ecosystem services provided by the benthic infauna community, including bioturbation, nutrient recycling and maintenance of oxygenated layer, which maintain the assimilative capacity of the estuarine ecosystem. The worst-case discharge of untreated sewage will more than likely have an adverse effect on the communities that provide the bioturbation service.

45. In my opinion I would consider the worst case discharge to have the potential of a Major consequence, of Regional medium term adverse effects, based on:

a. the assemblages of threatened shorebird (migrant and resident) and seabird species dependent on the estuary and coast for foraging and breeding,

b. The area of extent (~234 ha) for the worst-case scenario for BOD_5 is approaching 10% of the total estuary. This effective loss of habitat does not reflect the gradient or succession of habitats and associated fauna, or shorebird feeding areas associated with the mouths of streams and their channels.

Climate change effects

46. The applicant's worst case scenario does not factor in the predicted increase in natural hazards that will impact the Nelson coastline. The recent rain events for the Nelson-Tasman region in December 2011 and Stoke-Richmond in April 2013 both

equated to a 500 year return period extreme event (NIWA 2016)[10]. The Ministry for Environment guidance for climate change recommends increase of 8% for 50 and 100 year extreme rainfalls for each Celsius of temperature rise. The extreme rainfall events for Nelson-Tasman are anticipated to increase by about 16% by the 2090s and occur more frequently (NIWA 2008)[11].

47. Future planning will need to ensure that the adverse effects of flood hazards are adequately avoided, remedied or mitigated so that the land and any structures on it are not subject to material damage from an inundation level that has a 1% probability of being reached or exceeded in any year (also termed the 1% Annual Exceedance Probability (AEP). Stormwater inflow and groundwater infiltration of the wastewater network in the Nelson urban coastal area is more than likely to occur during extreme rainfall events (2% AEP, 50 years and 1% AEP, 100 years).

48. The 0.01 annual exceedance probability (AEP) sea-level elevation is often adopted as a design "extreme sea-level" for coastal-hazard planning in New Zealand, being a high sea level that is exceeded infrequently when high tides and storm surges combine (i.e., a storm tide). This high storm-tide sea-level elevation is seldom reached in any given year at present-day mean sea level (1% chance), however, projected sea level rise will noticeably increase the frequency of sea-levels reaching or exceeding these elevations (NIWA 2015)[12].

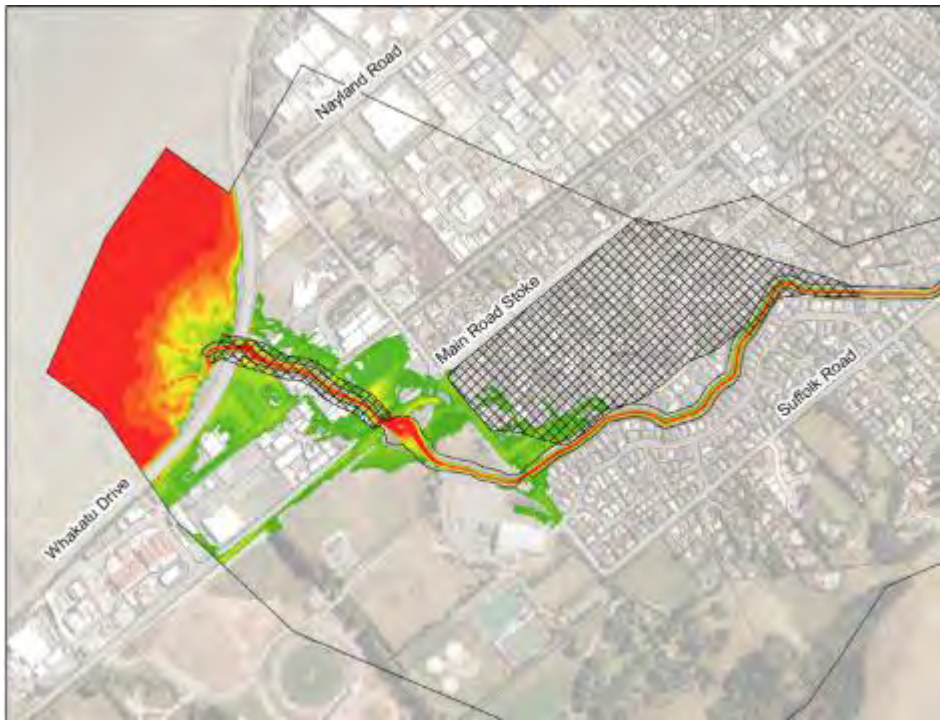
49. The extent of flooding with backwater effects from sea level rise have been modelled for Nelson. For example, Figures 1a,b show the extent of flooding for

[10] NIWA 2016. The climate and weather of Nelson. Second Edition. http://docs.niwa.co.nz/library/public/NIWAsts71.pdf

[11] NIWA 2008. High intensity rainfall analysis for Nelson urban area. http://envirolink.govt.nz/assets/Envirolink/463-NLCC14-High-Intensity-Rainfall-Analysis-for-Nelson.pdf

[12] NIWA 2015. The effect of sea level rise on the frequency of extreme sea levels in New Zealand. http://www.pce.parliament.nz/media/1382/the-effect-of-sea-level-rise-on-the-frequency-of-extreme-sea-levels-in-new-zealand-niwa-2015.pdf

Orphanage stream with a 0.5 m sea level rise within a 50 and 100 year planning time frame (NCC 2017)[13].



Scenario	
AEP	2%
Rainfall Climate	2065
Tide	100% AEP
Sea Level Rise	+ 0.5 m

Figure 1a Extent of flooding of Orphanage stream in 2065, 50 year return period, high tide, 0.5 m sea level rise

[13] NCC 2017. Natural hazards: Flooding. http://nelson.govt.nz/environment/nelson-plan/natural-hazards/flooding/

Figure 1b Extent of flooding of Orphanage stream in 2065, 100 year return period, high tide, 0.5 m sea level rise

NZCPS 2010 considerations

50. The Nelson Resource Management Plan includes the Waimea estuary in the marine Areas of Significant Conservation Value, because of its high biological values and is also the largest enclosed estuarine area in the South Island. The Waimea estuary is also recognised internationally for significant numbers of roosting and feeding shorebirds and assemblage of Threatened and At Risk birds.

51. Policy 11 of the NZCPS requires decision-makers to protect indigenous biological diversity in the coastal and marine environment by avoiding adverse

effects[14] of activities on particular taxa, habitats and ecosystems, including indigenous taxa that are listed as Threatened and At Risk in the New Zealand Threat Classification System.[15]

52. Policy 11 of the NZCPS also requires decision-makers to avoid *significant* adverse effects and avoid, remedy or mitigate other adverse effects of activities on and habitats of indigenous species where the species are at the limit of their natural range:[16]

i. areas of predominantly indigenous vegetation in the coastal environment;

ii. habitats in the coastal environment that are important during the vulnerable life stages of indigenous species;

iii. indigenous ecosystems and habitats that are only found in the coastal environment and are particularly vulnerable to modification, including estuaries, lagoons, coastal wetlands, dune lands, intertidal zones, rocky reef systems, eelgrass and saltmarsh.

53. The Waimea Estuary intertidal zone and salt marsh habitat is significant habitat for regularly occurring species categorised as Threatened and At Risk under the NZ threat Classification System. Four of these species are endemic to New Zealand, including the Wrybill, Banded dotterel, South island oystercatcher and Variable oystercatcher. Other threatened native species occur in the estuary; however, their long term status of uncommon estuarine species is governed by habitat and food availability.

54. The recent the assessment of shorebird counts from 2001 to 2012 (Schuckard and Melville 2013) has also identified that significant numbers of the Threatened endemic Wrybill, South island pied oystercatcher and Variable Oystercatcher regularly occur in the estuary.

[14] Policy 11a requires all adverse effects to be avoided on Threatened species
[15] Policy 11(a)(i)
[16] Policy 11(a)(iv)

55. A discharge of untreated sewage that results in a decline in the abundance and availability of food resource for shorebirds or degradation of habitat and intrinsic bioturbation service is an adverse effect.

56. Estuaries provide nursery areas for juvenile diadromous freshwater fish (e.g. eels, whitebait (*Galaxiid*) and bullies (Gobiomorphiid) and marine fish including pelagic species such as Snapper (*Pagarus auratus*) and mullet (*Aldrichetta forsteri*) and benthic habitat for flatfish to feed and hide from predators. The displacement of fish spawning and nursery habitat for coastal and estuarine species has not been considered as part of the ecological assessment.

Conclusions

57. Based on the assessment of available information, including modelling the extent of contaminant plumes, the potential adverse effects from aberrational discharges on significant estuarine and coastal birds and their habitats are considered to be low risk for incidents associated with dry weather events.

58. However, extreme storm events resulting in worst-case adverse effects (e.g. maximum BOD_5 and faecal loads) have the potential to result in medium risk events (e.g. impact 7% of the estuary habitat) of regional consequence.

59. Recolonisation and establishment of estuarine species are likely to occur over a period of months following a worst-case scenario because of the tidal flushing and dilution, and resilience of estuaries. The shorter term effects in terms of disease risk to wildlife occupying a contaminated environment have not been assessed in this review.

60. Natural hazard type extreme flooding events are predicted to increase for the Nelson region within a 50-100 year planning time frame, along with sea level rise that has potential to exacerbate coastal flooding and inundate coastal areas where stormwater and wastewater infrastructure currently exist.

61. Significant adverse effects associated with storm event discharges cannot be avoided with current wastewater and stormwater infrastructure. Monitoring programmes to better characterise these events and their environmental effects on the

estuarine and coastal environment would assist to quantify risks and effects that can be remedied or mitigated. . Monitoring site locations and the sampling design will need to be agreed with NRSBU and appropriate technical experts.

62. Nelson City Council has yet to define what level of service (rainfall return period) will be met for stormwater inflow and ground water infiltration into the wastewater network, leading to wet weather discharges. The potential human health disease risk is the main driver for reducing wet-weather waste water discharges to the freshwater and coastal environment. Measures to reduce storm water inflow and ground water infiltration into the wastewater network would assist manage waste loads within the capacity of the network and pump stations.

63. Whilst the planning for infrastructure and coastal development is the responsibility of the Council, the NRSBU aberrational discharge consent might reflect the planning time frame such that it can align closely with a strategic long-term plan, incorporate new government guidance, national policy changes and industry standards such as the NZ Water Inflow and Infiltration Control.

64. Managed retreat is the most likely response to increasing sea level rise and increased coastal flooding, which will require a strategic plan, incorporating the findings of this NRSBU consent application and consider a staged approach over appropriate time frames to future proof the urban coastal infrastructure from natural hazards.

65. Long term monitoring of key estuarine biodiversity indicator species that are not currently included in council monitoring programmes is required to better understand ecosystem responses and quantify cumulative effects from anthropogenic activities. This information will also underpin wetland and estuarine habitat and species restoration programmes in the Waimea Estuary and region.

66. In terms of information gaps for threatened estuarine and coastal birds in the Waimea. Numbers of roosting wintering and resident shorebirds are counted regularly. However, the distribution of feeding birds and breeding birds are not well described. Monitoring of where shorebirds are feeding in the estuary and mapping breeding territories with respect to habitat types would assist in future assessments of

identifying key stressors on specific habitats and species to quantify adverse effects on threatened species.

Qualifications

67. I hold a BSc (Hons) Environmental Science (1991) and doctorate in seabird ecology (2001, Manchester Metropolitan University, UK). As a research ecologist I have undertaken ornithological and marine mammal surveys for the seismic offshore and windfarm industries, and various agencies including the Department of Conservation. Since living in Nelson over the last twelve years I have been part of the annual Top of the South (Nelson) shorebird surveys, organised by Birds NZ. I have provided expert opinion on ornithological values for Environment Court representing Marlborough District Council, Friends of Nelson Haven and Tasman Bay and Forest and Bird. Over the last eight years I have been employed as an Environmental Monitoring Officer and Water Quality Scientist at NCC, responsible for State of Environment (SoE) water quality and recreation bathing monitoring and the hydrology of Nelson's small stream network, including the Stoke streams discharging to the Waimea. My current role is managing the freshwater quality monitoring programme, data analysis, regional council reporting and freshwater technical advice for council teams, including Planning, Capital Projects and Utilities. Over the last year I have been responsible for coordinating a SoE ten year estuarine monitoring programme for Nelson's four main estuaries. Based on my local knowledge and experience I consider myself qualified to provide this statement.

Dr Paul Fisher
Water Quality Scientist, Nelson City Council

Appendix 1 Threatened and At Risk categories in the New Zealand Threat Classification System (2012). Activities resulting in potential effects on indigenous taxa that are listed as Threatened and At Risk need to be considered under the NZCPS Policy 11.

EXTINCT	
	Extinct
	Not assessed
DATA DEFICIENT	
	Extinct
	Nationally Critical
THREATENED	
Nationally Critical	
	Nationally Critical
	Nationally Endangered
	Nationally Vulnerable
	Naturally Uncommon
Nationally Endangered	
	Data Deficient
	Nationally Critical
	Nationally Endangered
	Declining
	Naturally Uncommon
Nationally Vulnerable	
	Nationally Critical
	Nationally Endangered
	Nationally Vulnerable
	Declining
	Migrant
AT RISK	
Declining	
	Declining
	Naturally Uncommon
	Migrant
Recovering	
	Nationally Vulnerable
	Recovering
Relict	
	Relict
Naturally Uncommon	
	Declining
	Naturally Uncommon
	Not Threatened

Appendix 2. Schuckard and Melville 2013. Shorebirds of Farewell Spit, Golden Bay and Tasman Bay

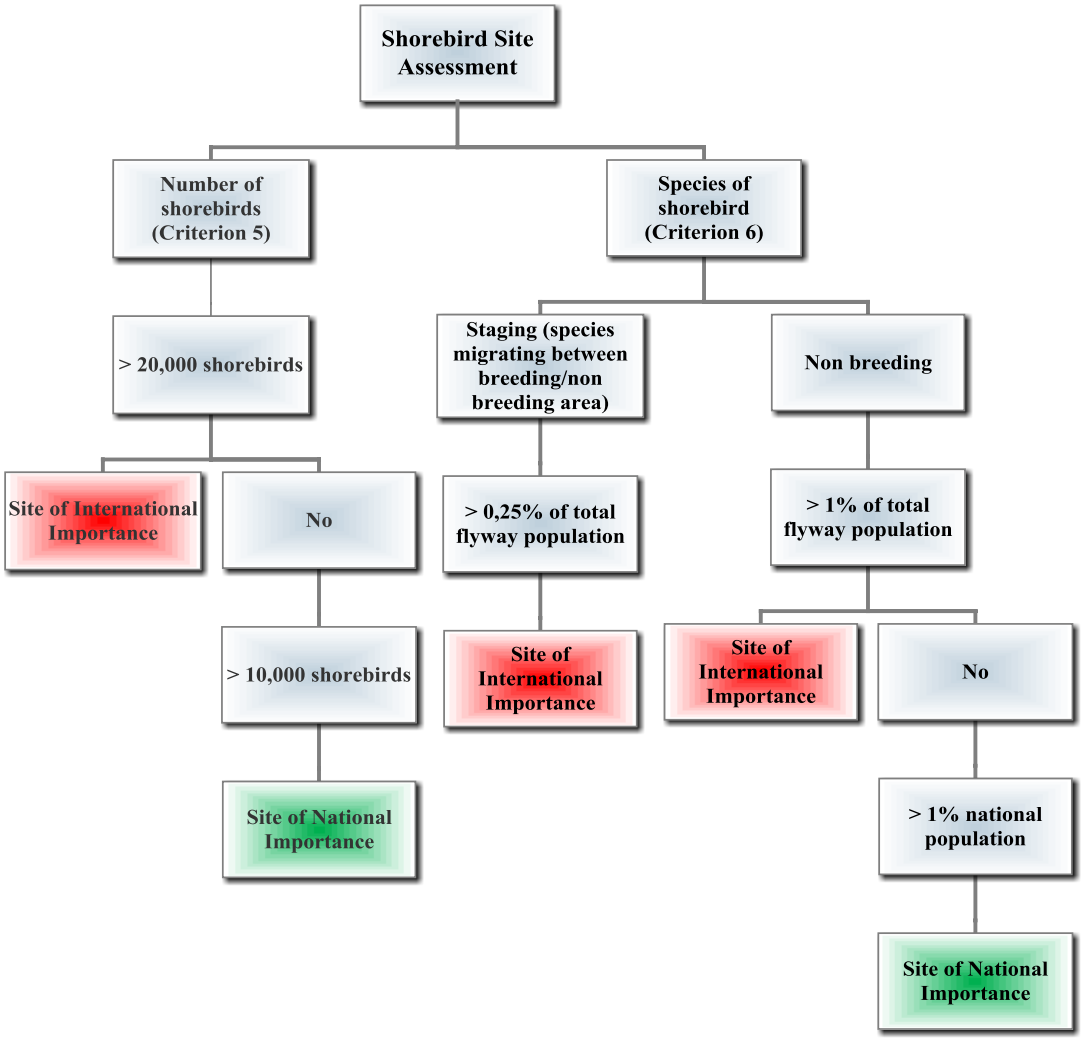


Figure 1. Protocol for assessment of importance of sites for shorebirds (after Watkins 1993 in Schuckard and Melville 2013).