ATTACHMENT 2

BELL ISLAND

ENVIRONMENTAL DEVELOPMENT PLAN

Stage One - Report

Prepared for

Nelson Regional Business Unit

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PART 1 INTRODUCTION

Bell Island is located in the Waimea Inlet, Tasman District, New Zealand.

It accommodates a Waste Water Treatment Plant (WWTP) operated by the Nelson Regional Sewerage Business Unit (NRSBU).

1.1 TERMS OF REFERENCE

The prime aims of the NRSBU for the use, management and development of Bell Island are:

1. to enable the efficient treatment and disposal of wastewater to continue,
2. to ensure adequate airflow across the oxidation ponds,
3. to enable disposal of treated liquid effluent through an irrigation system and/or by discharge to Waimea Inlet, in accordance with consent conditions,
4. to enable disposal of biosolids to areas managed as a commercial plantation forest, both on and off the island
5. to allow for future extensions of the plant within the carrying capacity of the island, as needed to cater for growth in sewage supply or changes in treatment methods.
6. as far as possible, to provide for the anticipated effects of climate change, and especially sea level rise, to occur over the next 100 years without impacting on the operation of the plant,
7. as far as possible, to mitigate any potentially negative environmental and aesthetic effects of the plant,
8. to manage the island in a way that gives protection to recorded and undiscovered archaeological sites as required by the Historic Places Act,
9. to balance productive use of the island with the protection and enhancement of the open space, natural and ecological values of Waimea Inlet, as set down in the Waimea Inlet Strategy.

The Board of the NRSBU is preparing this Environmental Development Plan in order to establish a management regime for the protection and enhancement of the open space, natural and ecological values of the island.

This document is Stage One of the Plan. The Board of the NRSBU will review the information in this stage and will establish priorities for addressing the key issues and opportunities. In Stage Two the techniques for addressing these will then be investigated in more depth, leading to their implementation through the management regime and through a programme of physical works.

This Stage One report provides a provisional overview of how those values can best be managed and enhanced within the context of the primary purpose of the land to treat wastewater efficiently.

It is organised into four parts and two appendices:

- Part 1 is this introductory section that sets the scene.
- Part 2 examines the regulatory and policy framework for the protection and enhancement of open space, natural and ecological values around the shores of the Waimea Inlet, within which the NRSBU makes decisions on how the land is to be used and managed.
- Part 3 identifies the ecological assets, archaeological sites and landscape values of Bell Island, and discusses the associated issues and opportunities.
- Part 4 recommends a number of policies and actions that the Board could consider adopting for the protection and enhancement of the open space, natural and ecological values of the island.
- Appendix 1 contains a set of plans that support Part 2.
- Appendix 2 contains a precis of the relevant parts of the key documents that were referred to in the preparation of this report.
- Appendix 3 provides some additional background information on three of the topics referred to in the report.

1.2 BACKGROUND

1.2.1 WASTE WATER TREATMENT PLANT

53 ha. of Bell Island is used for the Bell Island Waste Water Treatment Plant (WWTP), which serves the communities of Nelson South, Richmond and Mapua.

The treatment plant contains an aeration basin, a clarifier, a dissolved air flotation system, and an autothermal thermophilic aerobic digestion plant that treats captured solids to produce biosolids. A system of pumps and pipes transfers stabilised sludge (biosolids) to the pine forests on Bell Island and Rabbit Island.

The remaining wastewater is then treated in three facultative oxidation ponds and two maturation ponds. Most of the effluent from the last maturation pond is discharged into the Waimea Inlet on the outgoing tide, via an outfall pipeline and diffusers, while a smaller proportion is irrigated onto the grazed pasture on the island.

1.2.2 OTHER ACTIVITIES

Some 68 ha. of the island lie outside the area occupied by the treatment plant. Together with use for the disposal of some of the biosolids and treated wastewater, the balance of the land is used variously for plantation forestry, stock grazing and the protection and enhancement of coastal habitats.

1.2.3 LEGAL TENURE

Bell Island was officially named by the New Zealand Geographic Board in 1996[1].

Bell Island occupies about 121 hectares, being limited as to parcels. It is held in Certificate of Title 56/193 by the Nelson City Council and Tasman District Council as tenants in common. The title is fee simple, free of encumbrances. The legal description is Section 2 Waimea East Islands District Block II Waimea Survey District. The boundary of the landholding is the line of Mean High Water Springs (MHWS) around the island. This line moves where there is natural erosion or accretion.

The island's intertidal foreshore, below the line of MHWS, is part of the common

[1] *Gazette 1996 p1836*

marine and coastal area as defined in the Marine and Coastal Area (Takutai Moana) Act 2011. Neither the Crown nor any other person owns, or is capable of owning, the intertidal foreshore. If any part of the island becomes intertidal as a result of erosion or other natural occurrence, the title of that land is divested[2]. The Act provides free public access to the intertidal foreshore, unless it is restricted by the Tasman Resource Management Plan or by bylaws[3]. At present there is no such restriction.

The intertidal foreshore forms part of the Coastal Marine Area (CMA). Activities in the CMA are controlled by Tasman District Council through the Tasman Resource Management Plan and/or bylaws made under the Local Government Act 2002.

1.3 AREA COVERED BY THE PLAN

Figure 1: Area covered by the Bell Island Environmental Development Plan

The area covered by the Plan is shown in Figure 1. It includes areas that must remain available in the long term for the future expansion or upgrading of the treatment plant. These are shown by dashed outlines, labelled as 'Possible Ponds'. It also includes selected aspects of the management of the treatment plant.

[2] *s11(4) Marine and Coastal Area (Takutai Moana) Act 2011*

[3] *s26 Marine and Coastal Area (Takutai Moana) Act 2011*

PART 2 REGULATORY AND POLICY FRAMEWORK

This section examines the regulatory and policy framework for environmental protection and enhancement around the shores of the Waimea Inlet, within which the NRSBU makes decisions on how the land is to be used and managed.

2.1 NRSBU MISSION STATEMENT

The activities of the NRSBU are guided by the mission statement:

> *"To identify the long term wastewater processing and reticulation needs of our customers and to meet current and future needs in the most cost effective and sustainable manner."*

The mission statement guides the NRSBU's management of the whole of Bell Island, not just the wastewater treatment plant and the wastewater reticulation network. While cost effectiveness is essential, the NRSBU's actions must also achieve sustainable results. This includes sustainable management of the ecological, archaeological and landscape values of Bell Island.

2.2 PERMITTED ACTIVITIES AND RESOURCE CONSENT CONDITIONS

The Tasman Resource Management Plan (TRMP) identifies the Waimea Inlet as being of national significance because it has the following values:

- The largest barrier enclosed estuary in the South Island,
- One of only two sites where the endangered peppercress plant has been recorded. Also present are endangered grey saltbush, white heron, royal spoonbill, Australasian bittern and banded rail.
- Considered of outstanding importance to waders.
- Rabbit Island is the largest barrier island in New Zealand[4].

[4] *TRMP Schedule 25D:*

The TRMP considers that the use of Bell Island for wastewater treatment can be compatible with the need to protect those values of the inlet. It places the bulk of Bell Island in the Rural Industrial zone, with insignificant parts around the shoreline being zoned Open Space. Land within 200m of the shoreline falls within the Coastal Environment Area.

Section 17.12.2.1(d) of the Rural Industrial Zone Rules lists the land uses permitted for Bell Island:

(i) Sewage treatment plants, oxidation ponds, settlement ponds.

(ii) Land disposal of liquid and solid waste originating from the permitted activities stated in (d)(i). (Subject to other statutory rights and applications.)

(iii) One single unit dwelling for a plant operator's residence.

(iv) Buildings (excluding dwellings other than specified in (d)(iii)) and structures ancillary to any permitted activity.

(v) Farming, provided that the efficient and effective operation of the oxidation ponds is not threatened.

(vi) Telecommunication and radio-communication facilities.

Buildings are permitted provided they are not less than 30 metres from the Coastal Marine Area boundary, except that this rule shall only apply to buildings constructed after 25 May 1996.

Coastal Environment rules control the extension of existing buildings and restrict the erection of new buildings within 200 metres of the Coastal Marine Area boundary.

There are restrictions on parking and loading areas, stockpiles, lighting, cladding, noise, building coverage and height. The requirement for landscaping and amenity planting to screen new operating and storage areas and buildings may apply to parts of the island.

All other activities are discretionary activities.

The list of permitted activities does not include plantation forestry or ecological restoration. It would appear that plantation forestry is a permitted activity on part of the island insofar that it has existing use rights. It would appear that a resource consent may be required for ecological restoration.

The NRSBU holds resource consents for discharges from the treatment plant to air, water and land. Discharges to air and to the Coastal Marine Area (Waimea Inlet) are outside the scope of this report.

The NRSBU intends to use part of the grazed land for the extension of the treatment ponds at some future date[5]. The construction of new ponds and the upgrading of the existing ponds in the Coastal Environment Area (within 200 metres of the line of MHWS) may require land disturbance consents[6]. In this case the consenting authority would be obliged to have regard to the provisions of the New Zealand Coastal Policy Statement 2010.

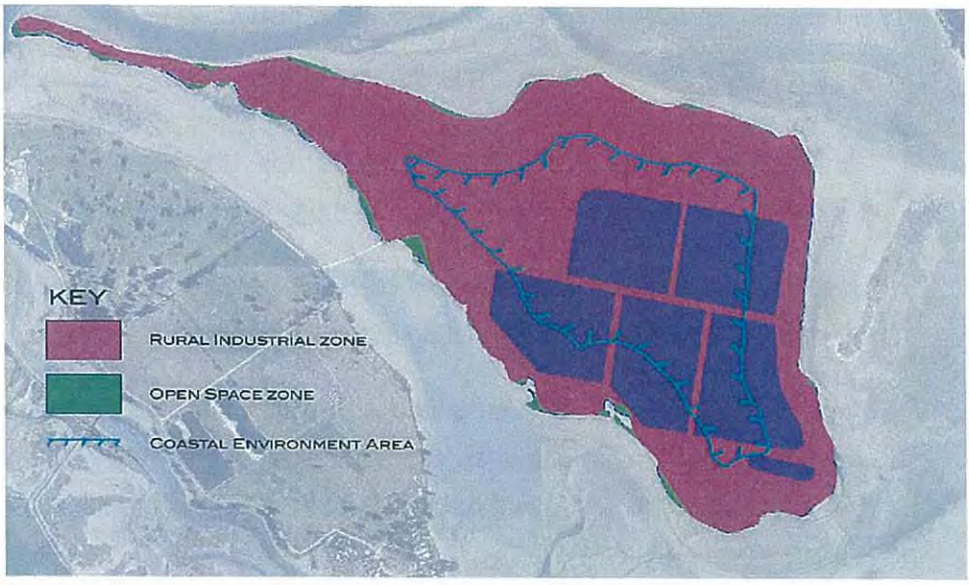


Figure 2: TRMP planning zones

[5] *Ferner Report 1983*

[6] *Tasman Resource Management Plan - Section18.5: Land Disturbance Effects*

Thin slivers of land around the island's shoreline are zoned Open Space. These appear to be the land between the shoreline as drawn on the cadastral base of the planning maps and the actual shoreline at the time that the planning maps were drafted. In the Open Space zone in the Coastal Environment Area, the following activities are permitted:

(i) a playground, picnic facility, or neighbourhood open space;

(ii) a public garden;

(iii) a walkway or cycleway.

Here again, it would appear that a resource consent may be required for ecological restoration. These small areas of Open Space zoned land are unlikely to be used for any other activity.

2.3 HISTORIC PLACES ACT

The Historic Places Act (1993) provides for the identification, protection and conservation of the historic and cultural heritage of New Zealand.

It defines an archaeological site as a place associated with pre-1900 human activity, where there may be evidence relating to the history of New Zealand.

Every person commits an offence under the Act who, knowing or having reasonable cause to suspect that a site is an archaeological site, destroys, damages, or modifies it, or causes it to be destroyed, damaged, or modified, without the prior authority of the Historic Places Trust.

The register of the NZ Archaeological Association records nine archaeological sites sites on the island, located as shown on Figure 3 and detailed in Table 1. In addition, all as-yet undiscovered sites are covered by the Trust's Accidental Discovery Protocol.

Figure 3: Registered archaeological sites

2.4 WAIMEA INLET STRATEGY

The Waimea Inlet Strategy (2010) is a support document under the Nelson and Tasman Councils' Long Term Plans. It supports the vision and community-sourced outcome statements of those documents, and it guides the Councils' decision-making across all departments, influencing not only statutory resource management but also the provision of infrastructure, services and all areas of council involvement.

As a business unit of Nelson City Council and Tasman District Council, the NRSBU has an obligation to use the Strategy's guidance when making decisions about the use and management of Bell Island.

The Strategy's overall vision is that the inlet be a vibrant place, richly appreciated by the community for its open space, natural and ecological values; happily remembered by generations for their activities, adventures and discoveries; a place where tangata whenua hold mana as kaitiaki of taonga; and a place to be shared with increasing respect.

The aims of the Strategy include:

- Healthy and regenerating populations of indigenous vegetation, habitats, and birds; maintained, improved, and extended.
- Water quality maintained or improved.
- Over-supply of nutrients or sediment avoided.
- Natural processes continuing to provide the habitats needed for the ecosystems and estuarine species dependent on them, and being able to respond to any future shore-line change.
- Generations remembering the inlet for its open spaces, naturalness, and ecological values, with happy memories of activity and adventure.
- Remnants of significant indigenous ecosystem are protected.
- Local indigenous stock is used as a source for expanding these ecosystem remnants and reducing their vulnerability.
- Ecosystem sequences from the inlet into adjoining land re-established.

This is to be achieved through, inter alia:

- Protecting, enhancing, and increasing existing remnants of valued habitats for indigenous species. These include habitats in terrestrial, freshwater, intertidal, and subtidal ecosystems.
- Managing catchments, including riparian and coastal margins, to minimise adverse discharge of sediments and contaminants.
- Maintaining the natural functioning of estuary margin habitats, intertidal areas, rivers and streams, to convey and filter water, and to provide habitat and passage for indigenous species.
- Integrating management of the Waimea River and the inlet, especially at the river mouth area, and into Tasman Bay.

- Monitoring and controlling weeds, pests, and invasive species, where practical.
- Protecting the inlet from further infilling for land use purposes.
- Seeking and providing opportunities for restoration, enhancement, or extension, of natural ecosystems. Using locally sourced stock for restoration planting.
- Retaining and enhancing landforms and land cover that give distinct landscape character to different parts of the inlet and to the whole inlet.
- In the long term, considering any opportunities that arise for alternative locations for activities that are not compatible with inlet values.

2.5 SEA LEVEL RISE

All planning for future use and management of activities on Bell Island needs to take into account the anticipated effects of sea level rise.

The New Zealand Coastal Policy Statement 2010 (NZCPS) requires that anybody "exercising powers and functions" under the Resource Management Act must assess and avoid increasing the risk of social, environmental and economic harm from coastal hazards over at least 100 years. Any prudent manager of land and assets which might be at risk from sea level rise will do the same.

The Ministry for the Environment's Coastal Hazards and Climate Change Guidance Manual for Local Government in New Zealand (2008) (CHCCGM) calls for local authorities to provide for a base value sea-level rise of 0.5 metres relative to the 1980–1999 average, but also, at the very least, all assessments should consider the consequences of a mean sea-level rise of at least 0.8 metres relative to the 1980–1999 average.

The effects of sea level rise are likely to be two-fold:

1 Inundation of low-lying coastal land, and

2 coastal erosion causing a retreat of the coastal margin.

In 2009 NIWA published a review of Nelson City minimum ground level requirements in relation to coastal inundation and sea level rise[7], which has relevance to Bell Island. The risk of coastal erosion has not been investigated.

The boundary of the land vested in the Councils and managed by the NRSBU is the line of mean high water springs (MHWS). As the line moves inland due to sea level rise, the land area under the control of the NRSBU can be expected to be reduced.

Figure 4: Likely changes to line of mean high water springs

MHWS is currently about 2.02 m above Nelson Vertical Datum 1955 (NVD-55), which is the level used by Tasman District Council for defining ground elevations. Interpolation of the advice of the Ministry of the Environment indicates that any assessment should consider the consequences of a rise in MHWS to at least 2.75 m above NVD-55 by the year 2099.

The CHCCGM establishes a methodology for analysing levels of risk from sea level rise and for setting priorities for risk mitigation. While individual circumstances vary, preference is given to managed retreat, with hard protection seen as a last resort.

[7] *NIWA Client Report HAM2009-124 - August 2009. NIWA Project ELF10223*

The approximate areas that can be expected to become below MHWS by 2099, and hence to divest from NRBU control, are shown in Figure 4

If the shoreline of the island is allowed to adjust naturally to the rising sea level, an increase in the total area of intertidal wetlands can be expected. This will compensate to some extent for the concomitant loss of intertidal wetlands that will occur on other estuarine shorelines around the inlet, where stop banks limit the extent of tidal influence.

PART 3 ENVIRONMENTAL VALUES, ISSUES AND OPPORTUNITIES

This section identifies the ecological, archaeological and landscape values of the study area, and discusses the issues and opportunities for managing and enhancing these. It also considers a number of other values, issues and opportunities that, while being outside the area covered by the Environmental Development Plan, may influence the management and development of Bell Island.

3.1 ECOLOGICAL ASSETS

3.1.1 FRESHWATER WETLANDS

Figure 5: Locations of freshwater wetlands

The access road dissects a freshwater wetland close to the western shoreline on the approach to the causeway. A wetland located on the south-eastern corner of the island contains archaeological site N27/141 (Refer Sheet 3 Appendix One). A third wetland is a small wet footprint area containing raupo.

These wetlands provide habitat for invertebrate communities and shorebirds such as pied stilts. Some of the plant communities contain native species.

Issues

- Part of the wetland near the causeway is not fenced. Damage by grazing cattle is resulting in increased nutrient inputs, compact soil, erosion, disturbance of wildlife, damage to wetland plants, and lower water quality due to sedimentation. This results in point source runoff to the Waimea Inlet.
- Rubbish is present in one of the wetlands.

Opportunities

The freshwater wetlands would recover naturally, with some supplemental planting, if stock were fenced out, rubbish was removed and exotic pest plants were controlled.

3.1.2 ESTUARINE WETLANDS

Figure 6: Locations of estuarine wetlands

A series of estuarine areas are located along the southern shoreline. They contain excellent examples of estuarine-terrestrial transitional ecosystems and are a potential seed source for eco-sourcing plants for re-vegetating other sites on the island. Parts of these areas are representative of the ecology of much of the Waimea Inlet prior to European settlement. They provide nesting, shelter and feeding habitats for a range of

indigenous and exotic wildlife.

Issues

- Exotic pest plants such as South African ice plant and gorse are competing with native species such as glasswort and estuary tussock.
- Introduced pest animals reduce the availability of food for indigenous birds.
- Erosion by high tide waves and by wind in exposed areas where there is a lack of ground cover.
- Predation and competition for food from pukeko. More information on this issue is provided later in the report.
- There is evidence of cattle not always being contained within the identified grazing areas, with resultant grazing damage to the wetlands.

Opportunities

The estuarine wetlands would recover naturally if cattle were fenced out and exotic pest plants were controlled.

Numbers of indigenous birds would be increased if introduced pest animals were controlled.

If the shoreline of the island is allowed to adjust naturally to sea level rise, an increase in the total area of intertidal wetlands can be expected. This will compensate to some extent for the concomitant loss of intertidal wetlands that will occur on other estuarine shorelines around the inlet, where stop banks limit the extent of tidal influence.

The population of pukekos is unusually high because they are currently protected and undisturbed, having few natural predators. A management programme to limit their numbers would be beneficial to other wildlife.

3.1.3 COASTAL FRINGE AND TRANSITIONAL PLANT COMMUNITIES

The coastal fringe, from the saltwater zone around MHWS through to the dryland interior, forms an almost continuous strip of shrubby vegetation around the island, It comprises mainly gorse, manuka and ngaio. These plants play an important role in stabilising the coastal sand dunes that run along parts of the shoreline. The plant communities provide habitat and food sources for native insects and birds. In addition many of the native plants provide a seed source for natural regeneration on Bell Island and in similar ecological communities surrounding Waimea Inlet.

Bell Island has high ecological values. The control of pest plants and animals and the enhancement of the remnant native vegetation using local seed stock will go a long way towards achieving the aim of the Waimea Inlet Strategy to protect, enhance and increase remnants of significant indigenous ecosystem.

Some existing exotic plant species can also have ecological value.

The tall pines provide roosting habitat for herons and shags, and their root systems help to bind the soil and hence to stabilise the shoreline. The pine plantation absorbs the biosolids and converts them into valuable timber which is used productively at maturity.

Gorse binds soil and provides cover and food (insects) for native birds. These values continue until restorative native plants become established and grow to shade out the gorse.

The introduced South African ice plant does not have significant ecological values. It is a mat forming succulent herb with sub-woody stems reaching up to 6 metres in length which out-competes native sand binders. In the past it had sometimes been used in dune restoration, but this practice has been discontinued since the National Pest Plant Accord (2008) declared the plant to be a national pest and banned its sale, propagation and distribution. Recently, Robertson and Stevens (August 2012)[8]

[8] *TDC SOE Report (2012) Tasman Coast: Waimea Inlet to Kahurangi Point, page 38, 4.10 Invasive Species*

consider that ice plant is one of the major threats to dune communities.

The current project to restore the vegetation of the north-western spit, carried out in 2011 and 2012, provides a blueprint for how the ecological values of the coastal fringe and transitional plant communities can be re-instated, through a programme of active intervention to control exotic pest plants and re-establish indigenous shoreline vegetation. This land had been part of the radiata pine plantation which was harvested in 2010.

Figure 7: Locations of coastal fringe and transitional plant communities

Issues

- Proliferation of exotic pest plants such as gorse and ice plant.
- Areas of active erosion where plants have been damaged.
- Introduced pest animals reduce the availability of food for indigenous birds.
- Damage to indigenous vegetation on the north-western shoreline by walkers and their dogs.
- Lack of connectivity corridors through the island mean that many native plants and animals can spread only around the shoreline.

Opportunities

To fence the plant communities off from the pasture to exclude cattle.

To carry out a programme to control exotic pest plants and re-establish indigenous shoreline vegetation.

To carry out a programme to control pest animals such as rabbit, rat, stoat and to manage the population of some protected species such as pukeko.

To establish corridors of indigenous vegetation linking the northern and western shorelines across the island, in a way that does not compromise the primary objectives of the NRSBU.

One opportunity that has already been taken is the re-vegetation of the north-western spit with indigenous plants.

To investigate the application of biosolids to boost the growth of native plantings.

3.1.4 RADIATA PINE PLANTATION

The Forest Environments Report states that "*the NRSBU's primary objective for the forest is to ensure that the application of biosolids continues unimpeded and at no less than the current application rate*".[9]

The Bell Island pine plantation was harvested in 2010. It has since been re-planted in pines. Prior to harvest the mature forest would have provided nesting, shelter, roosting and feeding habitat for some indigenous and introduced birds. Following harvest the open area provides habitat for introduced California quail and finches. At least one native falcon was observed hunting this area.

[9] *Options for Forest Management at Bells Island, Waimea Estuary (2011), page 4*

Figure 8: Location of radiata pine plantation

Issues

- Planted as a monoculture, radiata pine does not facilitate widespread biodiversity. However its purpose is to make productive use of the land, not to increase biodiversity.

Opportunities

To manage the area as a pine plantation for future income and as a site for disposal of biosolids from the treatment plant.

To "*find best outcomes for both inlet values and the continued operation of these facilities*" (Waimea Inlet Strategy) by encouraging natural regeneration of an under-storey of indigenous plants and the return of a range of forest-dwelling bird species, and by controlling the regrowth of exotic pest plants.

3.1.5 PASTURE

40.3ha of Bell Island is currently managed as pasture, grazed by cattle under a

licence agreement. Two additional areas (10.2ha.) are also available for grazing.

While unrestricted cattle grazing does not promote good biodiversity outcomes, its purpose is not to increase biodiversity, but rather to make productive use of the land, to ensure ample airflow across the ponds and to enable the disposal of treated effluent.

The pasture, free of tall vegetation, enables unrestricted air flow across the ponds from the prevailing wind directions (north, north-east and south-west). This ensures optimal conditions for the efficient operation of the ponds.

Part of the pasture is used for irrigation of some 2,300 litres of treated effluent per year, thus reducing the total discharge to the Waimea Inlet.

Figure 9: Location of grazed pasture

Licensing of the grazing generates income for the NRSBU.

The pasture provides feeding and roosting opportunities for native and introduced birds, including paradise shelduck, pukeko, black swan and Canada goose.

Conditions of the grazing licence include "some" control of gorse, broom and ragwort, as well as managing fertiliser levels, stocking rates and fence repair.

Issues

- Cattle are currently damaging areas of wetland and coastal fringe and transitional plant communities, because they are not excluded by fencing.
- In some circumstances conditions of the licence are not being enforced.
- Rabbits use the pasture for grazing.
- Black swans and Canada geese also graze on the pasture. These introduced bird species are a potential threat to aviation safety for aircraft using Nelson airport.
- The pasture also provides optimum habitat conditions for pukeko. The combination of an abundance of food and shelter and freedom from hunting has led to an unusually high population. By their aggressive nature they successfully out-compete other native fauna. Pukeko are mainly vegetarian and slice or wrench off shoots though using the strong beaks to unearth rhizomes. If given the opportunity they may select the proposed indigenous plants (over existing food resources) soon after they are planted.

Opportunities

To manage pasture and generate income for the NRSBU, to ensure ample airflow across the ponds and to enable the disposal of treated effluent.

To rationalise fencing of pasture that will exclude cattle from the wetlands, coastal fringe and transitional plant communities.

To manage bird numbers if populations increase to undesirable levels.

To control the regrowth and spread of exotic pest plants such as gorse.

To reduce the numbers of rabbits, black swans, Canada geese and pukeko.

3.2 ARCHAEOLOGICAL SITES

This section was compiled from information gathered from:

- the Archsite database for recorded sites;
- the literature relating to survey and investigation of all sites;
- personnel involved in previous work - Steve Bagley (Department of Conservation) and Ian Barber, (Historic Places Trust);
- Chris Hemi (Ngati Kuia), and preliminary discussion with Tiakina te Taiao

There are a total of 9 recorded sites on the island, located as shown on the map below and detailed in Table 1.

Figure 10: Locations of archaeological sites

The seven sites located on the western and southern shorelines lie in a band between the intertidal zone and a maximum distance of 20 metres inland. No archaeological deposits were discovered outside of these sites. Sea level rise can be expected to have inundated or eroded several of these sites by 2099.

Sites N27/186 and N27/187 are records relating to isolated artefact finds inland, which were discovered during recent monitoring of the Rising Main installation. Both finds were out of context and of low significance. They are not indicative of the presence of sites away from the coastal zone.

The most significant sites are in the northeast corner of the island. In 1992 these

sites, N27/139 and N27/140, were irrevocably damaged by bulldozing and root-raking to the water's edge, levelling the shell mounds which contained valuable stratified deposits, and scattering the remains so that spatial interpretation of the surface remains was no longer possible.

The sites were investigated by Ian Barber in 1997 but have yet to be fully reported on. They are considered to be of high significance, despite the damage incurred by the unauthorised earthworks. As well as covering a wide area the sites contain an unusual array of faunal species indicating specialist food processing (e.g. sting rays and pilot whales), as well as tool manufacture. The absence of moa bone suggests a date of about 400 years BP. By comparison, other midden sites of less importance might be more numerous locally, contain a limited species range and lack evidence of activity apart from cooking.

As a result of the damage caused by the bulldozing in 1992 the NZ Historic Places Trust imposed mitigation measures to prevent further damage to sites on the island. The Trust is unable to provide any information about the nature of these measures. It would appear that the sites were fenced out of the grazing land and are now protected by a cover of transitional vegetation. All of the known sites were mapped by Steve Bagley in 1993 to assist their ongoing management.

We note that under the RMA and HPA (1993) any proposed development that might impact on archaeological sites must be evaluated to mitigate damage to sites. If for example, the pond extensions indicated on Figure 1 were necessary to the functioning of the treatment plant, they would ideally be sited well away from any of the recorded sites. If this were not feasible then a detailed archaeological assessment would be required. Some of the assessment information is already be available as a result of Barber's 1997 work, but this will need corroboration and updating. The location and extent of any cultural remains will need to be accurately surveyed and marked, at least in the interim, to ensure their isolation from any development. Based on the evaluation, the Historic Places Trust might then authorise the partial modification or destruction of a site, along with a series of standard conditions including monitoring, recording and reporting of the finds. If a significant portion of a site was to be destroyed they would likely require a detailed archaeological excavation to maximise

the recovery of scientific data. Funding would need to be provided for this work.

The archaeology of the shoreline to the west of sites N27/139 and 140 been investigated. Midden and ovenstones might be present beneath accreted beach gravels or below the surface further inland. If the extension pond went ahead as marked the area would have to be tested (pits or trenches) for the presence of archaeological deposits. If nothing was found a precautionary HPA Authority would be applied for which would allow monitoring and reporting of finds.

Table 1 – amend to include the notes of importance and priority of various sites contained in the text above.

Site number	Site type	Date recorded	Grid reference NZTM	Location	Description	Condition
N27//119 and N27//140	Midden// ovens// stone working	1962 and 1980	E1614929 N5429279	Northeast corner of island over area 125m x 20m	Extensive occupation, midden, stone working, bulldozed. Excavated in 1962 and 1997	Damaged by bulldozing, excavation, fossicking and erosion
N27//139	Midden// ovens	1980	E1614687 N5429352	Northern end of Bell Island, up to 70m along bulldozed track leading inland (since obliterated by bulldozing)	Several small concentrations of cockle shell, charcoal, ovenstones	Damaged by bulldozing, excavation, fossicking and erosion
N27//141	Midden// ovens	1980	E1614903 N5427998	Southeast point of Bell Island	Midden and ovens, "made soil" eroding from beach section, inland extent investigated in 2008, not	Eroding

					identified.	
N27/157	Midden/ ovens	1993	E1613209 N5429397	On south side of island where it narrows at western end	Small area of ovenstones eroded onto beach	Eroding; not seen since first recorded
N27/158	Midden/ ovens	1993	E1613864 N5428740	Both banks of stream in tidal inlet	Blackened sand, charcoal, ovenstones	Eroding
N27/159	Midden/ ovens	1993	E1614408 N5428398	In front of small sand spit that cuts across tidal area in middle of large bay	Small remnant area of ovenstones eroded onto beach	Eroded; not seen since first recorded
N27/160	Midden/ ovens	1993	E1614644 N5428038	Exposed in shingle bank east of small ngaio tree on south beach	Blackened sand, charcoal, o/s, flake. Extends 35m along beach and up to 20m inland	Eroding, damaged by bulldozing
N27/186	Artefact find	2010	E1614744 N5438218	By WWTP	Piece of unworked argillite	n/a
N27/187	Artefact find	2010	E1613236 N5429391	Surface finds, out of context	2 argillite flakes	n/a

Issues

- Damage to shoreline sites caused by sea level rise.
- Further damage to the northern sites due to the construction of additional ponds.

Opportunities

The sites all lie within 50 metres of the line of MHWS, and they can be adequately protected by regenerating vegetation and stock-proof fencing

3.3 LANDSCAPE VALUES

Tasman District Council is working towards a comprehensive assessment of landscape values for the Tasman District, but there is no comprehensive identification of landscape values within the district as yet, nor have the District's areas of high natural character been identified. None of the completed studies of landscape values have any regulatory standing.

The Tasman District Coast Landscape assessment identified Bell Island as being located with the W3 Landscape Unit and notes:

> *Other than the access to Rabbit and Best Islands, the* [W3] *area is relatively inaccessible. However, in visual and landscape terms the area is an important and integral part of the wider Waimea coastal setting (Paragraph 4.27.4).*
>
> *... The offshore and adjacent islands and sand bars are important landscape components in the definition of the inlet and its appearance and visual relationship with inland locations within the wider area.*
>
> *While development has and continues to occur adjacent to the inlet, the ecological significance and values of the Waimea Inlet and its associated margins and wetlands should be protected and as appropriate enhanced. (Paragraph 4.32.1).*

Development Guidelines for the area included:

> R*esource management strategies for this coastal area should primarily be directed towards the protection and enhancement of the coastal margins in the context of appropriate adjacent rural* activity.

The report recommended:

> *Establish landscape protection and enhancement strategies to ensure the coastal margin in the southern section of the Waimea area is rehabilitated.*
>
> *Investigate the creation of an accessible and more natural public edge to the Waimea inlet/estuary area as an integral part of all strategic planning and development studies for the area.*

Landscape assessment (21.1.2009) by Tasman Carter Ltd in relation to the Duplicate Pipeline Project identified the following context and landscape values.

> *The eastern area of the Inlet is experienced from the immediate coastline perspective unless one ventures out into the estuary by boat. That provides an entirely different perspective; it enables exploration of the many beaches, intertidal areas, channels and the Islands themselves.*
>
> *Bells Island is considerably larger. There is tide dependent vehicle access across a concrete causeway between Bells and Bests Island. The Island is largely occupied by the sewage treatment plant (a series of bunded oxidation ponds). There is farmland on the northwest side currently leased for a dairy operation. The Far West Island peninsula is managed in pine plantation. There are natural sand beaches almost continually around the island, except were these give way to mud and deposits of softer sand or stone cobbles. It is a characteristic of the Inlet dynamics that on the south side of the Bells Island seven small inlets; a,b,c & d have formed (Refer Sheet 4 Annexure A). Immediately inland the beaches give way to either depleted native riparian vegetation or most commonly gorse and pines and then pasture. (Refer Sheet 4 Annexure A). The exception to that is the area on the arrival point of the existing pipeline route from Monaco. Here, in an effort to reduce coastal erosion, there has been modest native planting carried out. Unfortunately those plantings, due to lack of maintenance, are being over taken by gorse. Adjoining that area there is a small but natural inlet containing an archaeological site (N27 / 141) and bird nesting areas managed by D.O.C. The inlet, despite its natural values, is not fenced to keep cattle out. It is within this area that the NRSBU vehicles drive out onto the beach and into the inlet area and that spare parts and materials are stored. (Refer Sheet 4 & 5 Annexure A and Photos 3, 3A & 4).*

To identify landscape values at Bell Island a preliminary land typing study was carried

out. This identified different land types related to coastal morphology[10] and adjoining terrestrial landform, land use and land cover.

Seven coastal segments were identified. They are shown on Figure 11 and evaluated in Table 2 below. In addition, six terrestrial land areas were mapped. Their general locations are shown on Figure 12 and they are evaluated in Table 3.

The Coastal Segments and land areas were assessed separately in relation to Amended Pigeon Bay Factors[1]. Separate assessments were made of the coastal segments and adjoining inland areas because for much of Bell Island the shoreline and the inland areas have distinctly different characteristics.

Tables 2 & 3 score each segment and area on a five-point scale in relation to biophysical values, sensory values (including naturalness and transient values) and associative values (including historical sites). These incorporate the ecological and archaeological values discussed in Sections 3.1 and 3.2 above.

All of the coastal segments were found to have high landscape values. Most inland areas were also found to have high landscape values, but these were marred by significant detractors. Shading within Tables 1 & 2 indicates lowest landscape value when lightest and highest landscape value when darkest

Issues

Activities which reduced landscape values were:

- The effects of grazing activity on landscape features such as the freshwater wetlands, the estuarine wetlands and the shoreline.
- The causeway and the effects of modification of natural sediment flows west of Bell Island .
- Pine plantation management, particularly in relation to temporary aesthetic effects during the post harvest period.

[10] *A report on the ecology of the Waimea Inlet DOC 1990*

- The reflective buildings of the treatment plant, which can be seen from the wider inlet and SH60.
- Management of areas around the treatment plant roads and buildings.

Opportunities

Rationalisation of the fencing of the pasture would improve landscape values as well as providing for better management of both the inland pasture and the coastal dunes.

The natural growth of the pine plantation will result in steadily improving landscape values, up to the next harvest.

Consideration can be given to muting the visual effects of structures when selecting surface coatings, as part of the maintenance programme for existing structures and at the time of designing new structures.

Appropriate planting and landscaping of the spaces around the structures and hardstanding areas of the treatment plant can improve their level of visual amenity and reduce the visual prominence of the structures.

Figure 11: Coastal segments

		Natural science factors[1]				Associative Values[2]	Sensory values					
		Aspect	Land and coastal landform type	Original ecosystem	Current land cover / use	Archaeological sites	Natural	Memorability vividness	Visual coherence	Expressiveness	Transient values	Wild and Remote
COAST	A	South	Estuarine mud / raupo			N27/158						
	B	South / West	Mobile Sand and Fine Sand / pebble shore			N27/159 N27/160 N27/141						
	C	East	Pebble and cobble coast									
	D	East	Pebble and cobble coast with high shore sand beach adjacent shell bank									
	E	North	Wide sandy coast, oyster and shell fish beds adjacent Blind Channel and dune system (with possible fresh water drainage from Area 1)			N27/140						
	F	North	Pebble and cobble coast with high shore sand beach and dune system									
	G	North /	Pebble and cobble river coast			N27/157						

Table 2: Coastal segments

Figure 12: Terrestrial land areas

		Aspect	Land and coastal landform type	Original ecosystem	Current land cover / use	Archaeological sites	Natural	Memorability vividness	Visual coherence	Expressiveness	Transient values	Wild and Remote
TERRESTRIAL	1		Dune lands	Pingao and Spinifex grading to coastal shrub land	Gorse, ice plant and small groups of mature pines	N27/140						
	2		Sand and gravel dune and beach ridges modified by farming and forestry. Free draining, drought prone, low fertility	Podocarp - mixed broad leaf forest / shrub land.Open wetlands in sand and gravel hollows and on sand flats	Land cleared and bull dozed; irrigated pasture grazed by cattle and 2nd generation pine plantation.							
	3		Fine sand coast studded with inland lacustrine wetlands and often semi enclosed estuary / coastal wetlands.	Kanuka, manuka, ribbonwood, Stipa stipoides, coprosma repens [red leaved ground cover – TK confirm] coposma propinqua, gorse and sparse pines	Native and exotic riparian vegetation cover segmented by grazed and marginalised by Grazing Areas B, C, D & F.	N27/158 N27/159 N27/160 N27/141						
	4		Mud coast	Wiwi, raupo, and community native restoration	2nd generation pine plantation replanted 2011.	N27/157						
	5		Capeland	?	Pine plantation, converted to community native restoration programme with old man pines at the end of the cape.							
	6		Oxidation ponds									

Table 3: Terrestrial land areas

3.4 OTHER MATTERS

The report has also assessed a number of environmental values, issues and opportunities that, while being outside the area covered by the Environmental Development Plan, could play valuable roles in the protection and enhancement of the open space, natural and ecological values of Bell Island.

3.4.1 TREATMENT PONDS

Figure 13: Location of treatment ponds

Discussion

Tasman Resource Management Plan (TRMP) does not define wastewater treatment ponds as wetlands. However the large open water areas provide an attractive habitat for native water birds, such as the New Zealand scaup, shoveler and paradise shelduck, as well as introduced waterfowl such as mallard duck, black swan and Canada goose. The surrounding embankment is used by many species of shorebirds, gulls, terns, herons and royal spoonbills.

The ponds provide a safe refuge for game birds. Local hunters indirectly benefit when

these birds move to and from surrounding feeding areas during the open season.

Issues

- While the main purpose of the ponds is to treat effluent, they also provide a safe sanctuary for birds.
- Large concentrations of birds do not meet with the objectives of treating sewerage.
- Some species of introduced birds (black swan, Canada goose) that use the oxidation ponds are considered undesirable by the farming community and airport authority.
- Some species of native birds that use the ponds are considered a taonga by tangata whenua and are nationally at risk.
- Large open freshwater habitats within the Waimea Inlet will always attract a large number of waterbirds.

Opportunities

The safety of aircraft using the airport may be a major determining factor in the management of wildlife on the ponds. Any decision relating to enhancement of the ponds as wildlife habitat would need to take this into account.

Subject to this proviso, the NRSBU could have the opportunity to turn Bell Island into a wildlife refuge of international standing. The key to success lies in how the treatment ponds are managed, with predator control and the provision of nesting opportunities being the most important management tools. It would require relatively little effort or expense. [ii]

Alternatively, the Board may prefer to control the number of birds using the ponds.

3.4.3 SHELL BANK

Figure 14: Location of shell bank

The shell bank is an island within the Waimea Inlet. Those parts which are above the line of MHWS are unoccupied Crown land, and as such are administered by Land Information New Zealand (LINZ). Those parts which are below the line of MHWS are part of the foreshore of the Waimea Inlet, which is in the common marine and coastal area as defined in the Marine and Coastal Area (Takutai Moana) Act 2011.

Accordingly, the shell bank is outside of the area controlled by the Board of the NRSBU. However, it is able to address any matters related to the management of Bell Island that could have an effect on the open space, natural, ecological, and archaeological values of the shell bank.

Sea level rise can be expected to have affected the entire shell bank by 2099. It is not possible to predict whether the sea will inundate, erode, build up or shift the landform.

The shell bank is one of three high tide roosting sites located in the eastern Waimea Inlet. During the months of October to April it is used as a high tide roost by more than 2,000 godwits and hundreds of knots and turnstones (northern hemisphere migrants). Five species of terns also use the shell bank as a high tide roost, and it

provides nesting habitat for Caspian terns and for rare species such as variable oyster catcher. Royal spoonbills are common, with up to 71 observed at high tide. Banded dotterels and wrybills also use it through the winter months.

As noted in the archaeology section above, evidence of occupation has been reported from the shell bank, including *kōiwi* (burials) and ovenstones. The island is archaeologically sensitive and is a *wāhi tapu* (sacred place).

Issues

- Encouraging public access around the Bell Island foreshore would increase the risk of disturbance to roosting and nesting birds and to archaeological sites.
- Failure to fence the pasture and so prevent cattle from grazing the shell bank could damage plants and disturb wildlife.
- Failure to control predators on Bell Island could cause predation of bird nests.
- Noise from construction activities on Bell Island could disturb roosting and nesting birds. Sudden noises could cause bird flocks to put aircraft at risk.
- Exotic pest plants could spread from Bell Island if not controlled on the island

Opportunities

The discouragement of public access across and around Bell Island would reduce the risk of people and dogs disturbing birds using the shell bank.

Fencing of the grazed pasture to prevent cattle from straying onto the shell bank would protect the vegetation and birds' nests on the shell bank.

Planting of additional indigenous vegetation around the eastern shore of Bell Island would improve the screening of the activities at the treatment plant from the shell bank.

To establish a best practice protocol that avoids creating sudden noises that might disturb roosting and nesting birds.

3.4.4 CAUSEWAY

Figure 15: Location of causeway

The causeway is an authorised structure in the Coastal Marine Area, and any modification of it is subject to the policies and rules of the TRMP.

Monitoring by the Tasman District Council has shown that the design of the causeway is impeding natural coastal processes and causing sediment to build up within the intertidal zone upstream of it[11]. In addition, blooms of green and red algae (Enteromorpha and Gracilaria) between Bests and Bells Island are being caused by nutrients in the Waimea River becoming concentrated in the poorly flushed region upstream of the causeway[12].

Issues

- As with most causeways which restrict tidal flushing, the causeway is affecting the natural function and character of the channel.

[11] *T James (Tasman District Council) pers comm.*

[12] *Waimea Inlet 2010: Vulnerability Assessment & Monitoring Recommendations*

Opportunities

To engage a consultant with a knowledge of coastal processes to provide recommendations on how the natural flushing of the waterway might be restored at reasonable cost.

3.4.5 PUBLIC ACCESS

The NRSBU prohibits public access to the island for health and safety reasons related to the operation of the treatment plant. The public are also excluded from the access road which runs along a legal easement over the Best Island farmland from Barnett Avenue.

All authorised staff and visitors to the treatment plant are inducted to the requirements of the Health and Safety Act and sign in and out of a register. They generally arrive by vehicle, crossing the concrete causeway from Best Island, which can be used for about four hours either side of low tide. Groups authorised to carry out activities such as the restoration of the north-western spit use the same access route.

There is no esplanade reserve or esplanade strip around the island, but the public are entitled to walk on the intertidal foreshore below the line of MHWS. This line can vary over time, due to natural processes of coastal erosion and accretion.

Physical access to the foreshore around the island is possible by boat or by swimming across the tidal channels that surround it. Most people who access it this way can be expected to start from the Rabbit Island boat ramp, which is about 250 metres from the closest part of Bell Island. Members of the public can also walk about 800 metres around the foreshore of Best Island from the settlement at its south end, and then across the causeway to the Bell Island foreshore. Members of the Greenacres golf club and their guests can walk along the Best Island foreshore from the golf course and across the causeway.

The more or less continuous buffer of dense vegetation along the coastline, together with the farm fencing and the coastal landforms such as the dunes along the north

coast, provides a physical barrier to public access onto the island from the upper foreshore.

One of the priority actions of the the Waimea Inlet Management Strategy is "limiting access by people, vehicle, dogs, or vessels, in areas where significant vegetation and habitat types may be damaged, or where disturbance to birds may be critical, and directing these activities to places where damage of disturbance will be minimal".

Issues

- The current practice of excluding the public from Bell Island has worked well in the past. However, some issues arise from public access to the foreshore.
- Public use of the foreshore may be disturbing birds which live among the shoreline vegetation
- Trampling by members of the public is damaging the foreshore vegetation on the north-western shoreline, as they avoid the silt build-up upstream of the causeway.

Opportunities

To actively discourage public access around the island's foreshore, using educational signage that identifies the risks to personal health and safety and to the ecological values of the locality.

3.4.6 DOG EXERCISING

The Tasman District Dog Control Bylaw 2009 applies to the foreshore around the island, as to all public places in the Tasman District. Every dog on the foreshore must be kept under continuous leash control on any occasion that it is likely to injure, endanger, or cause distress to any wildlife protected by the Wildlife Act 1953 [13].

[13] *Clause4.2 (a) Tasman District Dog Control Bylaw 2009. Protected wildlidfe includes:Australasian Bittern, Banded Dotterel, Banded Rail, Bar-tailed Godwit, Black Shag, Black billed Gull, Black-fronted Tern, Blue Duck, Caspian Tern, Crakes, Fernbird, Fluttering Shearwater, Grey Duck, Kingfisher, Kiwi, Little Black Shag, Little Shag, New Zealand Pipit, Penguins, Pied Oystercatcher, Pied Shag, Pied Stilt, Red-billed Gull, Red Knot, Reef Heron, Royal Spoonbill, Sooty Shearwater, Spotted Shag, Turnstone, Variable Oystercatcher, Weka, White Heron, White-faced Heron, White-fronted Tern and Wrybill*

Anecdotal evidence (observation over time including foot and paw prints) indicates that members of the public regularly exercise dogs off the leash along the coastal margin. Both people and dogs can disturb shorebirds, which live among the shoreline vegetation. Monitoring and enforcement is required to ensure that dogs are prevented from straying above the line of MHWS, and that they are kept leashed at all times, due to the risk of them disturbing protected wildlife

Issues

- The TDC dog control bylaw is not being monitored or enforced on the shoreline. Unleashed dogs may be trespassing on the island, and also disturbing birds which live among the shoreline vegetation

Opportunities

To actively discourage dog exercising around the island's foreshore, using educational signage that identifies the risks to personal health and safety and to the ecological values of the locality.

To request that TDC instigate regular compliance monitoring to achieve a higher standard of enforcement of the dog control bylaw.

3.4.7 PUBLIC ENGAGEMENT ON ENVIRONMENTAL MANAGEMENT

The Board of the NRSBU has no obligation to engage with the community on any matter relating to the use and management of Bell Island. The official channel for public input is through submissions to the Long Term Plans of the Tasman District Council and the Nelson City Council, as joint owners of the island.

The Board has the ability to choose to engage with the community, and has already begun to do so. Community input should not be allowed to unduly compromise the Board's core activities of wastewater treatment and disposal, nor its health and safety obligations.

The Waimea Inlet Management Strategy has been adopted by the two Councils and

its implementation is co-ordinated through the Waimea Inlet Forum. The Strategy tasks the Forum to find best outcomes for both inlet values and the continued operation of the treatment plant. This can best be achieved by direct consultation with Forum members.

Possible negative aspects this approach include the risk of

a) pressure for environmental enhancement undermining the Board's primary objective of treating the wastewater from the Waimea basin in the most cost effective and sustainable manner, and

b) outside criticism arising from greater awareness of the details of the island's management issues .

It is unlikely that these risks would eventuate, because:

- The primary objective of the Board is well established through the NRSBU's mission statement and the zoning of the island for wastewater treatment in the District Plan

- The adoption and staged implementation of a management regime for the island which increases its ecological, cultural and aethetic qualities will demonstrate that the organisation is a "good citizen" and will help to achieve its mission of acting in a sustainable manner.

Establishment of a formal relationship with the Waimea Inlet Forum could provide the Board with more certainty around how formal applications and informal proposals will be scrutinised, as well as helping to publicise the Board's environmental successes. It may also lead to the establishment of joint enhancement projects and open up avenues for a wider funding base for the protection and enhancement of the open space, natural and ecological values of the island.

Such actions can be expected to give the Board enhanced environmental credibility when the time comes for it to expand the total area of the treatment ponds.

Issues

No issues have been identified.

Opportunities

The Board has a good working relationship with the Forum. There is the potential greater co-operation which could have significant benefits for both parties. The Board may be able to benefit, for instance, from an additional funding stream that could ease the implementation of the actions proposed in this report.

PART 4 MANAGEMENT OPTIONS AND RECOMMENDATIONS

The Stage One report concludes with recommendations that the Board of the NRSBU consider adopting policies and instigating a programme of actions for the protection and enhancement of the open space, natural and ecological values of the island.

It may be necessary to obtain resource consents for parts of the implementation programme.

4.1 Pest control

Mammalian pests

Control rats, stoats, rabbits, hares, wild cats, possums.

Limit access by dogs not under control of their owners.

Bird pests

Gain the necessary authorisation and undertake appropriate strategies to reduce numbers of bird pests in response to any issues that may arise.

Plant pests

Control gorse, broom, South African ice plant and other identified pest plants, with particular attention given to the control of pest plants that may start to colonise the island before they become widely established.

4.2 Freshwater wetlands

Identify three freshwater wetland areas for protection and enhancement. Exclude stock from these areas, by removing them from the grazing licence and by fencing if necessary. Design and implement a programme to restore the indigenous vegetation in the wetlands and around their margins.

Investigate the feasibility and potential environmental effects of discharging treated effluent to these wetland areas.

4.3 Estuarine wetlands

Identify a band of estuarine wetland areas along the western shoreline for protection and enhancement. Exclude stock from these areas, by removing them from the grazing licence and by fencing if necessary. Design and implement a programme to restore the indigenous vegetation in the wetlands and around their margins.

Provide for these areas to expand as and when sea level rise inundates more of the land along the western side of the island, by removing land from the grazing licence and moving fences back as appropriate, and by clear-felling pines which are killed by saltwater intrusion and replacing them with indigenous wetland vegetation.

Allow indigenous shoreline vegetation to be killed by saltwater intrusion and for these areas to be colonised naturally by indigenous vegetation.

4.4 Coastal fringe and transitional plant communities

Review the grazing licence, and remove woody vegetation from areas that are kept within the grazing licence (see below).

Design and implement a long-term programme to replace fenced off areas of exotic transitional plants, such as gorse, blackberry, wilding pine, iceplant and broom, with indigenous vegetation, around all of the island's shoreline. The recent replacement of the clear-felled pines on the the north-western spit provide an example of how this can be achieved.

Include in this programme the re-establishment of coastal dune species (coast care[iii]) on the dunes along the northern shoreline, to improve the resilience of the dunes in the face of rising sea level.

Include in the programme the establishment of stands of totara to replace the existing pines around the northern and eastern shorelines, and selectively fell the pines once the totara are well established.

4.5 Radiata pine plantation

Provide for continued disposal of biosolids to the pine plantation.

Manage the pines through to harvest, for a commercial income.

Encourage natural regeneration of an under-storey of indigenous plants and the return of a range of forest-dwelling bird species.

Control the regrowth of exotic pest plants.

4.6 Pasture

Provide for continued disposal of treated effluent to the pasture areas.

Keep options open for future expansion of the ponds over the pasture areas.

Enforce existing licence conditions.

Ensure that all areas licensed for grazing are securely fenced to contain the stock.

Convert all wetlands and coastal fringe and transitional plant communities that are more than 20 metres from the line of MHWS and are under the spread of the irrigation system into high quality pasture.

Review the ecological potential of all other ephemeral wetlands that are currently in the area of the licence, with a view to removing those with high potential from the licence and fencing them out of the paddocks

Fence off from grazing all foreshore areas and all drainage lines which transport stock effluent or irrigated effluent to the foreshore.

Control all pest plants within the fenced grazing areas.

Gain the necessary authorisation and undertake appropriate strategies to reduce numbers of grazing birds in response to any issues that may arise.

Investigate alternative productive opportunities to ensure adequate airflow, such as using the pasture to make hay or silage.

4.7 Archaeological sites

Make an accurate record of all known archaeological sites on the island and its foreshore and store it in an accessible place for future reference by the Board.

Obtain authority from the Historic Places Trust before undertaking any works that could cause damage to a registered archaeological site.

Adopt and implement the Historic Places Trust's Accidental Discovery Protocol to ensure that no previously un-recorded archaeological site is damaged.

Sign a memorandum of understanding with mana whenua, committing both sides to a consultation process that is to be followed before any decisions which might impact on archaeological sites are made.

4.8 Landscape

Create a palette of colours which blend into the landscape of the Waimea Inlet, and use them when choosing finishes for new buildings and structures and for re-coating of the existing buildings and structures of the treatment plant.

Design and implement a landscape enhancement programme for the setting of the structures and operational areas of the treatment plant, including planting, weed control, mowing and clearer delineation of areas.

4.9 Treatment Ponds

This stage 1 report recommends that the Board undertake further investigation, and then make an informed decision, about whether it wishes to manage the ponds in a

way that discourages their use by wildlife, or alternatively to encourage wildlife to use the ponds.

If wildlife is to be encouraged, the Board will need to design and implement a programme that might include:

- control of mammalian predators
- habitat enhancement such as nesting boxes / loafing logs on pond and embankment crests
- management of the numbers of selected bird species (such as black swans, Canada geese and pukeko) which might be undertaken by Fish and Game Council.

4.10 Shell Bank

Ensure that noise, pests, cattle, vehicles, vessels, people and dogs do not travel from Bell Island to the shell bank

Manage major noise generated emissions (e.g. sheet piling) on Bell Island construction areas close to the shell bank when birds are nesting or roosting at high tide.

4.11 Causeway

Investigate remedial actions to remedy the existing flow restrictions.

4.12 Public Access

Continue to exclude the public from Bell Island.

Do not encourage public use of the foreshore around the island.

Provide explanatory signage.

4.13 Dogs

Continue to exclude dogs from Bell Island.

Monitor dogs' activities on the foreshore and enforce the Dog Control bylaw.

Provide regulatory and explanatory signage.

4.14 Public Engagement on Environmental Management

Consider signing a memorandum of understanding with the Waimea Inlet Forum, to provide the Board with more certainty around how formal applications and informal proposals will be scrutinised by the community, as well as helping to publicise the Board's environmental successes.

Explore the development of relationships which can lead to the establishment of joint enhancement projects and open up avenues for a wider funding base for the protection and enhancement of the open space, natural and ecological values of the island.

4.15 Site specific recommendations

The locations are shown on Figures 12 and 13 below

1 Consider establishing a band of indigenous shrubland on the eastern side of the ponds to include the full width of Grazing Area E, thus removing all grazing from the eastern side of the island and improving the screening of the treatment plant.

2 Design and implement a coast care programme, including control of pest plants and enhancement of coastal shrubland, around the northern and eastern shorelines (the north and east sides of Grazing Areas A and E, extending inland far enough to encompass the archaeological sites and to provide a physical and visual buffer between the treatment plant and the foreshore. Consider extending to include the full width of Grazing Area E, thus removing all grazing from the eastern side of the island and improving the screening of the treatment plant.

3 Consider establishing a band of indigenous shrubland running between the pine plantation and Grazing Area A, to create a wildlife corridor linking the northern and western shorelines.

4 Fence off archaeological sites from grazing areas along the western and southern shoreline.

5 Remove grazing from Grazing Area F, and manage it as open grassland for hay or silage production.

6 Design and implement a programme to restore estuarine habitats and indigenous shrubland along the southern shoreline, extending from where the wastewater pipeline runs ashore around into the area between Grazing Areas F & D.

7 Fence around Grazing Areas C & D, along with an access corridor to enable cattle to move between them.

8 Design and implement a programme to restore estuarine habitats and indigenous shrubland along the shoreline between Grazing Areas C & D.

9 Fence off the western wetland to confine stock to Grazing Area B, along with an access corridor to enable cattle to move between Grazing Areas B & D.

10 Design and implement a programme to restore estuarine habitats and indigenous shrubland along the shoreline between Grazing Areas B & C.

11 Move the fence around the western corner of Grazing Area A so that it excludes the area of freshwater wetland.

12 Design and implement a programme to restore estuarine habitats and indigenous shrubland along the shorelines on the northern and western sides of the pine plantation.

13 Maintain the recently restored estuarine habitats and indigenous shrubland on the north-western spit to canopy closure.

Be prepared to move fences back from the coast as the sea level rises, notably in grazing Areas A, C and D, to allow the natural expansion of the estuarine wetlands.

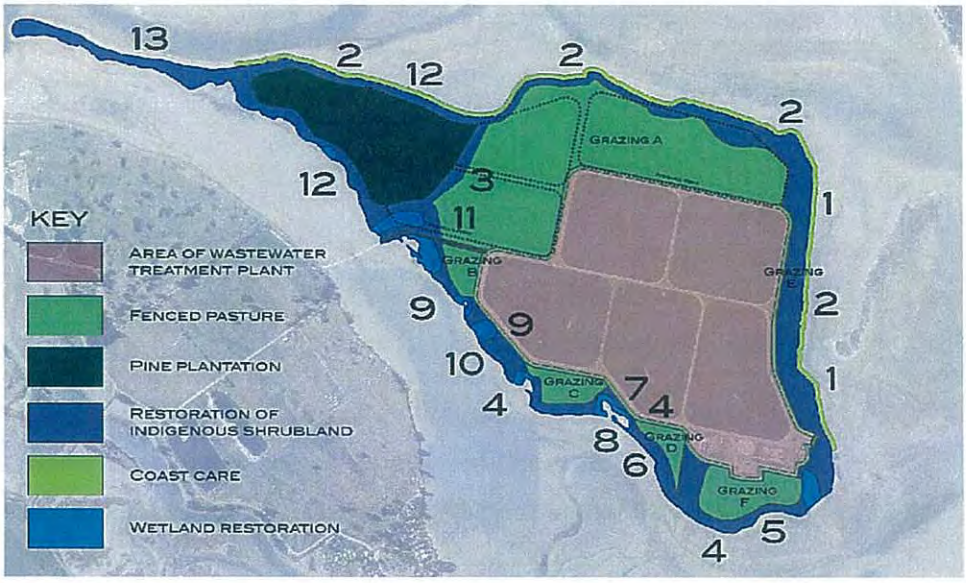


Figure 16: Locations of site specific recommendations

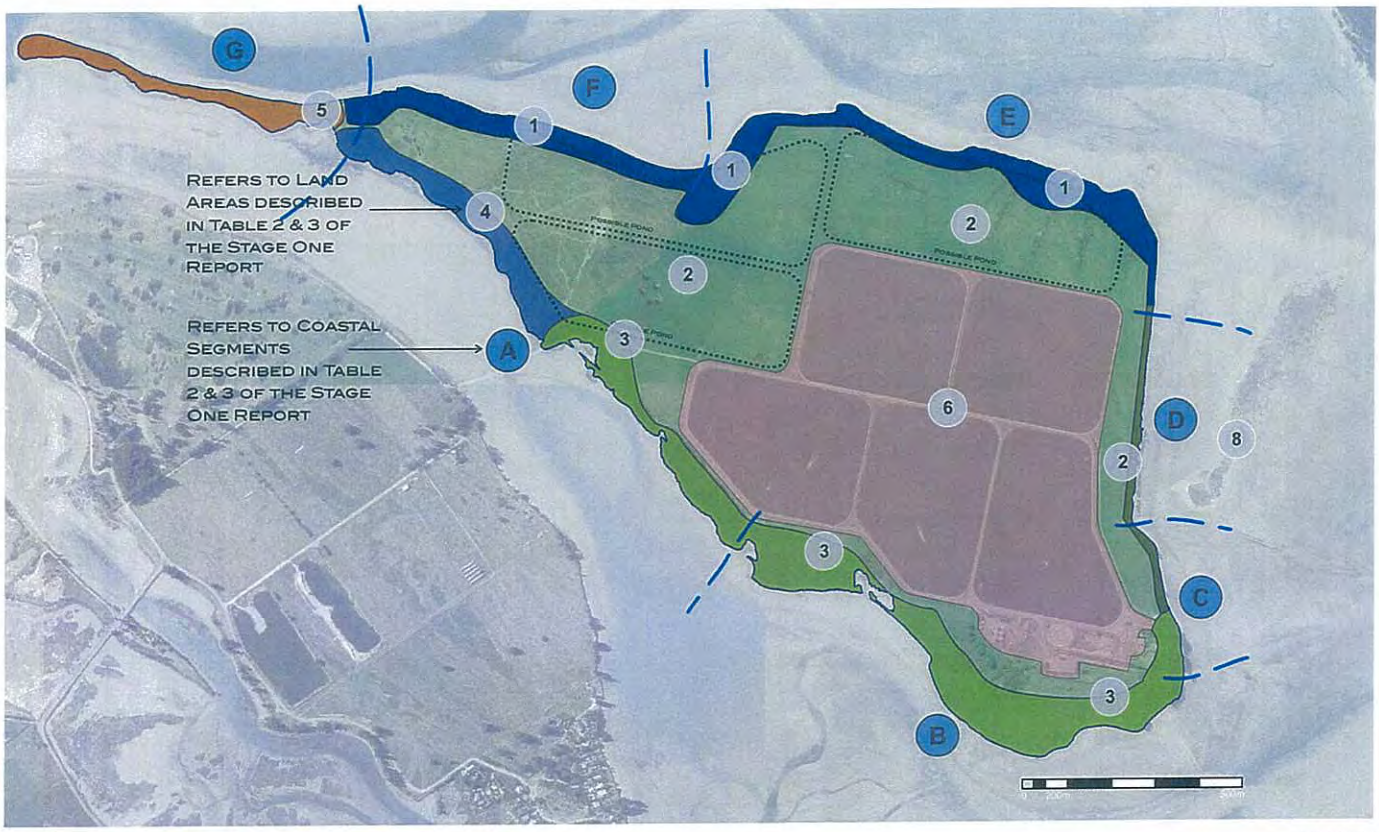
Figure 17: Detail of site specific recommendations beside the treatment plant

APPENDIX 1 - PLANS

Sheet 1	Land typing
Sheet 2	Ecological values
Sheet 3	Archaeological sites
Sheet 4	Landscape values
Sheet 5	Site specific recommendations
Sheet 6	Treatment plant detail

BELL ISLAND ENVIRONMENTAL DEVELOPMENT PLAN

WAIMEA INLET



SHEET 1: LAND TYPING

7 DECEMBER 2012

STAGE ONE - REPORT

LANDSCAPE ARCHITECTS tasmancarter LIMITED

FISH & WILDLIFE LTD

MAMAKU LTD

Bell Island Environmental Development Plan

Waimea Inlet

Sheet 2: Ecological Values

7 December 2012
Stage One - Report

tasmancarter
Fish & Wildlife Ltd
Mamaku Ltd

Bell Island Environmental Development Plan

Waimea Inlet

Sheet 3: Archaeological Sites

7 December 2012

Stage One - Report

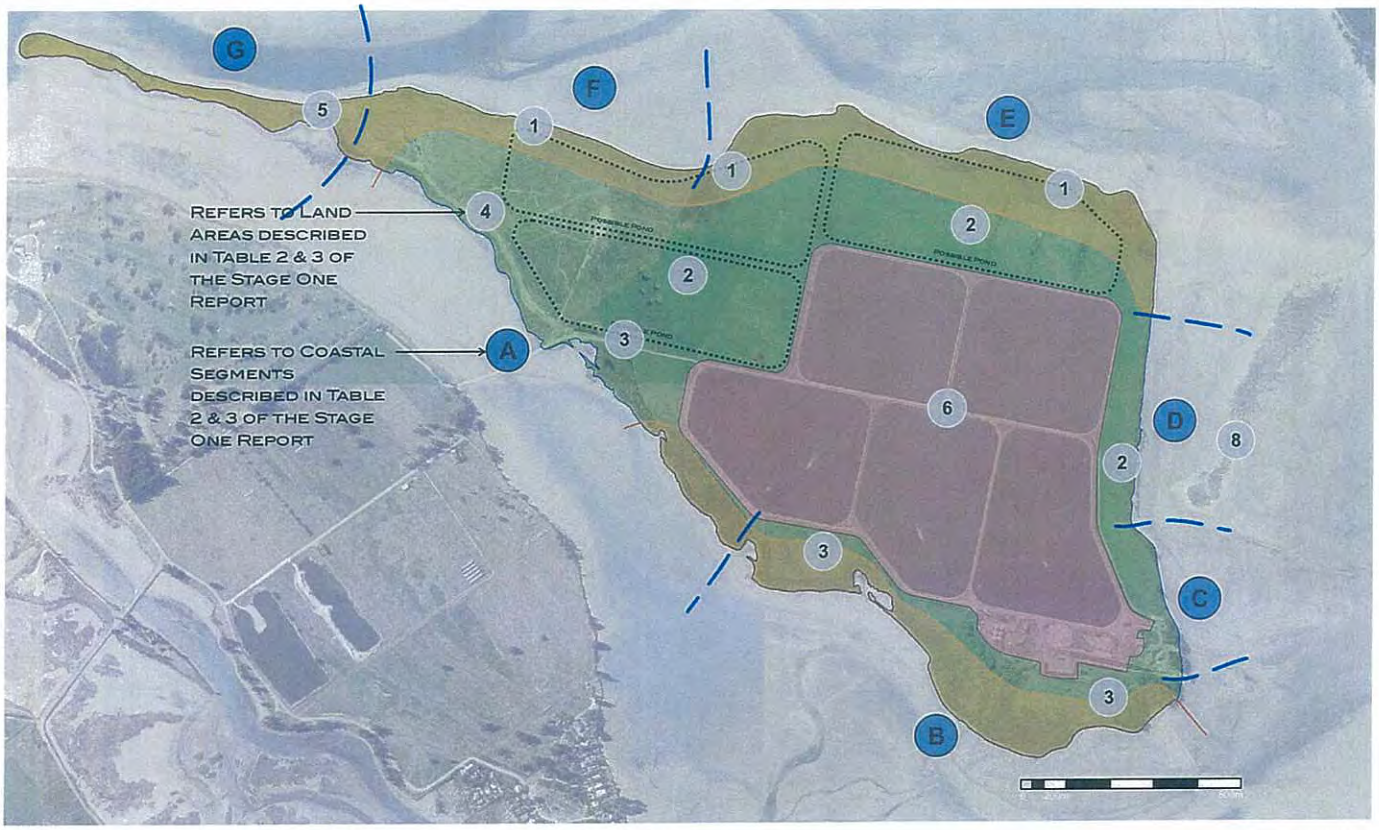
Landscape Architects tasmancarter Limited

Fish & Wildlife Ltd

Mamaku Ltd

Bell Island Environmental Development Plan

Waimea Inlet



Sheet 4: Landscape Values

7 December 2012

Stage One - Report

Landscape Architects tasmancarter Limited

Fish & Wildlife Ltd

Mamaku Ltd

BELL ISLAND ENVIRONMENTAL DEVELOPMENT PLAN

WAIMEA INLET

SHEET 5: SITE SPECIFIC RECOMMENDATIONS

7 DECEMBER 2012

STAGE ONE - REPORT

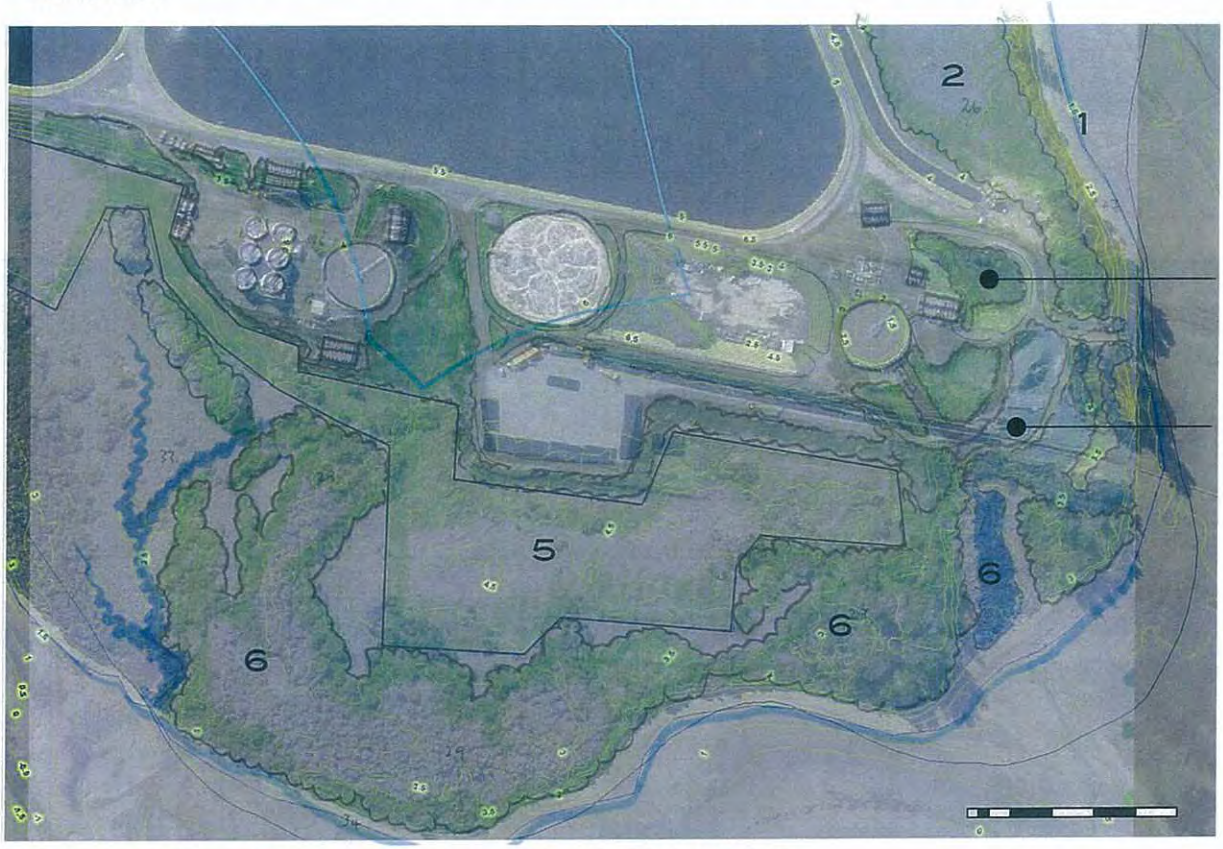
LANDSCAPE ARCHITECTS tasmancarter LIMITED

FISH & WILDLIFE LTD

MAMAKU LTD

Bell Island Environmental Development Plan

Waimea Inlet



WWTP
AMENITY
ENHANCEMENT

REVEGETATION
UNDER DUAL
PIPELINE
CONSENT

Sheet 6: Treatment Plant Detail

7 December 2012
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tasmancarter
Limited
Fish & Wildlife Ltd
Mamaku Ltd

APPENDIX 2 - SCHEDULE OF BACKGROUND DOCUMENTS

Duplicate Pipeline Resource Consent AEE reports:

- Tom Kroos Fish & Wildlife Services Ltd 29 June 2010
- Tasman Carter Ltd. Landscape Report 26 November 2009
- Tangata whenua ki Whakatu working group. Cultural Impact Assessment of the Nelson Regional Sewerage Scheme December 2008
- Deb Foster. An Archaeological Assessment of the Monaco-Bells Island Sewer Pipeline August 2008.
- Bells Island Landscape Restoration Plan. Tasman Carter Ltd 26 August 2010.

Other documents

- Raine Farms Ltd. licence
- Options for Forest Management at Bells Island, Waimea Estuary 27.5.11
- Bells Island Spit Restoration
- The Nelson Regional Sewerage Scheme 5.83
- Waimea Inlet Strategy
- A report on the ecology of the Waimea Inlet (Davidson , R. & Moffat, R. Dept Conservation)

Statutory Framework

Local Government Act 2002 (LGA)

The purpose of this Act is to provide for democratic and effective local government that recognises the diversity of New Zealand communities; and, to that end, it provides for local authorities to play a broad role in promoting the social, economic, environmental, and cultural well-being of their communities, taking a sustainable development approach.

Section 14 requires prudent stewardship and the efficient and effective use of each community's resources in the interests of the district or region, taking into account:

(i) the social, economic, and cultural well-being of people and communities,

(ii) the need to maintain and enhance the quality of the environment, and

(iii) the reasonably foreseeable needs of future generations.

Community outcomes are the prime drivers for all activities undertaken by local authorities. The following table lists the outcomes in the Long Term Plans of Tasman and Nelson Councils. The outcomes include themes of health, sustainability and environmental protection:

Tasman District (draft 2012-22)	**Nelson City (draft 2012-22)**
Our unique natural environment is healthy and protected.	We protect the natural environment
Our urban and rural environments are pleasant, safe and sustainably managed.	We build healthy, accessible and attractive places and live in a sustainable region
Our infrastructure is safe, efficient and sustainably managed.	
Our communities are healthy, resilient and enjoy their quality of life.	We are part of a welcoming, safe, inclusive and healthy community
Our communities respect regional history, heritage and culture.	We are proud of our creative local culture and regional identity
Our communities have access to a range of cultural, social, educational and recreational services.	
Our communities engage with Council's decision making processes.	Our leaders are proactive, innovative and inclusive
Our developing and sustainable economy provides opportunities for us all.	We all benefit from a sustainable, innovative and diversified economy

Nelson City Sustainability Policy

Nelson City Council's sustainability policy was adopted in 2008. It requires the Council to demonstrate leadership in sustainability across the region in the following ways:

- Achieve best practice standards
- Meet and strive to surpass requirements of environmental legislation targets
- Build partnerships and projects that create learning networks
- Take account of the impact on future generations when making decisions
- Provide decision makers with the information they need to deliver sustainable outcomes

Methods to achieve these objectives are:

- Optimise the efficient use of resources and minimise waste
- Increase the use of renewable resources and reduce greenhouse gas emissions
- Operate in ways that minimise any adverse impacts on the environment or the local community
- Require employees to incorporate informed sustainability perspectives within their work
- Encourage contractors, Council Controlled Organisations and other partners to adopt sustainable best practice
- Deliver an improved quality of life for the current and future residents of Nelson
- Nelson Regional Sewerage Business Unit

Bell Island is administered by the Nelson Regional Sewerage Business Unit (NRSBU).

The NRSBU's mission statement is as follows:

To manage the current treatment facilities and network efficiently and in accordance with resource consent conditions to meet the needs of the major Customers, and to plan for the future needs of the community in a cost efficient and environmentally sustainable manner. (NRSBU Business Plan 2011 – 2012)

The treatment plant was first proposed by the Nelson Regional Sewerage Committee, which was set up in 1973 with representatives from Nelson City, Richmond Borough and Waimea County councils. This committee took full responsibility for the planning of the scheme and details such as land purchase, loan raising and deciding on the cost sharing formula.

On March 30 1981 the formal agreement setting out the terms of each Council's membership, how the scheme should be administered and how costs should be shared was signed, and the Nelson Regional Sewerage Authority was established.

In October 1998 the two Councils as owners sought advice about the affordability of a proposed treatment plant upgrade. Following this report it was agreed that the administration should be restructured. The NRSBU was formally established as a Joint Business Unit of the two Councils on 1 July 2000.

The NRSBU is managed by a Joint Committee. The Joint Committee comprises two representatives from each of the Councils, and one independent Director who is appointed by the Councils. All capital assets are owned equally by the two Councils and administered by the NRSBU.

The Asset Management Plan (AMP) is a key component to the strategic planning work of the NRSBU. The plan is a management tool that guides and influences decision-making. It is related to the Business Plan (a strategic document) and process plans (operational documents).

Nelson City Biodiversity Strategy (2009)

The Nelson Biodiversity Strategy was adopted by Nelson City Council in 2007 and reviewed in 2009. It is issued under the umbrella of the Nelson Biodiversity Forum, comprising 23 signatory organisations.

Its vision is that Nelson is celebrated as the gateway to a region richly endowed with natural places that teem with native plants and animals; the mauri (life force) and wairua (spirit) of ecosystems and species of significance to tangata whenua, and to the community as a whole, are protected and enhanced; nature is accessible in and around the city; Tangata whenua customary use of nga taonga tuku iho (the treasured resources) is a recognised and accepted part of the wider integrated management of biological diversity in Whakatū; valued exotic species thrive in appropriate places, and pests and weeds are controlled and/or eradicated.

In 2009 the Nelson Biodiversity Forum adopted a Coastal And Marine Action Plan containing the following Priority Joint Action:

Prepare an integrated Waimea Inlet strategic plan. This strategy would establish a framework for managing the effects of uses and activities that impact upon biodiversity values in Waimea Inlet. The strategic plan would encourage the community to work together to sustain its marine environment using both regulatory and non-regulatory approaches.

This is identified as the highest priority action in the 2009 Nelson Biodiversity Strategy.

Waimea Inlet Management Strategy 2010

Bell Island lies in the Waimea Inlet. Decision-making needs to have regard to the Waimea Inlet Management Strategy.

This is a support document under the Nelson and Tasman Councils' Long Term Plans. It supports the vision and community-sourced outcome statements of those documents, and it guides the Councils' decision-making across all departments, influencing not only statutory resource management but also provision of infrastructure, services and all areas of council involvement.

The overall vision is that the inlet be a vibrant place, richly appreciated by the community for its open space, natural and ecological values; happily remembered by generations for their activities, adventures and discoveries; a place where tangata whenua hold mana as kaitiaki of

taonga; and a place to be shared with increasing respect.

Aims include:

- Healthy and regenerating populations of indigenous vegetation, habitats, and birds; maintained, improved, and extended.
- Water quality maintained or improved.
- Over-supply of nutrients or sediment avoided.
- Natural processes continuing to provide the habitats needed for the ecosystems and estuarine species dependent on them, and being able to respond to any future shoreline change.
- Generations remembering the inlet for its open spaces, naturalness, and ecological values, with happy memories of activity and adventure.
- Remnants of significant indigenous ecosystem are protected.
- Local indigenous stock is used as a source for expanding these ecosystem remnants and reducing their vulnerability.
- Ecosystem sequences from the inlet into adjoining land re-established.

This is to be achieved through, inter alia:

- Protecting, enhancing, and increasing existing remnants of valued habitats for indigenous species. These include habitats in terrestrial, freshwater, intertidal, and subtidal ecosystems.
- Managing catchments, including riparian and coastal margins, to minimise adverse discharge of sediments and contaminants.
- Maintaining the natural functioning of estuary margin habitats, intertidal areas, rivers and streams, to convey and filter water, and to provide habitat and passage for indigenous species.
- Integrating management of the Waimea River and the inlet, especially at the river mouth area, and into Tasman Bay.

- Monitoring and controlling weeds, pests, and invasive species, where practical.
- Protecting the inlet from further infilling for land use purposes.
- Seeking and providing opportunities for restoration, enhancement, or extension, of natural ecosystems. Using locally sourced stock for restoration planting.
- Retaining and enhancing landforms and land cover that give distinct landscape character to different parts of the inlet and to the whole inlet.
- In the long term, considering any opportunities that arise for alternative locations for activities that are not compatible with inlet values.

The inlet is of international significance for migratory bird species and is of national significance for other endangered or threatened species. These include birds such as bar-tailed godwit, white heron, royal spoonbill, little egret, Australasian bittern, and banded rail, and plants such as coastal peppercress and grey salt bush.

Estuaries are a sink for contaminants that run off the land. If we look after the land well the estuary with be in good health. The condition of the estuary health can be threatened by sedimentation, habitat loss, disease, nutrients and toxins.

Considerable research has been carried out into the natural values of the Inlet. A number of research reports can be viewed on the Tasman District Council website.

Historic Places Act (1993)

The NZ Historic Places Trust administers the Historic Places Act (HPA). The HPA contains a consent (authority) process for any work affecting archaeological sites, where an archaeological site is defined as:

Any place in New Zealand that

(a) Either –

(I) was associated with human activity that occurred before 1900; or

(ii) is the site of the wreck of any vessel where that wreck occurred before 1900; and

(b) Is or may be able through investigation by archaeological methods to provide evidence

relating to the history of New Zealand (HPA section 2).

Every person commits an offence under the Act who, knowing or having reasonable cause to suspect that a site is an archaeological site, destroys, damages, or modifies it, or causes it to be destroyed, damaged, or modified, without the prior authority of the Historic Places Trust.

Any person who intends carrying out work that may damage, modify or destroy an archaeological site, or to investigate a site using invasive archaeological techniques, must first obtain an authority from the Historic Places Trust. The process applies to sites on land of all tenure including public, private and designated land. The HPA contains penalties for unauthorised site damage or destruction.

The archaeological authority process applies to all sites that fit the HPA definition, regardless of whether:

- The site is recorded in the NZ Archaeological Association Site Recording Scheme or registered by the Trust,
- The site only becomes known about as a result of ground disturbance, and/ or
- The activity is permitted under a district or regional plan, or a resource or building consent has been granted.

The NZ Historic Places Trust also maintains a Register of Historic Places, Historic Areas, Wahi Tapu and Wahi Tapu Areas. The Register can include archaeological sites. The purpose of the Register is to inform members of the public about such places and to assist with their protection under the Resource Management Act (1991).

The register of the NZ Archaeological Association records nine archaeological sites located around the shores of Bell Island. In addition, all as-yet undiscovered sites are covered by the Trust's Accidental Discovery Protocol.

Resource Management Act 1991 (RMA)

The purpose of this Act is to promote the sustainable management of natural and physical resources.

In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while —

(a) Sustaining the potential of natural and physical resources(excluding minerals) to meet the reasonably foreseeable needs of future generations; and

(b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and

(c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment.

The Act establishes the legal framework for national policy statements, including the New Zealand Coastal Policy Statement 2010, as well as regional and local resource management documents (notably Regional Policy Statements and Resource Management Plans).

New Zealand Coastal Policy Statement 2010 (NZCPS)

New Zealand Coastal Policy Statement contains policies which regional and local authorities are required to apply in their resource management planning, in order to achieve the purpose of the Resource Management Act in relation to the coastal environment.

It contains seven objectives and 29 policies. Most have direct relevance to Bell Island, which forms an integral part of the coastal environment of Waimea Inlet.

Objective 1 aims to safeguard the integrity, form, functioning and resilience of the coastal environment and sustain its ecosystems, including marine and intertidal areas, estuaries, dunes and land.

Subsequent objectives include:

- preserving the natural character of the coastal environment,
- providing for tangata whenua involvement in its management,
- enhancing recreation opportunities,
- ensuring that coastal hazard risks taking account of climate change,
- not precluding use and development in appropriate places and forms, and within appropriate limits, provided natural and physical resources and historic heritage,are

not lost or damaged, and

- recognising and providing for New Zealand's international obligations.

MfE Coastal Hazards and Climate Change Guidance Manual 2008

In 2008 the Ministry for the Environment published a manual to guide local authorities in preparing for the effects of Climate Change on New Zealand's coastline.

It explains that, given the level of existing coastal development in coastal margins around New Zealand, the use of planned or managed retreat will need to become a fundamental and commonly applied risk-reduction measure within the next few decades. The alternative would be a considerable increase in the scale of hard coastal protection works that are installed. This may be an appropriate long-term strategy in certain (exceptional) circumstances, but such an approach does not fit comfortably with the values and principles of sustainably managing coastal margins: it would impact significantly on beaches, and on natural character, amenity and public access values.

The manual promotes the precautionary principle by guiding local authorities to proactively enhance our capacity to adapt to the future effects of climate change through minimising, adjusting to, or taking advantage of, the consequences of climate change. This can be achieved by:

- understanding existing risks and vulnerabilities to coastal hazards and climate change and their critical thresholds,
- identifying the most adverse coastal hazards and compounding climate change risks and focusing on actions to manage the most vulnerable areas,
- seeking opportunities to incorporate adaptation into all new and existing developments within the coastal margin,
- incorporating flexibility (ie, adaptive management) to deal with changing risks and uncertainties,
- recognising the value of a sequential and risk-based approach using no-regrets, low-regrets and win–win adaptation options to managing climate change risks,

- avoiding actions that will make it more difficult to cope with coastal hazard and climate risks in the future, and
- reviewing the effectiveness of adaptation measures and planning processes through continual monitoring and evaluation.

Tasman Regional Policy Statement

Bell Island falls within Tasman District for the purposes of the RMA and those policy statements and resource management plans which it mandates.

The objectives of the Tasman Regional Policy Statement include:

- Maintenance and enhancement of the quality of the Tasman District environment.
- Maintenance of the biological diversity and healthy functioning of land, freshwater, coastal and marine ecosystems
- Avoidance, remedying or mitigation of the adverse effects on the environment and the community from the use, development or protection of resources.
- Efficient use and development of resources.
- Maintenance of economic and social opportunities to use and develop resources in a sustainable manner.
- Protection and enhancement of significant natural, heritage and cultural values of resources.
- Recognition and protection of significant traditional interests of the tangata whenua in relation to land, water, the coast and other taonga Maori.
- Adequate knowledge and understanding of resource and environmental systems and processes, their state of health and any changes to them.

Tasman Resource Management Plan (TRMP)

The bulk of Bell Island is zoned Rural Industrial, with minor parts around the shoreline, being former foreshore which accreted since the legal boundary was mapped, being zoned Open Space.

Land within 200m of the shoreline falls within the Coastal Environment Area.

Section 17.12.2.1(d) of the Rural Industrial Zone Rules lists the land uses permitted for Bell Island:

(i) Sewage treatment plants, oxidation ponds, settlement ponds.

(ii) Land disposal of liquid and solid waste originating from the permitted activities stated in (d)(i). (Subject to other statutory rights and applications.)

(iii) One single unit dwelling for a plant operator"s residence.

(iv) Buildings (excluding dwellings other than specified in (d)(iii)) and structures ancillary to any permitted activity.

(v) Farming, provided that the efficient and effective operation of the oxidation ponds is not threatened.

Telecommunication and radio-communication facilities.

Hence it would appear that plantation forestry is a permitted activity only insofar that it has existing use rights.

Buildings are permitted provided they are not less than 30 metres from the Coastal Marine Area boundary, except that this rule shall only apply to buildings constructed after 25 May 1996. Coastal Environment rules control the extension of existing buildings and restrict the erection of new buildings within 200m of the shoreline.

There are restrictions on parking and loading areas, stockpiles, lighting, cladding, noise, building coverage and height. The requirement for landscaping and amenity planting to screen new operating and storage areas and buildings may apply to parts of the island.

All other activities are discretionary activities.

NIWA Review of Nelson City minimum ground level requirements in relation to coastal inundation and sea-level rise (2009)

This report assesses the possible effects of tidal inundation on low-lying parts of Nelson city. One area analysed is Monaco peninsula. The effects for this peninsula are comparable to those for Bell Island. Table A of the review recommends that future ground levels around all new development be at least 3.63 m above TDC datum for "low consequences" and 4.13 m for "high consequences".

TDC Lidar data indicate that currently the Bell Island settling ponds are surrounded by bunds between 4.5 and 6 m above TDC datum, the treatment plant and buildings are mostly about 6 m above TDC datum, and the grazed and afforested parts of the island are between 2 m and 4.5 m above TDC datum.

Civil Defence Emergency Management Act 2002 (CDEM)

The Civil Defence Emergency Management Act primarily focuses on the sustainable management of hazards and on the safety of people, property and infrastructure in an emergency. The Act recommends an approach based on risk reduction, readiness, response and recovery. Risk reduction is primarily achieved through proactive planning as required by the Local Government Act 2002, the Resource Management Act 1991 and the Building Act 2004.

APPENDIX 3 - FURTHER INFORMATION

i

LANDSCAPE ASSESSMENT

The Court has given guidance as to particular factors that may be evaluated to demonstrate a level of significance. These 7 factors are sometimes referred to as 'the amended Pigeon Bay factors'.

The factors for evaluating a landscape comprise:

a) Natural science factors
b) Aesthetics
c) Legibility (expressiveness)
d) Transient values
e) Shared and recognised values
f) Tangata whenua values
g) Historical associations

The datasets for each of the above can be more simply grouped under 3 headings:

Biophysical factors include the natural science, legibility and transient categories above.
They are generally natural in origin, and range from the geology and landform that shapes
a landscape, to the ecology and land use that evolve within it.

Sensory qualities comprise the aesthetics category above. They are biophysical and other
less tangible phenomena as perceived and experienced by humans, such as the view of a scenic landscape or the distinctive smell of the foreshore. Some transient factors also fall into the category of sensory qualities.

Associative meanings includes the categories of historical association, Tangata whenua values, and 'shared and recognised values'. These are cultural or social associations with particular landscape features, such as a historic settlement site; and patterns of social activity that occur in particular parts of a landscape. This information helps understand the sense of attachment and belonging to a landscape,

negotiated in the recognition of what is outstanding.

In addition, the Environment Court has considered the meaning of 'natural' in relation to an outstanding landscape or feature, and has determined that a landscape need not be pristine to be a 'natural landscape'. The acceptable degree of modification is relative. A small settlement of dwellings may contribute to the 'aesthetic' of a landscape depending on the topography and surrounding vegetation. Exotic planting is also a form of modification. The recent NZ Coastal Policy Statement 2010 (Policy 13) lists a number of matters that also contribute to 'natural character'. The degree of naturalness is another criterion we are considering in our evaluation methodology.

Furthermore, a landscape does not end at the high water line, but may include parts of the Coastal Marine Area.

ii

MANAGING OXIDATION PONDS FOR WILDLIFE

The blueprint for managing oxidation ponds for wildlife was established fifty years ago at Christchurch's Bromley wastewater treatment plant. That plant and the surrounding farmland are together designated as the Te Huingi Manu Wildlife Refuge. Almost everything is already in place for this to be replicated at Bell Island.

The 240 ha Bromley Oxidation Ponds comprise the Te Huingi Manu Wildlife Refuge. It is not a reserve, and the wildlife management is secondary to the efficient operation of the treatment plant.

The site is located adjacent to the western shoreline of the Avon-Heathcote Estuary/Ihutai. The main function of the oxidation ponds is to treat the wastewater generated by a city of 350,000 people. However, an important secondary function is to provide breeding, feeding and roosting opportunities for wetland birds.

Currently some 5,000 New Zealand scaup (Aythya novaeseelandiae) comprising 15–20 per

cent of the world population), 7,000 Australasian shoveler (Anas rhynchotis), 4,000 grey teal (Anas gracilis), 2,500 paradise shelduck (Tadorna variegata), 2,500 Canada goose (Branta canadensis) and 1,000 black swan (Cygnus atratus) moult or winter on the ponds, establishing the site as one of New Zealand's most important sites for waterfowl.

Three of the six ponds have well vegetated islands, which provide nesting habitat for eight species of waterfowl and three species of cormorant.

A predator control programme (in place for seven years), and an abundant source of food in the form of aquatic invertebrates, combine to produce high rates of breeding success. 150-200 pairs of the endemic New Zealand scaup breed annually on the ponds, producing more than 1000 fledglings. Scaup have spread to re-colonise waterways throughout Christchurch and the Canterbury Plains, leading to an unprecedented population recovery in this once near-threatened species over the last ten years.

Reference:
http://www.rnzih.org.nz/pages/2003_Conference_Proceedings_PDFs/22_Andrew_Crossland.pdf

iii

COAST CARE – WHAT IS IT?

Coastal foredunes backing sandy beaches play an important role in the mitigation of coastal hazards and in the protection of the natural and human use values of beaches. These dunes will become increasingly important with projected climate change.

During periods with low to moderate wave action, sand tends to move onshore and a wide high tide dry beach develops. Dry sand blown landwards is trapped by dune vegetation, which slows wind velocities near the surface causing the sand to be deposited, building up

the dune over time (Figure 2a).

During major storms, waves erode the beach and the frontal dune – with the eroded sediments deposited on offshore bar systems, which help to protect the beach by breaking waves offshore and thereby dissipating excess wave energy (Figure 2b). Erosion continues until either the storm ceases or equilibrium is reached between beach profile shape and the storm waves. Immediately after storm erosion, the beach is lowered and the frontal dune is often characterised by a steep, near vertical eroded dune face.

After a storm gives way to calmer weather, the sand deposited on the offshore bar gradually moves onshore, restoring a high tide beach (Figure 2c). The eroded dune face also generally collapses to a more stable slope.

In extended periods without further dune erosion, the native sand binding grasses on the seaward face of the dune, particularly spinifex (Spinifex sericeus) and pingao Desmoschoenus spiralis, where present) gradually begin to extend down the eroded dune face – renewing the process of sand entrapment and gradually repairing the eroded dune face (Figure 2d). This natural dune repair process is relatively slow and full recovery can take years after a period of severe dune erosion.

Dunes vegetation plays an important role in natural beach and dune dynamics and in beach and dunes values.

In particular, natural dune repair after storms is critically dependent on the presence of appropriate sand trapping vegetation on the seaward face of the dune. In New Zealand, the key native sand binding species on the seaward dune face are spinifex (Figure 3a) and pingao (called pikao in the South Island) (Figure 3b). Good summaries of existing knowledge on these species are provided in Bergin and Herbert (1998) and Bergin (1999). While many exotic species have been used to stabilise dunes such as marram grass (Ammophila arenaria), ice plant (Carpobrotus edulis), and kikuyu grass (Pennisetum clandestinum), experience has shown that these species are not as effective as spinifex and pingao in repairing storm-damaged frontal dunes.

Without a good cover of spinifex and pingao on the seaward dune face, natural dune repair between storms tends to be very limited. This can result in the next storm picking up where the last one left off, giving rise to more serious dune erosion than would have occurred with some more natural dune recovery between the two events.

Wind erosion problems also occur if the cover of sand binding species on the seaward dune face is disrupted and can lead to severe dune damage (e.g. blowouts) and to problems with wind blown sand further inland (Figure 4a). The sand blown inland is often permanently lost from the beach system – so that a sandy beach without a vegetated dune (or with a damaged dune) is a lot like a bucket with a hole!

Coastal dunes provide natural protection from coastal erosion and flooding and this role will become even more important with projected climate change.

For instance, dunes provide a natural buffer that can absorb the impact of erosion, thereby protecting areas further landward. The wider and higher the dunes between development and the sea, the greater the level of natural erosion protection provided. Dunes do not "stop" wave erosion; rather, an adequate dune buffer enables communities to live with natural shoreline movements – the dune erodes during erosional phases (Figure 2b) and repairs/builds during accretionary periods (Figure 2d).

Extracted from 'Community-based Dune Management for the Mitigation of Coastal Hazards and Climate Change Effects: A Guide for Local Authorities' April 2005