



Moturoa/Rabbit Island Biosolids Reconsenting

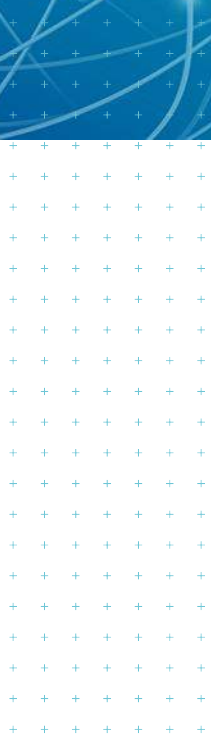
Assessment of Effects on the Environment

Prepared for
Nelson Regional Sewerage Business Unit

Prepared by
Tonkin & Taylor Ltd

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Executive summary

The applicant

The Nelson Regional Sewerage Business Unit (NRSBU) has applied biosolids to the commercial forestry area on Moturoa/Rabbit Island under existing resource consents¹, obtained under the Resource Management Act 1991 (RMA), for the past 24 years. NRSBU is managed by a joint committee comprising representatives of the Tasman District and Nelson City Councils, an Independent member, a committee member representing the three major industrial customers, and an iwi representative. The NRSBU oversees the operation of the Nelson Regional Sewerage Scheme (NRSS), which is collectively owned by the two Councils.

What are biosolids?

Biosolids are a product of the wastewater treatment process at the Bell Island Wastewater Treatment Plant. The sludge produced from this process is treated to effectively eliminate disease causing pathogens and volatile organic matter to the extent that the resultant biosolids are suitable for application to land and pose a very low risk to human health. Biosolids provide beneficial nutrients (they act as a substitute for fertiliser) to the existing forestry operation and improve the condition, structure and water quality retention of the nutrient poor soils at Moturoa/Rabbit Island.

Research trials have shown that the application of biosolids increases tree growth rate by approximately 30% which in turn enhances the economic return from the forestry. Beneficial reuse of resources is a key project objective which stems from the NRSBU's mission statement², which is *"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"*.

Resource consents sought

The existing discharge permit held by the NRSBU for the application of biosolids to land expires on 8 November 2020. NRSBU proposes to continue the activity beyond this date and therefore seeks a new discharge permit. NRSBU also seeks to ensure all other activities associated with the biosolids application hold the appropriate resource consents under the current planning framework.

The full suite of resource consents sought from Tasman District Council in relation to activities on Moturoa/Rabbit Island are:

- A discharge permit for the application of biosolids to land,
- A discharge permit for the discharge of odour to air as a result of the application of biosolids to land and the operation of the Biosolids Application Facility (BAF),
- A land use consent to operate and maintain the BAF and all other land use activities associated with the application of biosolids to land, and
- A discharge permit for stormwater and washdown at the BAF.

NRSBU seeks flexibility in any resource consents granted to provide for opportunities for innovation and improvements to be made to operations while maintaining or enhancing environmental bottom lines.

¹ Discharge permit NN940379V3, Land use consent RM940534 and Coastal permit RM050862.

² Nelson Regional Sewerage Business Unit Strategic Plan, 2013-2016.

Specialist assessments and environmental effects

Comprehensive monitoring of the biosolids discharge over the last 24 years has produced a robust database of information and resulted in the environmental effects of the activity being well understood. This data and knowledge has been considered in a number of detailed specialist assessments prepared by independent experts in support of the current applications, including assessment of the environmental effects of the biosolids operation on forestry and soils, groundwater, the coastal marine area, and public health.

The assessments conclude that continued biosolids application will have a less than minor adverse effect on both the natural and recreational values of Moturoa/Rabbit Island and surrounding Waimea Inlet. This is subject to the continued implementation of a detailed suite of resource consent conditions, including (but not limited to):

- The use of exclusion zones and buffer areas (where no biosolids can be applied),
- Ongoing monitoring of potential effects on soil, groundwater, and the coastal marine area,
- Adherence to a biosolids management plan which prescribes operational detail and odour management, and
- A six-yearly monitoring and technology review to assess whether application of biosolids continues to represent the best practicable option (BPO).

Alternatives assessments

Comprehensive assessments of alternative wastewater treatment process options, disposal methods, and disposal locations have also been undertaken to inform these applications. These assessments have confirmed continuation of the authorised activity is the BPO. This is on the basis that the application of biosolids to land at Moturoa/Rabbit Island produces minimal environmental effects, has relatively low energy inputs, relatively low cost, and is a 100% beneficial reuse of nutrients. Under the RMA the BPO represents the best available method for minimising potential harm to the environment, taking into account the type of discharge, the sensitivity of the environment, the cost compared with other options, and the available technology and the likelihood of success.

Consultation

NRSBU recognises the special significance of Moturoa/Rabbit Island to Te Tai Ihu iwi. Prior to lodging this application NRSBU has engaged with iwi via emails, information letters and an online hui. NRSBU has used the consultation feedback to inform these applications; for example, an annual hui with iwi is proposed as a condition of consent. NRSBU is committed to ongoing consultation beyond lodgement and throughout the terms of any granted consents.

Consultation has also been undertaken with a number of key organisations and groups including the District Health Board, environmental interest groups including the Department of Conservation and the Waimea Inlet Forum, a number of recreational users of Moturoa/Rabbit Island and the neighbouring Best Island and Mapua communities. This feedback has also been incorporated into the proposal and AEE.

Resource consent duration sought

NRSBU seeks a 35-year duration on all resource consents relating to the application of biosolids. This term reflects the positive reuse of resources, limited adverse effects on the environment observed under the existing consents and predicted into the future, and provides certainty and financial security to NRSBU. As noted above, a robust set of monitoring and review conditions are volunteered by NRSBU to manage any new information or environmental effects (including cumulative effects) which come to light during the term of consents.

A five-year term is sought on the discharge permit for washdown water and stormwater at the BAF. This provides sufficient time for NRSBU to implement measures to capture and direct those discharges to holding tanks at the BAF.

Schedule 4 Requirements

Schedule 4 of the Resource Management Act 1991 sets out the information required in an application for a resource consent. All relevant matters required to be included have been addressed in the assessments and descriptions in this Assessment of Effects on the Environment. The following table sets out a summary of the information required by Schedule 4 and provides a brief reference to where each item is addressed in this report.

Schedule 4 Item	Location within report
A description of the activity.	Sections 3 and 4
A description of the site at which the activity is to occur.	Section 6
The full name and address of each owner or occupier of the site.	Application forms in Appendix A
A description of any other activities that are part of the proposal to which the application relates.	Sections 3, 4 and 7
A description of any other resource consents required for the proposal to which the application relates.	Section 7
An assessment of the activity against the matters set out in Part 2.	Section 9.3
An assessment of the activity against any relevant provisions of a document referred to in section 104(1)(b). This must include: <ul style="list-style-type: none"> Any relevant objectives, policies, or rules in a document. Any relevant requirements, conditions, or permissions in any rules in a document. Any other relevant requirements in a document (for example, in a national environmental standard or other regulations). 	Section 9
An assessment of the activity’s effects on the environment that includes the following information: <ul style="list-style-type: none"> If it is likely that the activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity. An assessment of the actual or potential effect on the environment of the activity. If the activity includes the use of hazardous installations, an assessment of any risks to the environment that are likely to arise from such use. If the activity includes the discharge of any contaminant, a description of— <ul style="list-style-type: none"> The nature of the discharge and the sensitivity of the receiving environment to adverse effects; and Any possible alternative methods of discharge, including discharge into any other receiving environment. A description of the mitigation measures (including safeguards and contingency plans where relevant) to be undertaken to help prevent or reduce the actual or potential effect. Identification of the persons affected by the activity, any consultation undertaken, and any response to the views of any person consulted. 	<p>Although adverse effects are not considered significant, alternatives are assessed in Section 5.</p> <p>Section 8</p> <p>n/a</p> <p>Section 5</p> <p>Section 11</p> <p>Section 10</p>

Schedule 4 Item	Location within report
<ul style="list-style-type: none"> • If the scale and significance of the activity's effects are such that monitoring is required, a description of how and by whom the effects will be monitored if the activity is approved. • If the activity will, or is likely to, have adverse effects that are more than minor on the exercise of a protected customary right, a description of possible alternative locations or methods for the exercise of the activity (unless written approval for the activity is given by the protected customary rights group). 	<p style="text-align: center;">Section 11</p> <p style="text-align: center;">n/a</p>
<p>An assessment of the activity's effects on the environment that addresses the following matters:</p> <ul style="list-style-type: none"> • Any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects. • Any physical effect on the locality, including any landscape and visual effects. • Any effect on ecosystems, including effects on plants or animals and any physical disturbance of habitats in the vicinity. • Any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural value, or other special value, for present or future generations. • Any discharge of contaminants into the environment, including any unreasonable emission of noise, and options for the treatment and disposal of contaminants. • Any risk to the neighbourhood, the wider community, or the environment through natural hazards or hazardous installations. 	<p style="text-align: center;">Section 8</p>
<p>If any permitted activity is part of the proposal to which the application relates, a description of the permitted activity that demonstrates that it complies with the requirements, conditions, and permissions for the permitted activity (so that a resource consent is not required for that activity under section 87A(1)).</p>	<p style="text-align: center;">Section 7</p>
<p>If the application is affected by section 124 or 165ZH(1)(c) (which relate to existing resource consents), an assessment of the value of the investment of the existing consent holder (for the purposes of section 104(2A)).</p>	<p style="text-align: center;">Sections 5 and 8.2</p>

Glossary and abbreviations used in this report

AEE	Assessment of Effects on the Environment
ANZECC	Australian and New Zealand Environmental and Conservation Council
ATAD	Autothermal thermophilic aerobic digested
BAF	Biosolids Application Facility, being the biosolids storage tanks and compound area on Moturoa/Rabbit Island
Biosolids	The term used to refer to appropriately treated sludge that can be beneficially used on land
BPO	Best Practicable Option
CIA	Cultural Impact Assessment
DAF	Dissolved air flotation system
EIANZ	Environment Institute of Australia and New Zealand
Ha	Hectare as a measure of area
m³	Cubic metres as a measure of volume
MfE	Ministry for the Environment
MoH	Ministry of Health
N	Nitrogen
NCC	Nelson City Council
NES	National Environmental Standard
NES Soil	National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health
NESAQ	National Environment Standards for Air Quality
NIWA	National Institute of Water and Atmospheric Research
NPS	National Policy Statement
NRSBU	Nelson Regional Sewerage Business Unit, the applicant for resource consents
NRSS	Nelson Regional Sewerage Scheme
NZ Biosolids Guidelines 2003	Guidelines for the safe application of biosolids to land in New Zealand, published by the New Zealand Water and Waste Association in 2003
NZCPS	New Zealand Coastal Policy Statement 2010
P	Phosphorous
pH	Measure of acid or base nature of liquid
RMA	Resource Management Act 1991

RMP	Moturoa/Rabbit Island Reserve Management Plan (September 2016), published by Tasman District Council
TDC	Tasman District Council
TRMP	Tasman Resource Management Plan
TRPS	Tasman Regional Policy Statement
Wastewater	The mix of domestic sewage, trade waste and industrial wastewater
WWTP	Bell Island Wastewater Treatment Plant

1 Introduction

1.1 Purpose of this report

This Assessment of Effects on the Environment (AEE) report has been prepared on behalf of Nelson Regional Sewerage Business Unit (NRSBU, the applicant). The AEE supports resource consent applications to Tasman District Council (TDC) to authorise the continued application of biosolids to land at Moturoa/Rabbit Island and has been prepared in fulfilment of Section 88 and Schedule 4 of the Resource Management Act 1991 (RMA).

Application forms for the resource consents sought are included in **Appendix A** of this report.

1.2 Background to the existing activity

NRSBU is responsible for managing and operating the Bell Island Wastewater Treatment Plant (WWTP), which is jointly owned by the Nelson City Council (NCC) and TDC. The WWTP is a key strategic asset for both councils and receives domestic, commercial, and industrial wastewater from Tahunanui, Stoke, Richmond, Wakefield, Brightwater, and Mapua.

The WWTP has been operating since 1984 and has been subject to several major upgrades over the years. Resource consents for the continued operation of the WWTP were recently granted by TDC in February 2020.

Wastewater entering the WWTP undergoes various treatment processes and treated wastewater is discharged to the Waimea Inlet. Sludge, a product from the WWTP processes, is stabilised in an Autothermal Thermophilic Aerobic Digestion (ATAD) system to produce biosolids, i.e. the sludge is heated to high temperatures for a prolonged period. The treatment process significantly reduces volatile organic matter and eliminates pathogens to the extent that they are not considered to pose a risk to human health. The resulting biosolids meet Grade Ab standards under the *Guidelines for the Safe Application of Biosolids to Land in New Zealand 2003* (NZ Biosolids Guidelines 2003), produced by the New Zealand Water and Waste Association³. Further details on biosolids and the treatment process are contained in Section 3 of this report.

The biosolids, which are diluted in water at a ratio of approximately 1:24 (or put another way, approximately 4% biosolids to 96% water) are pumped from the WWTP via an underground pipeline to holding tanks at the Biosolids Application Facility (BAF) on Moturoa/Rabbit Island. From the BAF, the biosolids are applied to land onto plantation forestry on Moturoa/Rabbit Island via tankers and travelling irrigators. The application of biosolids provides beneficial nutrients to the existing forestry operation, which is managed by PF Olsen on behalf of TDC as landowner. Research trials have shown that biosolids increase the tree growth rate by approximately 30%. Accordingly this enhances the economic return of the forest, which is ultimately a benefit to TDC's ratepayers.

NRSBU, through its contractors, has applied biosolids at Moturoa/Rabbit Island for the past 24 years. The application of biosolids is consistent with the Moturoa/Rabbit Island Reserve Management Plan (September 2016) (RMP) and remains an integral component of the Bell Island wastewater treatment and disposal system and the wider NRSS. The biosolids operation serves to provide an end use solution that fits with NRSBU's strategic objectives of reusing materials for beneficial outcomes.

Table 1.1 (overleaf) summarises the current resource consents held by NRSBU from TDC for the activity. Copies of the resource consents are included as **Appendix B** of this report.

³ Now known as Water New Zealand.

Table 1.1: Existing resource consents held by NRSBU

Activity	Resource consent type	Reference	Granted	Expires
Application of biosolids to land at Moturoa/Rabbit Island	Discharge permit	NN940379V3	17 October 1995	8 November 2020
Operation and maintenance of the Biosolids Application Facility and all other land use activities associated with the application of biosolids to land at Moturoa/Rabbit Island	Land use consent	RM940534	17 October 1995	n/a (unlimited duration)
Occupy the coastal marine area with an underground pipeline from Bell Island WWTP to the BAF.	Coastal permit	RM050862	14 October 2005	14 October 2040

1.3 Reasons for current applications

The current applications are driven by the impending expiry of resource consent NN940379V3 on 8 November 2020. NRSBU proposes to continue the biosolids operation beyond this date and therefore seeks a new discharge permit to authorise its ongoing activities.

NRSBU also seeks to ensure that all other activities associated with the biosolids application hold the appropriate resource consents under the current planning framework and that these reflect current operations. The existing coastal permit for the pipeline, which transfers the biosolids from the WWTP to the BAF, does not expire until 2040 so renewal is not sought within the current suite of applications.

1.4 Resource consents sought

Table 1.2 overleaf summarises the resource consents sought, along with the relevant rules and activity status prescribed by the Tasman Resource Management Plan (TRMP). Further details on the resource consent requirements are contained in Section 7 of this report.

Key information relating to the application area and exclusion zones is illustrated on the plan in **Appendix C**.

Table 1.2: Resource consents sought by NRSBU

Activity	Resource consent type	Duration sought	TRMP relevant rule	TRMP activity status
Application of biosolids to land at Moturoa/Rabbit Island	Discharge permit	35 years	Rule 36.1.5.2	Discretionary
Discharge of odour to air as a result of applying biosolids to land and the operation of the BAF at Moturoa/Rabbit Island	Discharge permit	35 years	Rule 36.3.5.3	Discretionary
Operation and maintenance of the Biosolids Application Facility and all other land use activities associated with the application of biosolids to land at Moturoa/Rabbit Island	Land use consent	35 years	Rule 17.6.3.5 & Rule 17.11.2.2	Discretionary
Discharge of washdown water and stormwater at the BAF to land at Moturoa/Rabbit Island	Discharge permit	5 years	Rule 36.1.5.2 & Rule 36.4.2.3	Discretionary

1.5 Consent duration sought

As noted in Table 1.2, under Section 123 of the RMA a duration of 35 years is sought for the three principal consents. NRSBU acknowledges reservations from iwi and community feedback received in relation to consent term, however NRSBU considers this duration is appropriate for the following reasons:

- Evidence from the past 24 years of operation has demonstrated that the activity is sustainable and can effectively co-exist with other users of Moturoa/Rabbit Island, including a limited odour complaints history,
- The updated specialist assessments undertaken in support of the current applications have concluded that the adverse effects of the activities on the environment, subject to conditions, are less than minor,
- The WWTP has operational flexibility to manage future biosolids loads by varying the split of wastewater to the ponds and the activated sludge plant, and via NRSBU’s trade waste agreements with industrial contributors,
- A robust set of monitoring and review conditions are proposed by NRSBU to manage any new information, including any subsequent version of the Biosolids Guidelines, or environmental effects (including cumulative effects) which come to light during the term of consent,
- Biosolids application to land has a low environmental impact when compared to alternatives and is the preferred option ahead of disposal to landfill or discharge to the coastal marine environment,
- A long duration provides certainty and financial security to NRSBU, utilises existing infrastructure, and importantly, continues to provide for the long-term beneficial reuse of materials which has a positive effect on the region, and
- Biosolids application provides nutrient and financial benefits to the forestry operation which return positive economic benefits to TDC as landowner and local ratepayers.

A term of five years has been sought for the discharge of washdown and stormwater at the BAF. Plans are in place to collect 100% of stormwater and washdown water generated at the BAF, and to reuse that water in the biosolids operations by using it to flush out the holding tanks rather than the current practice of using potable supply. At that point, the discharge is likely to either be a permitted activity, or it will fall within the scope of the biosolids application discharge permit. A five-year term provides sufficient time to implement this solution.

1.6 Exercise of existing resource consents while applying for new consents

These applications have been lodged at least three months before the expiry of NN940379V3. This means the NRSBU may, in accordance with section 124 of the RMA, continue to operate under NN940379V3 until a new consent is granted or declined, and all appeals are determined. Such applications must normally be lodged at least six months before expiry, but TDC has exercised its discretion under section 124(2)(e) of the RMA to allow this application to be lodged no later than three months prior to expiry⁴.

1.7 Supporting information

NRSBU has commissioned comprehensive specialist reports to support the current applications and this AEE. These are appended as identified below, along with other information in support of the applications. The appendices are referred to regularly throughout this AEE. For ease of reference the previously mentioned Appendices A, B and C are also included in this list.

- Appendix A: Resource Consents Application Form
- Appendix B: Existing Resource Consents
- Appendix C: Plan of biosolids application area and exclusion zones
- Appendix D: Biosolids process alternatives
- Appendix E: Biosolids application alternatives
- Appendix F: Biosolids Management Plan
- Appendix G: Effects on forestry and soils
- Appendix H: Effects on groundwater
- Appendix I: Effects on the coastal environment
- Appendix J: Effects on birds
- Appendix K: Effects on lizards
- Appendix L: Effects on air quality
- Appendix M: Effects on public health
- Appendix N: Objectives and Policies Assessment
- Appendix O: Consultation Material
- Appendix P: Consultation Feedback
- Appendix Q: Draft Volunteered Consent Conditions

⁴ Email from Phil Doole (Resource Consents Manager, TDC) to Katherine Forward (Legal Counsel, NRSBU), dated 15 April 2020.

2 NRSBU Objectives and Project Objectives

2.1 NRSBU Strategic Goals

The NRSBU's Strategic Plan contains the following strategic goals and details key performance measures for achieving these:

- Wastewater reticulation, treatment and disposal services meet customers' long-term needs,
- The costs of wastewater reticulation, treatment and disposal services are minimised,
- Risks associated with the services provided are identified and mitigated to a level agreed with customers and owners,
- The right people with the right skills and experience are engaged,
- NRSBU operates sustainably and endeavours to remedy or mitigate any identified adverse environmental, social and cultural impact,
- Good relationships are maintained with all stakeholders, and
- All statutory obligations are met.

All strategic goals are important and no one goal will be pursued at the expense of another.

2.2 Project Objectives

In addition to the NRSBU's mission statement, statutory obligations, and the relevant RMA planning framework, there are a number of other drivers that have influenced the current applications to renew the biosolids application activity, in particular NRSBU strives to:

- Provide a solution that continues the philosophy of beneficial re-use of biosolids and resource recovery,
- Provide a solution that is the Best Practicable Option (BPO) for the treatment and re-use of biosolids generated at the WWTP,
- Work with tangata whenua, the community, and key stakeholders, to ensure a biosolids treatment and reuse solution that:
 - Provides for current and future community well-being, health and safety,
 - Ensures acceptable environmental effects and minimises cultural effects,
 - Provides for planned future population and industrial/commercial growth, and
 - Achieves efficient use of existing infrastructure.
- Obtain long-term consents that provide certainty and security for the ongoing beneficial reuse of resources and continued investment in the WWTP infrastructure.

3 Description of biosolids and the treatment process

3.1 Overview

The biosolids applied to land on Moturoa/Rabbit Island are a product of the wastewater treatment process at the WWTP. Sewage sludge is converted to biosolids at the WWTP through a treatment process which effectively eliminates disease causing pathogens and volatile organic matter. This produces a stabilised product which meets Grade Ab standards under the NZ Biosolids Guidelines 2003, poses a very low risk to human health, and is suitable for beneficial use and application to land.

This section provides an overview of the treatment process and the resulting biosolids product. Information has been sourced from the detailed assessment report in **Appendix D**, entitled “*Moturoa/Rabbit Island Consent Application - Biosolids Process Alternatives Assessment*”. The appended report should be referred to for detailed information, assessment methodology, and related assumptions.

3.2 WWTP treatment process

Figure 3.1 below illustrates the treatment process at Bell Island, which ultimately leads to the production of biosolids.

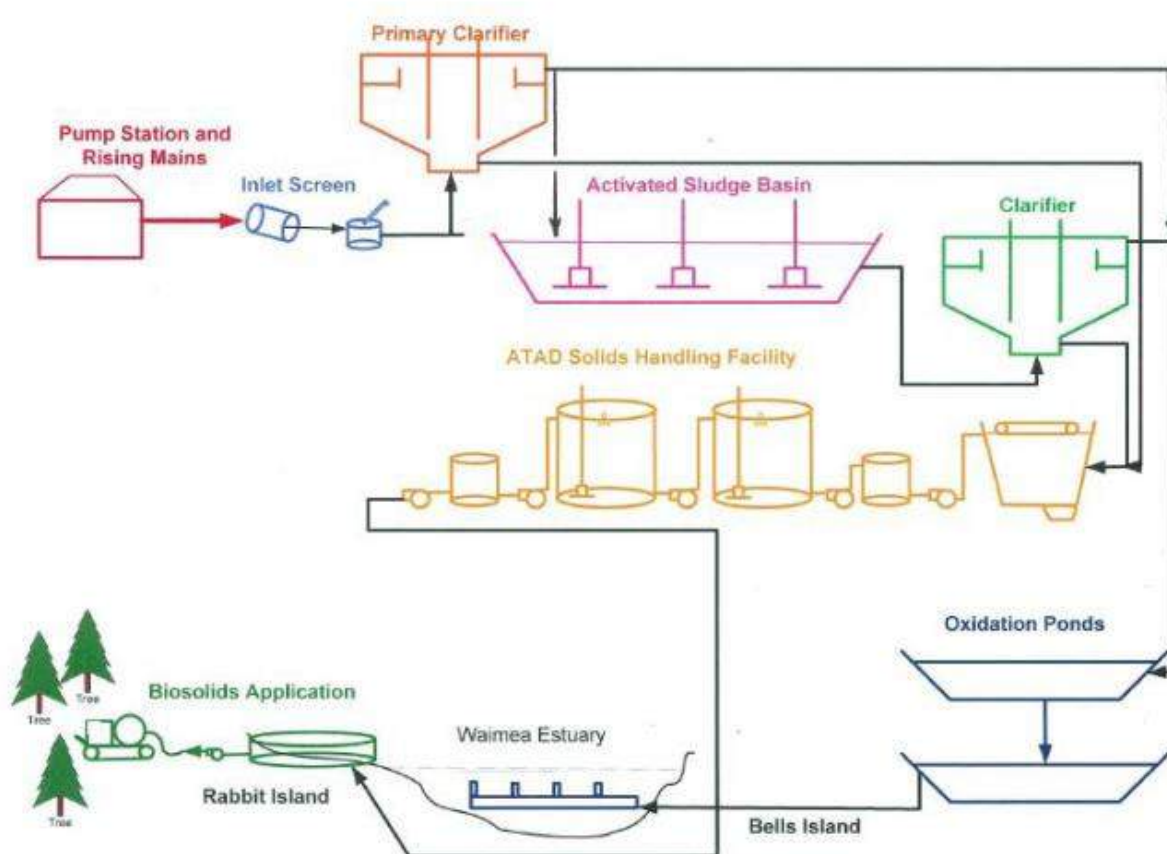


Figure 3.1: Bell Island WWTP treatment process.

The treatment process is summarised as follows:

- 1 Wastewater from domestic, commercial, and industrial premises in Nelson City (Tahunanui, Stoke) and Tasman District (Richmond, Wakefield, Brightwater, and Mapua) is directed to the WWTP through a series of pump stations and pipelines,
- 2 Wastewater entering the WWTP firstly passes through an inlet screen and a grit chamber, in which large solids and grit are removed and then disposed of offsite to an authorised landfill. Flows then pass through a primary clarifier (settlement tank),
- 3 The flow is then split into two liquid streams:
 - a The first approx. 300 l/s travels through an activated sludge basin and secondary clarifier to a series oxidation ponds. Treated wastewater is discharged to the Waimea Estuary, and
 - b Flows above this, are directed through a series of oxidation ponds prior to the discharge of treated wastewater to the Waimea Estuary.
- 4 There are two solid (sludge) streams:
 - a Sludge drawn off from the primary clarifier is discharged directly to the sludge holding tanks, and
 - b Sludge drawn off from the secondary clarifier (Waste Activated Sludge: WAS) passes through a dissolved air flotation system (DAF) and is then blended with the sludge from the primary clarifier in the sludge holding tanks.
- 5 Sludge from the holding tanks is then fed through the Autothermal Thermophilic Aerobic Digestion system (ATAD) process, where the sludge is aerated and mixed; this exothermic process allows aerobic microorganisms to break down organic material into carbon dioxide, water and nitrogen and produces biosolids, and
- 6 The digested biosolids are then pumped to the storage tanks at the BAF on Moturoa/Rabbit Island, via an underground pipeline across Waimea Estuary, for subsequent application by irrigation to forestry blocks.

3.3 Current and future biosolids volumes

Data from the WWTP illustrates that the volume of biosolids has steadily increased over recent years; from 1,602 kilograms per day (kg/day) in 2012, to 2,613 kg/day in 2020. Both these measurements are reflective of 'dry solid' biosolids. The volume of biosolids varies year to year as biosolids loads are not directly related to the influent loads at the WWTP.

Future biosolids volumes have been estimated for 2053 using the growth projections contained in the recent AEE for the WWTP⁵. Based on the operation of the plant in the year to 30 June 2020, it is estimated that by 2053, biosolids production will increase to approximately 3,020 kg/d (dry solids basis). This represents an approximate 16% increase from the 2020 production.

The WWTP has operational flexibility to manage future biosolids loads. It is the nutrient content, particularly nitrogen load, of the biosolids that is the limiting factor, rather than volume of biosolids produced. The WWTP can be managed to favour more or less nutrients in the biosolids in order to maintain the applied nitrogen loads within the consented limits.

⁵ Stantec, (2017) *Bell Island Wastewater Treatment Plant Resource Consent Application and Assessment of Environmental Effects*. Prepared for NRSBU.

3.4 Biosolids constituents

The biosolids applied at Moturoa/Rabbit Island are a mix of water and organic materials and have the appearance of a dark brown liquid. By volume, the biosolids comprise no more than approximately 4% solid materials with the remainder being water.

As noted above, the main contributor to the biosolids is principally the wastewater from household kitchens, laundries, and bathrooms. As such, biosolids may contain:

- Macronutrients, such as nitrogen, phosphorus, potassium and sulphur,
- Micronutrients, such as copper, zinc, calcium, magnesium, iron, boron, molybdenum and manganese, and
- Traces of synthetic organic compounds and metals, including arsenic, cadmium, chromium, lead, mercury, and nickel.

Table 3.1 below summarises the chemical and physical properties of biosolids produced from the WWTP. The table includes the contaminant concentrations set out under the NZ Biosolids Guidelines 2003, discussed further in Section 3.5 below.

Table 3.1: Chemical and physical characteristics of biosolids from Bell Island WWTP⁶

Property/ Composition	Bell Island biosolids (mg/kg)	NZ Biosolids Guidelines 2003 Contaminant Grade (mg/kg)	
		a	b
Arsenic	13.5	20	30
Cadmium	3.1	1	10
Chromium	103	600	1500
Copper	533	100	1250
Lead	50	300	300
Mercury	1.1	1	7.5
Nickel	48	60	135
Zinc	1020	300	1500

3.5 Classification under the NZ Biosolids Guidelines 2003

In 2003, the New Zealand Wastewater Association (now Water New Zealand) published “*Guidelines for the safe application of biosolids to land in New Zealand*” (NZ Biosolids Guidelines 2003). These guidelines contain information and recommendations to assist producers, dischargers, and regional councils to manage the discharge of biosolids to land in New Zealand. The stated aims of the guidelines are to:

- Safeguard the life-supporting capacity of soils,
- Promote the responsible use of biosolids,
- Protect public health and the environment,
- Identify the risks associated with biosolids use and promote best practice for minimising such risks,
- Encourage local authorities to adopt a consistent approach to regulating the application of biosolids to land,

⁶ Sourced from Table 6 in the report in Appendix D.

- Create awareness within the community of the benefits and risks of biosolids use, and
- Minimise the risk to the economy.

The NZ Biosolids Guidelines 2003 do not have legal status on their own, but have been developed by experts within the wastewater industry to promote best practice for the application of biosolids to land.

Biosolids pumped to the BAF on Moturoa/Rabbit Island meet Grade Ab standards under NZ Biosolids Guidelines 2003. The “A” means the biosolids consistently meet the required stabilisation levels for pathogen reduction and vector attraction reduction. Potential vectors for disease spreading include birds, rats and flies. The “b” is the contaminant grade and is determined on the concentrations of specific heavy metals and organic compounds (as identified in Table 3.1 above).

The NZ Biosolids Guidelines 2003 suggest that the discharge of Ab biosolids to land be treated as a discretionary activity under regional plans. This allows for the discharge to be considered with regard to the sensitivity of the receiving environment. As discussed further in Section 7 of this report, the proposed discharge of biosolids is a discretionary activity under the Tasman Resource Management Plan.

3.6 NZ Biosolids Guidelines 2017 (Draft)

In 2017 Water New Zealand⁷ released “*Guidelines for Beneficial Use of Organic Materials on Productive Land*” for public consultation. At the time of preparing this AEE, this 2017 update is still watermarked “Draft for Public Comment”. It is understood that further development of the guideline has stalled based on divergent views received in consultation feedback. For this reason only, the NZ Biosolids Guidelines 2003 are referred to throughout this AEE and supporting specialist reports.

Notwithstanding this, under the draft guidelines the biosolids produced at the WWTP would be Grade A and compliant for metals. However, current monitoring for organics does not analyse the same compounds that have limits imposed under the NZ Biosolids Guidelines (Draft 2017) so it cannot definitively be identified as a Type A1 organic material.

⁷ In conjunction with WasteMINZ, the Centre for Integrated Biowaste Research (CIBR) and the New Zealand Land Treatment Collective (NZLTC), and in partnership with the ministries of Environment, Health and Primary Industries.

4 Description of the biosolids application activities

4.1 Overview

As highlighted in Section 1.2, the NRSBU has operated the BAF and applied biosolids to land at Moturoa/Rabbit Island for the past 24 years under an existing suite of resource consents. In broad terms, NRSBU proposes to continue those activities but with amendments and enhancements to reflect:

- Experience and knowledge gained from the past 24 years of operation,
- New knowledge gained from the specialist reports prepared in the course of developing this AEE,
- Current industry best practice,
- Future demands from a growing population, and
- Iwi and stakeholder feedback.

The contractor currently appointed to apply the biosolids on Moturoa/Rabbit Island, on behalf of NRSBU, is NM Waste. It is important to note that some of the details provided in subsequent sections is based on the current operations and methods of NM Waste. However, this does not necessarily reflect the exact nature of operations and methods that might apply throughout the term of the consents sought. For example, the current or future contractor may from time-to-time wish to make amendments to the layout of the BAF or adjust the method of applying biosolids. NRSBU seeks flexibility in any resource consents granted, to provide for opportunities for innovation and improvements to be made to operations while maintaining or enhancing environmental bottom lines.

4.2 Biosolids Application Facility

4.2.1 Existing authorised use

The BAF is currently authorised under existing land use consent RM940534 (refer **Appendix B**), which has an unlimited duration (no expiry date). The majority of activities described below fall within this authorised scope, however, some improvements and amendments to those activities are proposed by NRSBU. For the avoidance of doubt, both existing and proposed activities are discussed.

4.2.2 Buildings and amenities

The BAF is located in a forest clearing on the eastern half of Moturoa/Rabbit Island and receives the biosolids product from the WWTP via an underground pipeline. The BAF's location is shown on the plan in **Appendix C**.

The BAF is not accessible to the general public. All forestry access roads leading to the BAF have lockable gates and signage alerting the public not to enter the area (refer Photograph 4.1 overleaf).



Photograph 4.1: Lockable gate on forestry access road on Moturoa/Rabbit Island (July 2020).

The BAF covers an area of approximately 2,000 m² and currently comprises the following key facilities:

- Four biosolid holding tanks, located above ground, each with a current capacity of 390,000 litres (1.56 million litres combined capacity),
- Two portacom (portable) units, one used as an office and lunchroom, and the other as a toilet block,
- An equipment shed, pump shed and a garage, and
- Hardstand areas for vehicle parking and access.

The BAF is shown in the photographs overleaf.

NRSBU has recently increased the capacity of each of the holding tanks by 50% by raising their height. The new capacity of 1.56 million litres provides increased resilience, and increased flexibility for adverse weather conditions, and also allows for future growth. Further details on the tanks are contained in Section 4.2.4 below.

The site is supplied with reticulated power and potable water from the respective networks. Wastewater and greywater generated on site are stored in a holding tank, which is emptied and disposed of at an off-site approved facility when required.



Photograph 4.2: The Biosolids Application Facility (BAF) on Moturoa/Rabbit Island (July 2020).

Currently, stormwater from approximately 50% of the site drains to a sump which is then pumped into a biosolids holding tank. The remaining 50% soaks to ground. NRSBU proposes to amend the site so that all stormwater from roofs and hardstands, drains to a sump and is then stored in a tank. This water will be reused for cleaning out the biosolids holding tanks (and from there be applied to land with biosolids).

At the current time there are no dedicated washdown areas within the compound. Tankers and equipment are cleaned in the grassed fire-break area adjacent to the facility. NRSBU proposes to amend this by requiring washdown to occur within a hardstand area of the compound where the washdown can be collected and pumped directly to the biosolids holding tanks.

A mobile diesel tank is retained on site for refuelling plant and machinery. Minor volumes of other hazardous substances used for maintenance activities such as engine oil, are stored in buildings on the site. All hazardous substance storage occurs in compliance with the Health and Safety at Work (Hazardous Substances) Regulations 2017.

4.2.3 Staff and hours of operation

Under current operations, a maximum of three staff associated with the biosolids application operation are located on Moturoa/Rabbit Island at any one time. These staff will make use of the BAF at various times of the day, however, for the majority of the time, two staff are typically in the forestry area undertaking the application activity.

The BAF and the biosolids application activity, generally operate from 6 am to 5 pm Monday to Friday. This coincides with public access during daylight hours to Moturoa/Rabbit Island. On occasion, some activity may need to occur outside those hours to accommodate demand, or as a result of unexpected events such as equipment breakdown or prolonged bad weather. During the summer months operations may occur at reduced hours, predominantly in the morning, to avoid applying biosolids that coincide with afternoon sea breezes.

4.2.4 Biosolids holding tanks

As noted above, the four holding tanks have a combined capacity of 1.56 million litres following a recent upgrade. The tanks are contained within a concrete-lined bunded area capable of holding 110% of the volume of one tank. The tanks are currently uncovered, but NRSBU proposes to install covers to mitigate potential odour.

The daily volume of biosolids received from the WWTP varies according to seasonal and sewerage production characteristics, but currently on average is approximately 100,000 litres per day. Daily communication occurs between the WWTP and biosolids application contractor to manage demands and holding capacity. Manually operated valves at the BAF direct the biosolids received from the pipeline (from the WWTP) to the appropriate holding tank. This is proposed to be upgraded to an automated system within the next three years.

Two tanks are always kept empty to provide an emergency buffer. The tanks are used for short-term holding rather than storage, with the maximum biosolids residence time under normal operating conditions being approximately five days.

When the biosolids volume within a tank reach low levels, there is the potential for solids to settle out. Mechanical stirrers within the tanks help limit this, however, at times additional water needs to be added to resuspend the solid residues. This water is supplied from either the potable supply, reused from washdown of plant and machinery, or from stormwater collected on-site. As noted at Section 4.2.2 above stormwater and washdown water is intended to be collected and reused for this purpose, which will reduce the need for using potable supply.

4.2.5 Filling tankers

Material in the biosolids holding tanks is pumped into tankers which then deliver the biosolids to the travelling irrigators for application to land, as described further in Section 4.3 below. Up to three tankers may be in use at any one time.

The material pumped from the WWTP to the holding tanks is tested for Nitrogen concentration so the appropriate application rate can be determined (see further detail in Section 4.3.4 below).

4.3 Biosolids application to land

4.3.1 Flexibility required in application method

The existing resource consents do not prescribe a biosolids application method. Instead, the conditions set in place a comprehensive set of environmental controls, including (among other things) limitations on where the biosolids can be applied (exclusion zones and buffer areas), nutrient loading limits, compliance with a biosolids management plan, and comprehensive monitoring requirements. This provides for some flexibility in the application method while ensuring any adverse effects on the environment are avoided, remedied, or mitigated.

NRSBU considers flexibility in the application method will continue to be critical to provide for ongoing innovation and enhancement. An example of a past innovation, which has led to changes in application method, is the research trials where varying nitrogen application rates were applied and an optimum application rate then selected based on tree uptake and reducing losses to groundwater.

Ongoing monitoring of the environmental effects of the application, and the six-yearly monitoring and technology review proposed under these consents, may also lead to future changes being required. It is important to NRSBU that they do not get “locked in” to a method which may preclude both environmental benefits as well as financial and operational enhancements and efficiencies.

For the purposes of the assessment undertaken below and elsewhere in this AEE, an overview of the current application method is described. It is important to reiterate this is just one of several possible methods of applying biosolids. NRSBU therefore requests that the application method is not prescribed in any consent conditions.

4.3.2 Current application method

Once the tanker has been filled with biosolids at the BAF, it travels to the appropriate application area (see ‘Determining location of application’ in Section 4.3.3 below). At the application area, the tanker connects to a customised heavy-duty travelling irrigator (see Photograph 4.3 overleaf). The connection occurs via a flexible pipeline of approximately 250 m length.

The irrigator drives in between rows of pine trees, spraying biosolids to one or both sides (as required) up to a distance of approximately 20 m in each direction. This is sufficient to apply biosolids to two rows of pine trees (in each direction).



Photograph 4.3: A travelling irrigator.

Currently, at NRSBU's request, NM Waste own and operate two travelling irrigators. These are located at two separate open sites, although typically only one is in use at any given time. One is larger and typically used in the larger forestry blocks. The other is typically used in smaller blocks with more challenging terrain.

The use of two irrigator kits provides the operation with some flexibility to adapt to changing weather patterns to minimise effects (e.g. odour and wind direction) and redundancy in the event of a breakdown or forest fire.

At the conclusion of each day, the irrigators are left out on site. Any required maintenance occurs in-situ. The tanker trucks return to the BAF.

As with the operation of the BAF, application of biosolids is generally limited to 6 am – 5 pm Monday to Friday. There have been a small number of instances where work has had to occur in the weekend (due to weather events or machinery break-downs).

4.3.3 Determining location of application

The area available for biosolids application on Moturoa/Rabbit Island is shown in Figure 4.1 overleaf (an A3 version is contained in **Appendix C**). By way of summary, this is the entirety of Moturoa/Rabbit Island⁸, but excluding:

- Exclusion zones which have been identified as holding important ecological, recreational, archaeological, or cultural value (as shown in blue and green in Figure 4.1), and
- A buffer area from the coastal margin (above mean high water springs) and recreation areas.

The exclusion zones and buffer areas are explained in further detail in Section 4.3.5 below.

⁸ The land area above Mean High Water Springs

At any given time, the location of application is a collective decision of the biosolids application contractor and the forestry manager. The location is determined by taking into account a number of factors, including:

- Current forestry requirements including planting, pruning and harvesting cycles (the forestry manager has a comprehensive system for forestry block management, which is updated on a monthly basis),
- Records of prior application of biosolids,
- Wind direction (to limit potential odour transport to sensitive receptors),
- Recent and predicted rainfall (to ensure biosolids are not applied during wet weather where there is potential for ponding to occur),
- Seasonal recreation usage of Moturoa/Rabbit Island, and
- All legal requirements including conditions of resource consents.

Currently, an electronic app is being developed by NRSBU to assist with automating several of the above inputs and keeping relevant records.

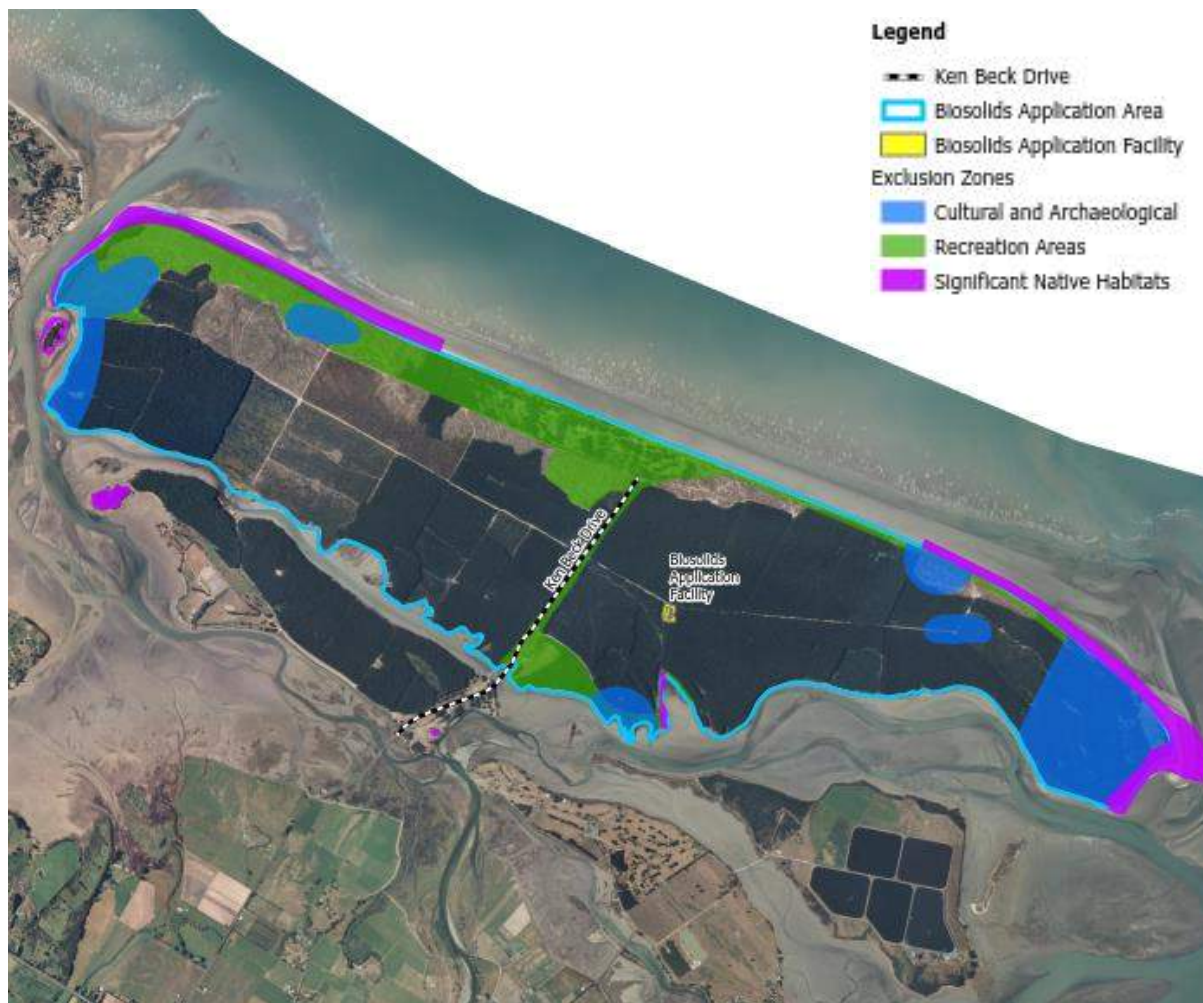


Figure 4.1: Biosolids application area and exclusion zones.

The application method, and the dual irrigator kits, allows for a high degree of flexibility to alter the location depending on changing factors such as the weather, which greatly assists with the management of any potential adverse environmental effects including odour.

A Biosolids Management Plan, (discussed further in Section 4.3.6 below) sets out all procedural matters and the roles and responsibilities of all parties. The plan also prescribes that one month prior to application, signage is installed around the perimeter of the target forestry block at 100 m spacings, warning the general public of the impending activity. These remain in place until one month after the application has occurred. Records of all application locations are kept.

A pre-spray check occurs immediately prior to application. This includes completion of a checklist covering matters such as machinery access, public access, signage, exclusion zones, and any other areas of concern. Post application, further quality control occurs in relation to matters such as any forestry and access damage, ponding issues, and litter.

4.3.4 Determining rate of application

The rate of application of biosolids occurs in accordance with the existing resource consent (NN940379V3), which includes a number of limitations on application rates as well as minimum requirements determined by environmental monitoring. The specialist assessments appended to this report, and discussed further in Section 8, support the retention of these application parameters.

Below is a summary of key matters relating to application rates. Please refer to the proposed conditions in Section 11 of this AEE for further detail.

- Maximum average depth per application of 40 mm,
- Maximum nitrogen loading - biosolids application to any given forestry block shall be limited to the following:
 - During the time period from the last prior-to-harvest biosolid application to 12 years after replanting, biosolids shall be discharged at an average rate of no more than 150 kilograms of nitrogen per hectare per year, calculated using a three year rolling average, and no single discharge shall exceed 450 kilograms nitrogen per hectare per application year,
 - During the time period from 12 years following replanting to the last prior-to-harvest biosolid application, biosolids shall be discharged at an average rate of no more than 100 kilograms of nitrogen per hectare per year, calculated using a three year rolling average, and no single discharge shall exceed 300 kilograms nitrogen per hectare per application year, and
 - No more than one application of biosolids shall occur to any given forestry block during the period following harvest and prior to replanting.
- Rainfall:
 - No application within 24 hours of a 10 mm rainfall event occurring in 24-hour period, and
 - No application in the event of a forecast of rainfall exceeding 50mm in the following 24-hour period.

4.3.5 Exclusion zones and buffer areas

A number of exclusions zones are identified in Figure 4.1 above. Figure 4.1 includes updates to align with Figure 7 in the RMP⁹ and differs from Figure 1 referred to in the existing discharge permit

⁹Moturoa/Rabbit Island Reserve Management Plan, 2016, Figure 7 - consented biosolids application areas (as at 2016).

consent conditions¹⁰. No biosolids will be applied to any of the exclusion zones identified in Figure 4.1 above under any new consent. The exclusion zones are:

- Land regularly used for recreation purposes, including the entire domain area on the northern margin of the island,
- Significant native habitats, and
- Archaeological and cultural sites.

The significant native habitats and archaeological sites were largely determined during the original consent process in the mid 1990's. As identified above, modifications have been made to their extents during production of the RMP. Sites of cultural value are depicted on Figure 4.1 as "buffered" zones rather than clear boundaries which reflects how these areas have been identified in the RMP. Further discussion on these areas is contained in Section 6 of this report.

Revision to the exclusion zones may be required as a result of ongoing engagement with Te Tau Ihu Iwi and/or to confirm that the demarcation on Figure 4.1 provides a practical boundary on the ground and does not present any operational difficulties.

In addition to the exclusion zones, a number of buffer areas apply. As with the exclusion zones, no biosolids are applied in the buffer areas. The key difference is that the exclusion zones remain fixed whereas the location of buffer zones have the potential to change according to the circumstances. The buffer areas proposed are:

- 50 m from Mean High Water Springs, to limit any adverse effects on the coastal marine area and recreation users,
- 15 m from areas where the public has unrestricted access (such areas may change from time-to-time due to forestry operations),
- For areas bordering the Domain (i.e. the Recreation Reserve area located just behind the front beach on Moturoa/Rabbit Island):
 - 30 metres during the months of April to October inclusive, and
 - 100 metres in the months of November to March inclusive.

4.3.6 Biosolids Management Plan

A comprehensive Biosolids Management Plan (BMP) manages the responsibilities and interactions of NRSBU, the biosolids application contractor, the forestry manager, WWTP staff, and TDC as landowner. The BMP covers:

- Roles and responsibilities,
- Procedures relating to application (e.g. pre spray checks),
- Health and safety matters (both contractor staff and the general public),
- Accident and incident management, and
- Monitoring and reporting.

The BMP is periodically updated annually to reflect current circumstances. For example, NRSBU proposes to update the BMP to include a specific chapter on odour management and minimisation, in line with the discussion later in this report. Further updates may also be required to address other matters resulting from this consent renewal process and/or revisions to the existing conditions of consent.

The latest version of the BMP is included in **Appendix F** of this AEE.

¹⁰ Ibid, refer condition 5.1.

5 Description of alternatives

5.1 Overview

Schedule 4 of the RMA requires that an AEE for any activity which includes the discharge of a contaminant must include a description of:

- a The nature of the discharge and the sensitivity of the receiving environment to adverse effects, and
- b Any possible alternative methods of discharge, including discharge into any other receiving environment.

This requirement is consistent with Section 105 of the RMA, which directs the consent authority to have regard to these matters when making a decision on the application.

Section 5.2 addresses the nature of the biosolids produced by the WWTP and potential process alternatives. Section 5.3 covers alternative methods and locations for biosolids disposal. The sensitivity of the receiving environment is discussed in Sections 6 and 8 of this report.

5.2 Biosolids treatment

5.2.1 Long list options

The report in **Appendix D**, entitled "*Moturoa/Rabbit Island Consent Application - Biosolids Process Alternatives Assessment*", firstly evaluates a "long list" of alternatives for a range of treatment process alternatives which could be considered for use at the WWTP to treat sludge and produce biosolids for re-use. This is consistent with NRSBU's strategic goals and project objectives covered in Section 2 of this AEE.

The treatment alternatives were considered on the basis of whether they were technically feasible, technically viable, and consistent with NRSBU objectives. The processes are described in terms of how they function, the advantages and disadvantages, and their relevance to the current consent applications.

The five principal options, each of which have numerous sub-options which can be applied in combination with other sub-options, are:

- Mechanical pre-treatment,
- Thermal pre-treatment,
- Biological stabilisation,
- Thermal and chemical processing, and
- Dewatering.

Please refer to Section 3 of the report in **Appendix D** for further details.

5.2.2 Short list options

Based on the high-level screening of the long list, a “short list” for biosolids treatment was then established:

Application to land as a slurry:

- 1 ATAD (status quo),
- 2 Thermal pre-treatment + anaerobic digestion, and
- 3 Thermal pre-treatment + anaerobic digestion + post-aerobic digestion.

Application to land as a dewatered cake:

- 4 Thermal pre-treatment + anaerobic digestion + dewatering.

Application to land as a dried product:

- 5 Anaerobic digestion + dewatering + drying.

Disposal to landfill:

- 6 Anaerobic digestion + dewatering.

The shortlisted solutions are then evaluated on a qualitative basis against the following criteria:

- Technical risk/viability (operational complexity, operational flexibility, footprint, appropriate for future biosolids loads),
- Local environmental impacts (odour, organic contaminants),
- Greenhouse gas impacts (effectively energy - process and transport), and
- Financial cost.

5.2.3 Evaluation

The evaluation in section 4 of the report in **Appendix D** concludes that the biosolids produced by the existing ATAD process at the WWTP (Option 1 above) is the preferred option. In particular, the ATAD process produces a biosolid product which meets Grade Ab standards under the NZ Biosolids Guidelines 2003, and provides a product which can be beneficially reused via application to land.

The evaluation also concludes there are alternative processes available which could also produce a Grade Ab biosolids. However, for continued application to land as a slurry, they offer no significant net benefits over the existing ATAD solution and would incur a significant investment cost to implement. None of the alternative process options would produce a Grade Aa product as they do not materially affect the metals concentrations.

5.3 Biosolids application and locations

5.3.1 Long list options (potential end uses)

The report in **Appendix E**, entitled “*Moturoa/Rabbit Island Biosolids Application: Alternatives Assessment*”, identifies a range of potential end uses for biosolids, including:

- Composting,
- Vermicomposting,
- Land application as a slurry (**status quo**),
- Land application as a dewatered product,
- Land application as a dried product, and
- Landfill disposal.

The technically feasible end use disposal options are presented in Table 5.1 overleaf.

5.3.2 Evaluation

At section 3 of the report in **Appendix E** the seven short-list options are evaluated on a qualitative basis according to their technical risk/viability, market risk, resilience risk, local environmental impacts, greenhouse gas impacts, community impacts, and financial cost. This is similar criteria to that adopted for the process alternatives assessment in **Appendix D**.

For each criterion, options are ranked according to their risk or impact as high, medium, or low (and respectively colour-coded red, orange and green). Options with a high proportion of green are preferred over those with a higher proportion of orange and red coding. There is no weighting of the criteria.

It is important to note the high/medium/low categorisation in the evaluation is not an assessment of the magnitude of environmental effect under the RMA. Rather, the purpose of the categorisation is to compare and contrast the short-listed options to, on balance, identify the preferred option and the best practicable option.

Table 5.2 provides a summary assessment of the short-list options. Based on this assessment, and the further assessment contained in Table 3.5 in **Appendix E**, the subsequent evaluation confirms Option 1a (the **status quo**, being the application of slurry from the existing ATAD process) as the preferred option. This reflects a secure ‘market’, relatively low energy inputs and relatively low cost. This option requires careful management of odour risk. The evaluation considers community impacts are low and reflects 24 years of experience with land application of biosolids, no significant adverse effects and balanced by the positive view of beneficial use of the nutrients present in the biosolids.

Table 5.1: Biosolid end use viability¹¹

Biosolid product	End use/disposal	Comment	Viable
Grade A slurry	Moturoa /Rabbit Island	Current approach.	✓
	Other forestry/horticulture	There are no suitable alternative locations close to Bell Island, slurry is unlikely to be suitable for horticulture due to stand down period after application. Soil injection could be possible on NRSBU or other farm land with 600 Ha or more required.	✗
Grade A dewatered	Moturoa /Rabbit Island	Requires new application approach and investment in new processing at Bell Island (digestion, pasteurisation, dewatering). Potential for odour issues similar to slurry.	✓
	Other forestry/horticulture	Requires new processing at Bell Island (digestion, pasteurisation, dewatering). There are no suitable alternative locations close to Bell Island, dewatered biosolids are unlikely to be suitable for horticulture due to stand down period after application.	✗
Grade B dewatered	York Valley Landfill	Requires dewatering at Bell Island, transport and disposal charges are likely to be significantly more expensive than the current costs.	✓
Grade A dried	Moturoa /Rabbit Island	Potential to spread dried biosolids with conventional fertiliser spreader and existing tracks. Low odour product. Requires investment in new processes at Bell Island (dewatering and dryer).	✓
	Other forestry/horticulture	Potentially suitable locations (horticulture) but likely to be concerns about sewage derived product. Potentially viable to transport dried product to suitable forestry block. Requires investment in new processes at Bell Island (dewatering and dryer).	✓
	Open market	Contaminant levels likely to preclude general sale. Likely to be concerns about sewage derived product. Requires investment in new processes at Bell Island (dewatering and dryer).	✗
Grade A compost/vermi-compost	Moturoa /Rabbit Island	Requires new application approach, requires investment in new processing at Bell Island (dewatering, enclosed composting or vermi-composting). Requires a source of bulking agent (for example green waste or sawdust). Addition of bulking agent means there will be significantly more material to apply i.e. Moturoa/Rabbit Island may not be large enough.	✗
	Other forestry/horticulture	Requires new application approach, requires investment in new processing at Bell Island (dewatering, enclosed composting or vermi-composting). Requires a source of bulking agent (green waste, sawdust, ...). Potentially suitable locations (horticulture) but may to be concerns about sewage derived product. Potentially viable to transport compost/vermi-compost product to suitable forestry block.	✗
	Open market	Requires new application approach, requires investment in new processing at Bell Island (dewatering, enclosed composting or vermi-composting). Requires a source of bulking agent (green waste, sawdust, ...). Potentially suitable locations (horticulture) but may to be concerns about sewage derived product. Potentially viable to transport compost/vermi-compost product to suitable forestry block.	✗

¹¹ Sourced from Table 2.2 of the report in Appendix E of this AEE.

Table 5.2: Evaluation of end use options for disposal of treated biosolids¹²

	1a ATAD + Slurry (Moturoa) STATUS QUO	1b Thermal + Anaerobic Digestion + Slurry (Moturoa)	1c Thermal + Anaerobic Digestion + Aerobic Slurry (Moturoa)	2 Anaerobic digestion + landfill	3 Thermal + Anaerobic digestion + Dewater (Moturoa)	4 Anaerobic Digestion + Drying (Moturoa)	5 Anaerobic Digestion + Drying (Moturoa)
Technical risk/viability	Low	Medium	Medium	High	Low	low	Medium
Market risk	Low	Low	Low	Medium	Low	Low	Medium
Resilience risk	High	High	High.	Medium	High	Low	Low
Local environmental impacts	Low	Medium	Low	Medium	Low	Medium	Low
Greenhouse gas impacts	Low	Medium	Medium	High	Low	High	High
Community impacts	Medium	Medium	Low.	Medium	Low	Medium	Medium
Cost	Medium	Medium	Medium	High	High	High	High

¹² Sourced from Table 3.4 of the report in Appendix E of this AEE.

6 Environmental setting

6.1 Site location and overview

Moturoa/Rabbit Island is located at the northern extent of the Waimea Inlet, between Mapua and Nelson City. The WWTP is located approximately 1 km to the south of Moturoa/Rabbit Island. Both locations are illustrated in Figure 6.1 below. The total land area of Moturoa/Rabbit Island (i.e. that area above mean high water springs) is approximately 1,105 ha.



Figure 6.1: Location of Moturoa/Rabbit Island (green) and Bell Island WWTP (red).

The nearest residential area to Moturoa/Rabbit Island is the environs of Mapua township, located to the immediate north-west and across a short channel about 200 m in width. A small residential area on Best Island lies to the south-east of the nearest coast of Moturoa/Rabbit Island. The Best Island residential area is about 950 m from the Bell Island WWTP infrastructural facilities (and slightly closer to the facultative ponds) and is approximately 1,800 m from the nearest point of Moturoa/Rabbit Island.

The majority of Moturoa/Rabbit Island is occupied by commercial forestry and has been highly modified by human activity, including the replacement of almost all indigenous vegetation with *pinus radiata* and the changes in landform from ongoing logging activity. Forestry has been the predominant land use on Moturoa/Rabbit Island since the 1920's.

In addition to commercial forestry, the perimeter of the island is used for various recreational purposes including picnicking, walking, swimming, cycling, horse riding and running.

Underground pipelines (potable water and wastewater) owned by TDC cross the island. These provide connections between Mapua, Bell Island and the remainder of the TDC network.

6.2 Land ownership and status

The island is vested in TDC as Local Purpose (Plantation) Reserve and Recreation Reserve under the Reserves Act 1977, as illustrated in Figure 6.2 below. The commercial forestry operation is managed by PF Olsen under a license arrangement with TDC.

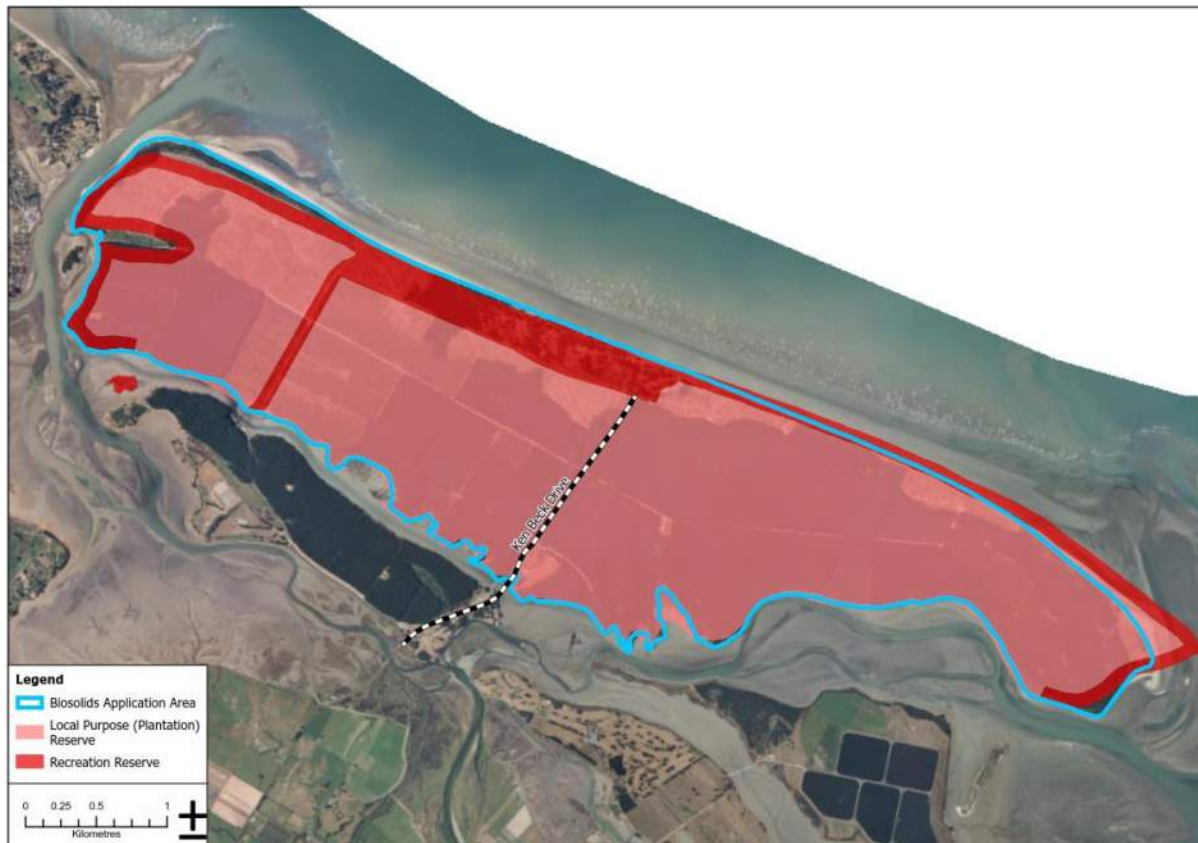


Figure 6.2: Classification and location of reserve areas on Moturoa/Rabbit Island.

6.3 Māori association with Moturoa

6.3.1 Overview

The following sections are a high-level summary sourced from existing published sources, principally the RMP. Cultural Impact Assessment(s) (CIA) are to be prepared by iwi, as discussed further in Sections 8.3 and 10 of this report, which may add further information and context.

6.3.2 History

Moturoa/Rabbit Island and adjacent Rough and Bird Islands have an extensive and rich Māori history. Historically, the Waimea/Waimeha Inlet provided fertile plains, wetlands, estuarine and freshwater ecosystems and with that, an abundance of resources.

Moturoa/Rabbit Island was an extensive occupation site for Māori with fishing villages and waka landing sites. The earliest hapū and iwi groups to occupy the Islands, and to populate the northern South Island, were Waitaha, Rapuwai, Ngāti Wairangi, Ngai Tara and Ngāti Tūmatakokiri (1400-1600 A.D) and later Ngāti Apa ki te Rā Tō and Ngāti Kuia of Kurahaupo waka.

As a result of the hekenga/migrations, there was a variety of movement and waves of settlement of iwi around Moturoa/Rabbit Island and the wider area. The iwi who are kaitiaki of Moturoa/Rabbit

Island and Waimea/Waimeha are Ngāti Rārua, Ngāti Koata, Ngāti Tama, Te Ātiawa, Ngāti Kuia, Ngāti Apa ki te Rā Tō, Ngāti Toa Rangatira and Rangitāne o Wairau.

6.3.3 Recorded archaeological sites

The general locations of the archaeological areas of Moturoa/Rabbit Island have been mapped through the RMP and are shown in Figure 6.3 below. As at 2016, there are twelve recorded archaeological sites on the Islands covered by the RMP. These sites are excluded from the biosolids application area. However, it is important to note the entirety of Moturoa/Rabbit Island is considered wāhi tapu for iwi and is a culturally sensitive area.



Figure 6.3: Recorded archaeological sites on Moturoa/Rabbit Island.

The recorded sites at the western end of the island are thought to be associated with the Māori fishing village at Grossi Point at Mapua, occupied as early as 1200AD. Many of the recorded archaeological sites include midden and oven finds, indicative of pre-European occupation and fishing activities.

It is important to note that recorded archaeological areas are discovered and recorded through Arch Site, the public, and Heritage NZ and may not be reflective of Te Tau Ihu iwi discoveries or cultural layers. Many of the iwi will have their own cultural mapping mechanism that are regarded as tapu or sacred files and are not disclosed to all parties.

6.3.4 Te Tau Ihu Iwi Deed of Settlements and Statutory Acknowledgements

The Deed of Settlement legislation for Te Tau Ihu o te Waka a Māui iwi provides statutory acknowledgement of identified areas. A statutory acknowledgement is a type of cultural redress of Crown owned portions of land or geographic features that acknowledges the cultural, spiritual and historical and traditional association and significance of that particular area.

The relevant statutory area for manawhenua iwi in relation to the current applications is shown in Figure 6.4 below. The identified areas within the statutory area include the Te Tau Ihu Coastal Marine Area and numerous river catchments and tributaries. Moturoa/Rabbit Island is not specifically identified as a statutory acknowledgement.

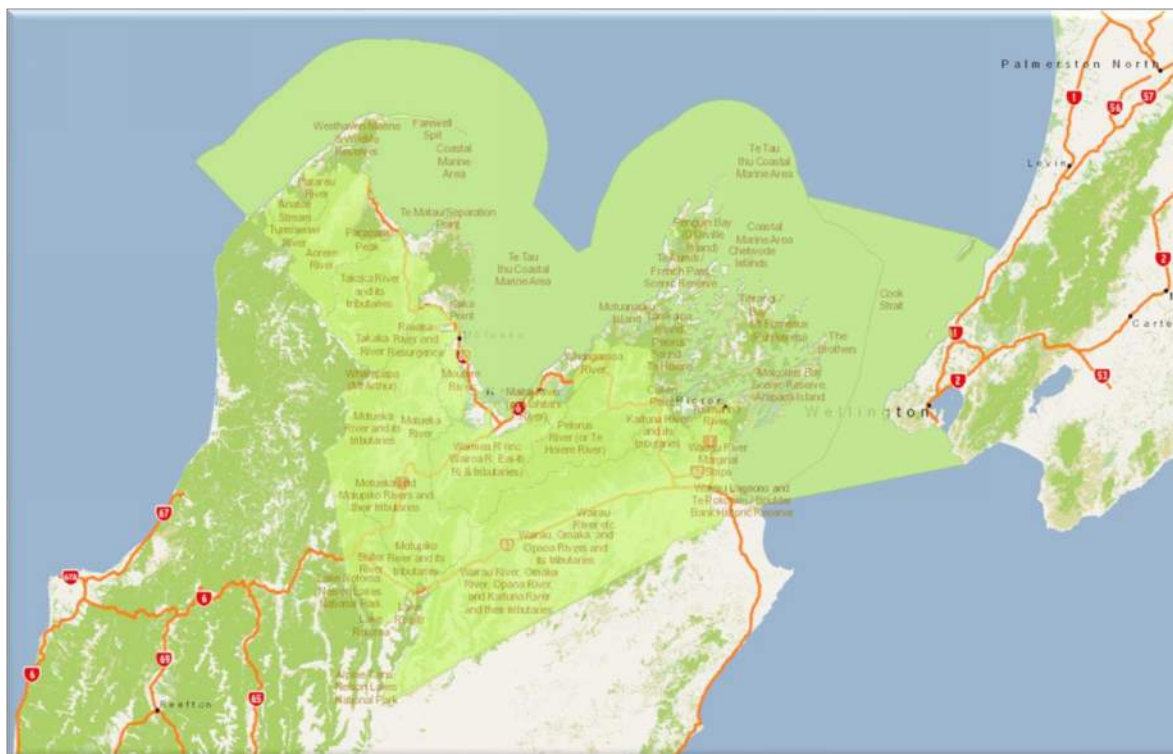


Figure 6.4: Statutory acknowledgements (in green) for Te Tau Ihu Iwi (source: Top of the South Maps).

6.4 Recreational values and access

Moturoa/Rabbit Island has been an important recreation destination for both locals and visitors to the Tasman District since the early 1900’s. The sole land access to the island is via Ken Beck Drive, which crosses the Waimea Inlet via a causeway and a small length across Rough Island. Public access is limited to the daylight hours (dusk to dawn) year-round.

Ken Beck Drive accesses the recreation area alongside the front (northern) beach of Moturoa/Rabbit Island. This area, and the coastal margin extending along the northern, western, and eastern shore, is held under the Reserves Act 1977 for recreation purposes.

Most recreation use takes place along the front beach and within the adjacent recreation reserve area, which is a popular picnic spot in the Nelson/Tasman Region. Users are attracted by the expanse of gently sloping beach, safe swimming, and large areas of grass for picnics and barbeques.

Other drawcards of Moturoa/Rabbit Island include the opportunities for walking, relaxing on the beach, horse riding, cycling (including Tasman’s Great Taste Trail and the mountain bike park in

Conifer Park), running, orienteering, cross country, triathlons, kayaking, fishing, kite flying, blo-karting, kite surfing and other water sports.

Access to the commercial forestry area, where biosolids are applied, is largely restricted. This is particularly the case where planting, harvesting, pruning, weed control, or biosolids application is occurring or planned to mitigate health and safety risks. A permit system operates whereby some activities may occur within otherwise restricted areas provided a permit is first be obtained from TDC to authorise access.

Notwithstanding the above, TDC has identified some areas within the plantation reserve such as identified roads and trails that are generally available for specified recreational purposes without a permit being required. These areas may be temporarily closed on occasion when operational activities are underway in adjacent forestry blocks.

Recreation use that does occur from time to time within restricted areas includes:

- Cycling/walking/running on a network of roads and trails located on the western half of the Island including connections to the ferry across to Mapua,
- Horse riding on the eastern foreshore area of Moturoa/Rabbit Island,
- Organised game bird hunting events during three weekends each winter, on the eastern half of the Island, and
- Organised events held on specific dates, at the discretion of TDC (locations range across the entire Island and are dependent on the type of event being held).

6.5 Commercial forestry

The majority of the land area on Moturoa/Rabbit Island is run as a commercial *pinus radiata* forestry operation. The relevant land is held under the Reserves Act 1977 for this specific purpose (Local Purpose (Plantation) Reserve). The forestry operation is currently managed by PF Olsen on behalf of TDC.

Under the RMP, the anticipated outcome is that the commercial forestry operation continues to be successfully managed as a sustained yield commercial forest, where similar timber volumes are harvested each year. This is achieved by:

- Growing trees and producing logs for the domestic and export market,
- Ensuring that the productivity of the land does not decline,
- Ensuring that environmental values are identified and maintained,
- Ensuring that cultural values, wāhi tapu and other significant sites are identified and protected,
- Ensuring that other forest values and products are identified, protected and where possible enhanced,
- Harvesting the trees as close as possible to their economic optimum age,
- Replanting following harvesting where appropriate, and
- Enabling recreation activities in areas where forestry operations are not currently underway.

The forestry operation is subject to an Act of Parliament¹³ which prescribes that a minimum of 10% of the net profit derived from the sales of forest products are to be made available for funding of recreational activities in the area.

¹³ Waimea County Council Empowering Act 1979.

As detailed further in the report in **Appendix G**, entitled “Assessing the impact of land application of biosolids on planted pine forest and soil properties at Moturoa/Rabbit Island”, research trials and ongoing monitoring at Moturoa/Rabbit Island has demonstrated that the application of biosolids within the forest has resulted in a net improvement in tree growth of over 30%. This in turn increases the economic return from the forest.

6.6 Geology, topography, and soils

Moturoa/Rabbit Island is composed of late Quaternary clastic deposits, comprising the Rabbit Island Gravels overlain by the Tahunanui Sand. The Rabbit Island Gravels comprise rounded gravels and cobbles with varying lithology, predominantly from the Moutere area, as well as the Port Hills area. The gravels have been deposited via longshore drift, and have been reworked in part, from older beach ridges. The Rabbit Island Gravels are up to 20 m thick. The Tahunanui Sand is a fine-grained sand that forms beach ridges and dunes that overlie or laterally grade into the Rabbit Island Gravels. The Tahunanui Sand is estimated to be 16 m thick in places on Moturoa/Rabbit Island.

Moturoa/Rabbit Island is largely flat with a maximum altitude of 10 metres above sea level. The soil is classified as a sandy raw soil with naturally low nutrient and organic levels. The lack of nitrogen (N) in particular greatly limits radiata pine growth. The soil is permeable and provides free root access to the shallow ground water levels which are 2-4 m below the surface.

Soil quality within the biosolids application area has been monitored under the existing consents over many years. As detailed further in the report (**Appendix G**) all relevant quality standards under the NZ Biosolids 2003 Guidelines are consistently met. In particular, heavy metals such as cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg) and zinc (Zn) are below limits. The one exception is nickel, which occurs at naturally high levels in Moturoa/Rabbit Island soils due to the influence of the Ni rich Dun Mountain Complex.

6.7 Climate

In the Nelson City area, the prevailing wind directions are from the north and northeast and the southwest. Winds from the north-westerly or westerly quarters are relatively infrequent. An indicative wind rose is shown in Figure 6.5 below. Annual rainfall in the area is around 900 mm per annum.

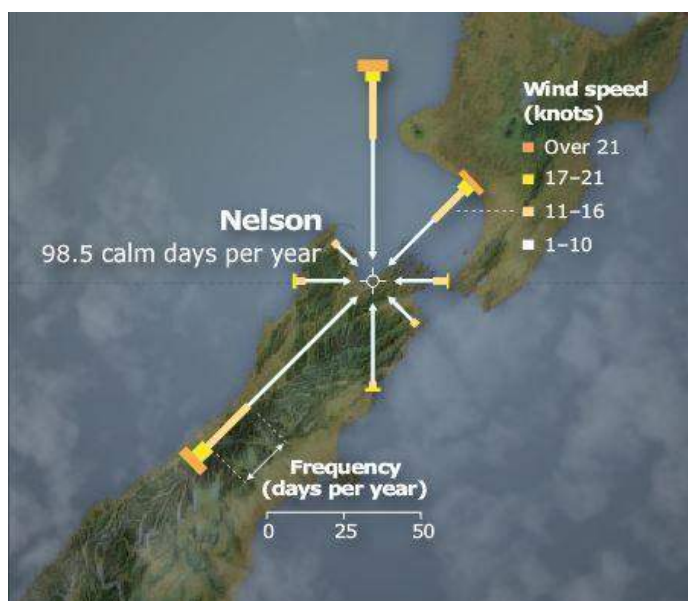


Figure 6.5: Indicative wind rose for Nelson

6.8 Groundwater and surface water

The hydrogeology of Moturoa/Rabbit Island comprises an unconfined aquifer within the unconsolidated sediments of the Tahunanui Sands and Rabbit Island gravels. This unconfined aquifer is underlain by the clay-bound Hope Gravels that may act as an aquitard, separating the island aquifer from other water-bearing units. The unconfined aquifer at the island is recharged through rainfall and it is likely that there is a lens of freshwater underlain by saline water intruding from Tasman Bay and the Waimea Inlet.

Based on the interpolated groundwater surface, there is a horizontal (on plan) hydraulic gradient from the northeast to the southwest of the island, with some spatial variation. There is also some seasonal variation that is likely to be driven by variation in rainfall recharge. Hydrogeological properties for the unconfined aquifer at Moturoa/Rabbit Island have been summarised in Table 6.1.

Table 6.1: Hydrogeological properties of Moturoa/Rabbit Island¹⁴

Property		Value
Mean hydraulic conductivity [m/s]		1×10^{-4} m/s (Rabbit Island Sands)
Horizontal hydraulic gradient i	5 th percentile	0.0001
	50 th percentile	0.0003
	95 th percentile	0.001
Mean porosity [-]		0.44 - 0.5
Fraction of organic carbon [-]		0.0025

Given the highly permeable nature of the soils, there are only ephemeral water bodies on the island. Ponds for fire-fighting purposes are present in some locations.

Further details on these above matters can be found in the groundwater assessment in **Appendix H**, entitled "*Moturoa/Rabbit Island Biosolids Application Groundwater assessment*".

6.9 Coastal values

The below information is a summary of the detailed report on coastal values and effects contained in **Appendix I**, entitled "*Assessment of the Effects on the Coastal Environment of Biosolids Application to Land on Moturoa/Rabbit Island*".

6.9.1 Waimea Inlet

Moturoa/Rabbit Island sits at the northern extent of the Waimea Inlet. The Inlet is the ultimate receiving environment for any surface water runoff and groundwater discharge from the island.

Waimea Inlet is a shallow, bar-built estuary and one of the largest Inlets in New Zealand. It contains approximately 3,307 ha of intertidal area with the remaining c. 150 ha being subtidal, e.g. river and tidal channels. Within the Inlet, ten islands total approximately 296 ha (excluding Moturoa/Rabbit Island). There are two tidal openings located at opposite ends of Moturoa/Rabbit Island, with the island forming a barrier between the Inlet and Tasman Bay.

The Inlet is identified in Schedule 25D of the Tasman Resource Management Plan (TRMP) as an area with nationally significant ecosystem values. These values include the Inlet's status as the largest barrier-enclosed estuary in the South Island. The Inlet is one of only two sites where the endangered peppergrass plant (*Lepidium banksii*) has been recorded and the endangered grey saltbush (*Atriplex*

¹⁴ Sourced from Table 2.1 in the report in Appendix H of this AEE.

cinerea) is also present. The Inlet is ‘considered of outstanding importance to waders’, and is used by white heron, royal spoonbill, Australasian bittern and banded rail.

The Inlet’s variety of coastal habitats provide biodiversity value in terms of the numbers and range of types of organisms. The inlet also provides ecosystem services. These include retaining and processing sediments and other contaminants from the catchment, nutrient cycling, and primary and secondary production, some of which is exported to Tasman Bay. It also serves as a feeding or nursery area for several species of fish and birds.

Waimea Inlet plays a significant role in the integration of terrestrial and coastal marine ecosystems. High value is placed on the Inlet’s terrestrial-wetland-coastal aquatic continuum as habitat for wildlife (e.g. waterfowl), fish and invertebrate, and its complex, heterogeneous physical and biological structure. The Inlet has also been assessed by the Department of Conservation (DOC) as meeting the criteria for a wetland of international importance.

Based on four State of the Environment monitoring stations in unvegetated tidal flat habitat (two located within West Waimea and two within East Waimea), the Inlet was in a generally healthy ecological state at the time of assessment compared to a number of other New Zealand estuaries. However, it has been considerably impacted by extensive habitat loss / modification and sedimentation. Localised areas of nutrient enrichment are present, and more widespread faecal bacteriological contamination occurs in regions of freshwater inflows, largely from agricultural sources within the catchment. The areas most affected are locations of high natural deposition, where concentrated catchment inputs of sediments and nutrients provided suitable conditions for the growth of opportunistic algae. None of these areas are present around the shoreline of Moturoa/Rabbit Island.

6.9.2 Fish

Thirty-one marine and eleven freshwater fish species occur in the estuary and tidal reaches of tributary streams of the Inlet, including the giant kokopu *Galaxias argenteus*. Several areas associated with the Waimea Inlet have also been highlighted as inanga spawning grounds. Most marine fish enter the Inlet from the sea (e.g. kahawai, gurnard and snapper), while others spend their juvenile or adult life in the Inlet (e.g. grey mullet, sand flounder and sole).

Many New Zealand freshwater fish species migrate between fresh and salt water at some stage of their life history, with estuaries such as Waimea Inlet providing an essential link in their life cycle. These include whitebait species. Whitebaiting is popular in the lower Waimea River.

6.9.3 Benthic invertebrates (shellfish)

Waimea Inlet is home to a range of benthic invertebrates and 112 species have been recorded. Benthic invertebrate composition within the Inlet was consistent with a range of other New Zealand estuaries, with species richness at representative locations indicating relatively diverse and healthy sandflat habitats containing a broad range of feeding types. However, slight to moderate organic enrichment was indicated at one location (within West Waimea) by the density of polychaete worms belonging to the family Capitellidae. Losses of some mud-sensitive organisms (e.g. pipi) were apparent between 2001 and 2014, although no broad trends of change in macroinvertebrate communities are evident from monitoring undertaken. The analysis of historical sediment cores also indicated that large increases in mud coincided, at times, with decreases in shellfish populations.

Shellfish beds are scattered around eastern Waimea Inlet, including oyster reefs, cockle and pipi beds. The pipi beds along the northern side of Moturoa/Rabbit Island and off Tahunanui are harvested recreationally for seafood although monitoring indicates elevated nickel and arsenic concentrations in shellfish. The report in **Appendix I** concludes that shellfish are affected to varying degrees by the minerology of the catchment.

6.9.4 Marine vegetation

Twenty estuarine vascular plants have been recorded within the Waimea Inlet intertidal zone. The dominant vegetated habitat is herbfield—primarily glasswort, *Sarcocornia quinqueflora*) and rushland (primarily searush, *Juncus kraussii*). The high proportion of glasswort is relatively unusual in comparison to many other New Zealand estuaries.

The Inlet is also home to rare and threatened native plants, such as coastal peppergrass (*Lepidium banksii*), occurring within West Waimea (No Mans Island and off Bronte Peninsula), and grey salt bush (*Atriplex cinerea*), occurring within West Waimea (No Mans Island) and East Waimea (Bell Island West saltmarsh) (DOC 2015). Cromarty and Scott (1995) also noted that the Inlet contains the southernmost populations of the estuarine tussock, *Stipa stipoides*, and that the rush *Baumea articulata* has been recorded from the Rough Island wetland, the only locality for this species in the South Island.

Eight macroalgal taxa have been recorded from the Waimea Inlet intertidal zone. Opportunistic macroalgal growth, a possible indication of nutrient enrichment, was found to be low overall in 2014, although dense beds of both agar weed (*Agarophyton (Gracilaria) sp.*) and sea lettuce (*Ulva sp.*) were present in localised areas within West and East Waimea.

The amount of vegetation (e.g. scrub and forest) immediately surrounding the Inlet was relatively low in 2014 and was comprised largely of plantation forestry on Moturoa/Rabbit and Rough islands. Ongoing restoration efforts, including native revegetation within the estuary and its margins are being made by various groups, including those associated with the Waimea Inlet Forum. The Forum was created as a result of the Waimea Inlet Management Strategy and includes groups that have an interest in, and a commitment to, the Waimea Inlet.

The condition suite for the recently renewed Bell Island WWTP resource consents includes a requirement for the NRSBU to consult with the Bell Island Stewardship Group (comprised of all members of the Forum and Te Tau Ihu iwi) to develop a restoration planting programme to enhance the cultural values of Bell Island.

6.10 Terrestrial ecology

6.10.1 Overview

The terrestrial ecology values of Moturoa/Rabbit Island have previously been canvassed in detail through the RMP. The below discussion has been sourced from the RMP as well as specialist reports prepared for this AEE on birdlife and lizards (refer **Appendices J and K** respectively). At the outset of this section, it is important to note that all Significant Native Habitats on the island have previously been mapped and are excluded from the biosolids application area subject to these applications.

6.10.2 Terrestrial vegetation

Since the arrival of humans, most of the native vegetation and related habitats have been lost from Moturoa/Rabbit Island. The fragments that remain are small patches of forest and freshwater wetland, all of which are located within biosolid exclusion and buffer areas. An example of this is near the boat ramp on the southern shore of the island, where an intact coastal vegetation sequence is contained within an approximate 2-hectare area. This site supports a sequence from the edge of the saltmarsh herbfield through to tall manuka scrub, and includes a narrow to broad band of saltmarsh ribbonwood, areas of estuary tussock, and mixed vegetation of sea rush, tall fescue and knobby clubrush. Small areas of herbfield turf also occur. Areas of significant native habitat are identified in Figure 4.1 and **Appendix C** of this AEE.

The majority of the land area of Moturoa/Rabbit Island consists of the commercial *pinus radiata* forestry operation. The understorey of this forest principally consists of grass, broom and pampas, with some pockets of understory regrowth of native species (for example, ti kouka / cabbage trees). This understorey does occasionally get disturbed or removed as a result of the forestry operation.

6.10.3 Birds

As detailed in the report in **Appendix J**, entitled “Resource Consent Renewal: Moturoa/Rabbit Island Biosolids Application to Land - Review of potential impacts on birds”, Moturoa/Rabbit Island provides valuable habitats for both roosting and nesting coastal birds, and the adjacent intertidal flats and shallow coastal waters provide foraging areas. Waimea Inlet is of international importance for three waders: Variable Oystercatcher *Haematopus unicolor* (At risk – recovering), South Island Pied Oystercatcher *Haematopus finschi* (At risk – declining) and Wrybill *Anarrhynchus frontalis* (Threatened – nationally vulnerable). It is also of national importance for Bar-tailed Godwit *Limosa lapponica* (At risk – declining) and Red Knot *Calidris canutus* (Threatened – nationally vulnerable).

The plantation forests support a mixture of native and introduced birds; the species composition depending largely on the age of the vegetation. Recently felled/replanted sites are populated by open country birds, including Skylarks *Alauda arvensis*, and may include breeding colonies of Southern Black-backed Gulls *Larus dominicanus*. As the pines grow and a more shrubby community develops, birds such as Yellowhammer *Emberiza citronella*, Goldfinch *Carduelis carduelis* and Chaffinch *Fringilla coelebs* occur, while more mature plantation has Fantail *Rhipidura fuliginosa*, Blackbird *Turdus merula* and Dunnock *Prunella modularis*. There are no ‘Threatened’ or ‘At Risk’ birds occurring regularly in the plantation forest areas.

Overall, the most sensitive areas for birds of conservation concern (those classified by the Department of Conservation as ‘Threatened’ or ‘At risk’) are the shores of the western and eastern parts of the island. These areas are excluded from the biosolids application area.

6.10.4 Lizards

As detailed in the report in **Appendix K**, entitled “Moturoa/Rabbit Island, Tasman: Assessment of lizard habitat for application of biosolids to land programme”, native lizards in the Nelson and Tasman regions are typically scattered in distribution, in low numbers, and are generally limited to skinks and ground-dwelling geckos, rather than to arboreal (tree-dwelling) geckos.

Natural habitat for lizards on Moturoa/Rabbit Island has been highly modified by the long history of forestry and related land disturbance. However, it is acknowledged that, in general, very little is known about lizards use of plantation forests and in the case of Moturoa/Rabbit Island no records have been taken.

Lizards previously recorded in the Nelson and Tasman regions and which are potentially on Moturoa/Rabbit Island include the northern spotted skink (*Oligosoma kokowai*), northern grass skink (*Oligosoma polychrome*), glossy brown skink (*Oligosoma zelandicum*) and Raukawa gecko (*Woodworthia maculata*). The likelihood of these species being present in the biosolids application area is very low, with the exception of the northern grass skink which has a high likelihood. The northern grass skink typically favours habitat which is densely vegetated open or sheltered with adequate groundcover such as logs, rocks or long grass.

6.11 Landscape and natural character

The area to which biosolids applied is a commercial forestry operation, and as such, is highly modified from its natural state. The *pinus radiata* plantation consists of generally uniform rows of trees which are subject to a regular pruning and maintenance regime to enhance productivity and maintain continuity of access for plant and machinery, including for biosolids application. Metalled access roads criss-cross the island. A series of mountain bike tracks traverse the western end of the island. The BAF is located in a forest clearing in the eastern half of the island and due to access restrictions is generally not visible to the public.

The island's recreational reserves, coastal margins, and significant native habitats have a range of landscape and natural character values which are relatively higher than the commercial forestry area. However, these areas are protected by exclusion zones and buffer areas and are therefore not subject to biosolids application.

6.12 Natural hazards

In 2018 TDC (and NCC) commissioned sea-level rise and storm surge assessments from the National Institute for Water and Atmospheric Research (NIWA)¹⁵. This included development of an online tool which plots estimates of 0.5 m, 1.0 m, 1.5 m, and 2.0 m sea level rise scenarios along with 1% Annual Exceedance Probability (AEP) storm-tides. The storm-tides include the effects of storm surges and wave setup during storms. The scenarios in the tool assume that present day landforms remain intact and therefore do not take account of any accretion or erosion, nor any mitigation undertaken to prevent or reduce the effects.

The methods were based on identifying areas potentially affected by coastal hazards over at least 100 years, as required by the New Zealand Coastal Policy Statement. Based on the advice produced by the Ministry for the Environment¹⁶, it is appropriate to allow for around 0.5 m of sea level rise by approximately 2060, and 1 m of sea-level rise by approximately 2100.

Figure 6.6 illustrates the present day, 0.5m and 1.0 metre climate change scenarios for Moturoa/Rabbit Island. Table 6.2 provides calculations for the affected areas.

Table 6.2: Potential areas of Moturoa/Rabbit Island affected by sea level rise

Climate change / sea level rise scenario	Island area affected (ha) <i>Total island area: 1,105 ha</i>		Biosolids application area affected (ha) <i>Total application area: 778 ha¹⁷</i>	
	MHWS	Stormtide	MHWS	By stormtide
Present day	17	137	6	48
0.5 m rise (year 2060)	61	250	18	110
1.0 m rise (year 2100)	154	381	61	190

¹⁵ Stephens, S.A., Robinson, B., Allis, M. (2018) *Storm-tide and wave hazards in Tasman and Golden Bays*. NIWA Client Report to Tasman District Council and Nelson City Council, June 2018, 2018208HN.

¹⁶ Tables 10-12 from Ministry for the Environment (2018) *Coastal hazards and climate change: Guidance for local government*. Publication ME1341. Wellington.

¹⁷ The application area for the purposes of this assessment takes account of the exclusion zones as per Figure 4.1 in this AEE.

The conclusions which can be drawn from Figure 6.6 and Table 6.2 are:

- **Present day:** Inundation at MHWS and 1% AEP storm-tides may affect the coastal margins of the island but the majority of the land area (86%) remains unaffected. Less than 1% of the biosolids application area is potentially affected by MHWS inundation (noting these areas do not have any connection to the sea currently so in real terms are not affected by inundation at high tides) and 6% by 1 in 100 year storms,
- **0.5 m SLR (2060):** The island area affected by 1% AEP storm-tides marginally increases, and without protection or mitigation, the sea may occupy some areas of the present-day coastal margins; the majority of the island (72%) still remains unaffected. With respect to the biosolids application area, approximately 2% could be affected by MHWS inundation (assuming those areas develop connections with the sea) and 14% affected by 1 in 100 year storms (again, assuming no mitigation).
- **1.0 m SLR (2100):** 1% AEP storm-tides reach further into the island interior, generally along lower-lying depressions; however, sea inundation remains largely confined to the coastal margins. Approximately 8% of the biosolids application area may be affected by MHWS inundation and 24% by 1 in 100 year storms at high tide.

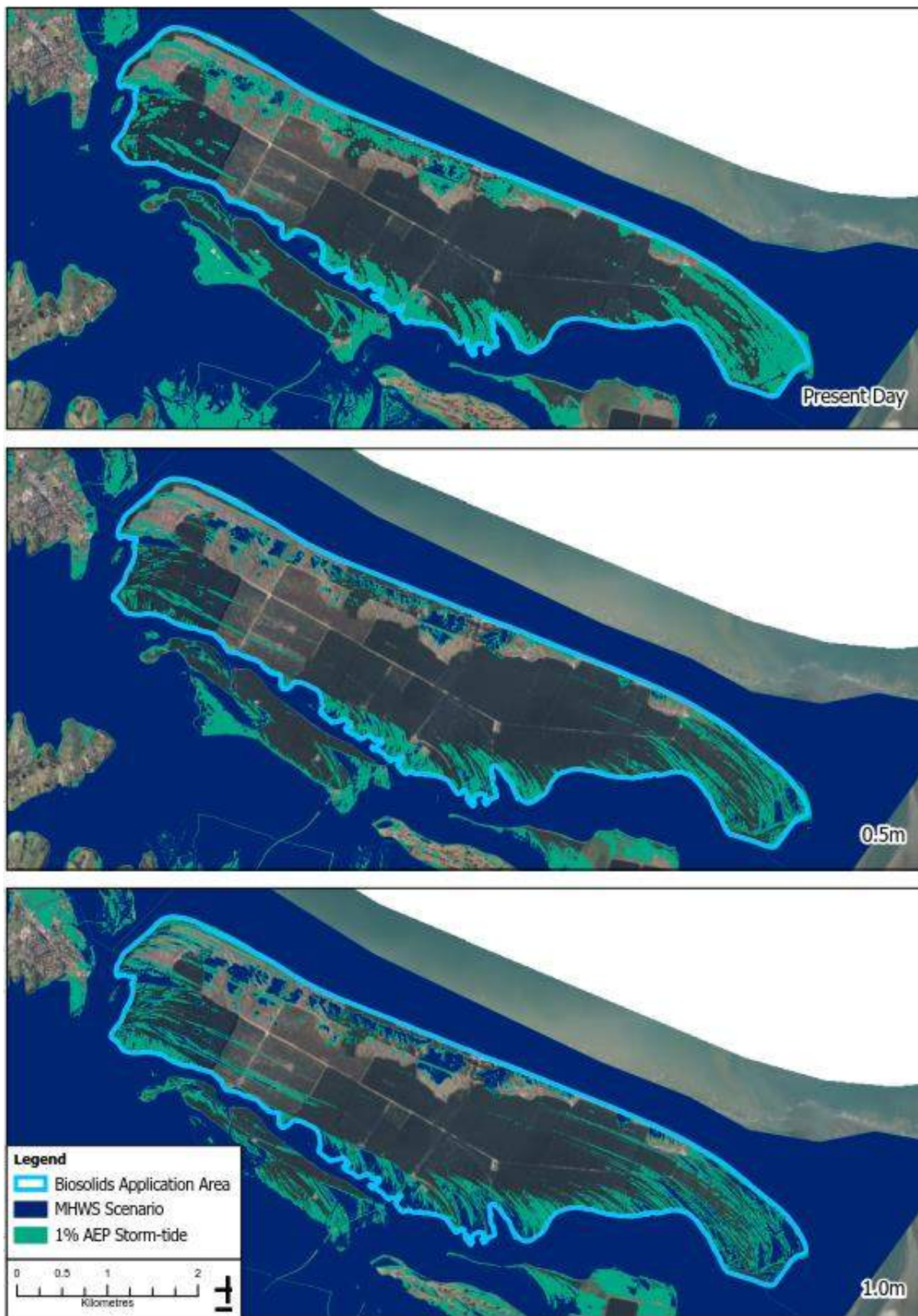


Figure 6.6: Sea level rise scenarios at Moturoa/Rabbit Island
SLR scenario data sourced from <https://tdc.maps.arcgis.com/apps/webappviewer/>

7 Resource consent requirements under the Tasman Resource Management Plan

7.1 Overview

The requirements for resource consents are determined by the rules in the Tasman Resource Management Plan (TRMP). The TRMP is a combined plan, meaning it includes both regional and district rules.

Parts of the TRMP were first made operative in September 2008. Over time, further sections were made operative and various amendments have since occurred. The most recent plan change, Plan Change 68 (Omnibus Amendments), was made operative on 15 June 2019.

7.2 Zoning and planning notations

The rules which apply are determined by the zoning of the site, any identified notations in the plan and the nature of the activities proposed.

The site is identified on Planning Maps 19, 22, 54, 55, 188 and AL20/AL21 of the TRMP. Table 7.1 below summarises the zoning and planning notations applying to the site.

Table 7.1: Zoning and planning notations

Zoning/planning limitation	Comment
Rural 2 Zone	The majority of the biosolids application area on Moturoa/Rabbit Island falls within land zoned Rural 2. The BAF is also located within the Rural 2 zone. Across the region this zone supports horticultural and agricultural industries such as production of crops, farming and food production.
Conservation Zone	A small component of the biosolids application area falls within the Conservation Zone. Across the region this zone consists largely of coastal margins, forests, and open spaces with limited buildings and facilities (except for conservation and recreation purposes).
Overlays	
Coastal Environment Area	The Coastal Environment Area covers the perimeter of the island and extends approximately 200 m inland from the point of MHWS. Rules in the plan regulate building activities and refuse disposal in this area.
Areas with Nationally or Internationally Important Natural Ecosystem Value	Waimea Inlet is part of the receiving environment for the proposal. The Inlet is identified as area 22 in Schedule 25D of the TRMP as follows: <i>“Largest barrier enclosed estuary in the South Island (~ 3,455 ha). One of only two sites where the endangered peppergrass 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/Moturoa is the largest barrier island in New Zealand.”</i>

There are no significant natural areas, protected trees, heritage buildings, designations, or any other special notations of features identified on the planning maps for the land area of Moturoa/Rabbit Island. The Significant Native Areas referred to throughout this AEE are from the RMP and are not identified in the TRMP.

7.3 Rules requiring resource consent

Table 7.2 identifies the rules requiring resource consent and their activity status.

Table 7.2: Resource consents required

Proposed activity	Assessment	Relevant rule and activity status
Discharge permit – Application of biosolids to land at Moturoa/Rabbit Island	The activity is not identified as a permitted activity under Section 36.1.2, a controlled activity under Section 36.1.3, a restricted discretionary activity under Section 36.1.4, or a non-complying activity under Section 36.1.6. Therefore the activity is a discretionary activity under Rule 36.1.5.2.	Rule 36.1.5.2 – Discharges to Land (Other) Discretionary
Discharge permit -- Discharge of odour to air as a result of applying biosolids to land and the operation of the BAF at Moturoa/Rabbit Island	The activity is not identified as a permitted activity in Section 36.3.2, a controlled activity in Section 36.3.3, a restricted discretionary activity under Section 36.3.4, a non-complying activity under Section 36.3.5, or a prohibited activity under Section 36.3.7. Therefore the activity is a discretionary activity under Rule 36.3.5.3.	Rule 36.3.5.3 – Discharges of Any Contaminant To Air Discretionary
Land use consent - Operation and maintenance of the Biosolids Application Facility and all other land use activities associated with the application of biosolids to land at Moturoa/Rabbit Island	The BAF and majority of biosolids application activities are located in the Rural 2 zone, which is subject to the rules in Chapter 17.6. Any general land use is a permitted activity if it complies with Rule 17.6.2.1. The proposal complies with those conditions. In particular the activity is not considered an industrial or rural industrial activity. The construction, alteration and use of buildings is permitted if they comply with the conditions of Rule 17.6.3.1. In this case the BAF facilities are within a plantation forest and therefore not setback 30m as per condition (j)(v).	Rule 17.6.3.5 – Discretionary Activities (Building Construction, Alteration or Use) Discretionary
	A small area of biosolids application occurs in the Conservation Zone (Chapter 17.11). Any activity is a permitted activity if it complies with Rule 17.11.2.1. The proposal does not comply with condition (b), which requires the activity to be undertaken by the Crown.	Rule 17.11.2.2 – Discretionary Activities (Land Use) Discretionary

Proposed activity	Assessment	Relevant rule and activity status
<p>Discharge permit – Discharge of stormwater and washdown water at the BAF compound to land</p>	<p>Currently washdown activities at the BAF discharges partly to ground. This is not identified as a permitted activity under Section 36.1.2, a controlled activity under Section 36.1.3, a restricted discretionary activity under Section 36.1.4, or a non-complying activity under Section 36.1.6. Therefore the activity is a discretionary activity under Rule 36.1.5.2.</p> <p>Stormwater discharges are permitted under Rule 36.4.2.1, subject to conditions. It is likely the proposal can comply with all conditions, however, due to the potential mixing with washdown water a precautionary approach has been taken under these applications.</p> <p>Note: NRSBU proposes to collect and reuse within the BAF, at which point this will become a permitted activity (or fall within the scope of the biosolids application discharge permit).</p>	<p>Rule 36.1.5.2 – Discharges to Land (Other) Discretionary</p> <p>Rule 36.4.2.3 Restricted Discretionary Activities (Discharge or Diversion of Stormwater or Drainage Water) Restricted discretionary</p>

7.4 Permitted activities

The following permitted activities under the provisions of the TRMP associated with the proposed activities have been identified in Table 7.3 below.

Table 7.3: Permitted activities relevant to the proposal

Proposed activity	Relevant permitted activity rule	Assessment
<p>Land use – coastal environment area</p>	<p>Rule 18.11.2.1 – Any land use is a permitted activity that may be undertaken without a resource consent, if it complies with the following conditions:</p> <p>(a) The activity is not the construction of a new building or the disposal of refuse.</p> <p>(b) The activity is an extension to an existing building that does not:</p> <p>(i) increase the ground floor area (as at 25 May 1996) by more than 50 percent; or</p> <p>(ii) reduce the existing building setback to mean high water springs</p> <p>(iii) increase the existing building height (not applicable in Commercial and Industrial zones with the exception of the Industrial zone and the Mixed Business Zone in the Richmond West Development Area, other than in the Light Industrial Zone location at Beach Road shown on the planning maps).</p>	<p>Part of the biosolids application area falls within the coastal environment area overlay. As that activity does not involve buildings or disposal of refuse the activity is permitted under Rule 18.11.2.1.</p>

Proposed activity	Relevant permitted activity rule	Assessment
Hazardous substance storage and use	Rule 16.7.2.1 - A hazardous facility is a permitted activity that may be undertaken without a resource consent, if it complies with conditions within the rule.	Small volumes of hazardous substances are stored at the BAF for fuelling and maintenance of plant and machinery in accordance with this permitted activity rule.

7.5 Other consents and approvals required

No other statutory approvals are considered to be required for the proposed activities. In particular, the activity does not disturb any recorded archaeological sites subject to the Heritage New Zealand Pouhere Taonga Act 2014.

The commercial forestry operation run by PF Olsen on behalf of TDC is subject to its own regulatory requirements and is therefore not addressed by this AEE or consent applications.

8 Assessment of effects on the environment

8.1 Introduction

The following sections identify and assess the types of effects that may arise from the biosolids operation. Actual and potential effects on the environment have been identified as including:

- Positive effects,
- Effects on cultural values,
- Effects on recreational values and access,
- Effects on forestry and soils,
- Effects on groundwater,
- Effects on coastal values,
- Effects on air quality (odour),
- Effects on public health,
- Effects on terrestrial ecology,
- Effects on landscape and natural character, and
- Effects from natural hazards.

8.2 Positive effects

The application of biosolids on Moturoa/Rabbit Island is a beneficial reuse of a product of the wastewater treatment process at the WWTP. The NRSS provides a safe and reliable means of collecting and treating human waste which has a net positive effect for human health.

The NRSS also eliminates the need for other wastewater collection and treatment methods along with the significant financial investment and potential adverse effects on the environment associated with those alternatives. The alternative assessment reports in **Appendices D and E** discuss these matters in greater detail.

A key objective of the NRSBU is to ensure wastewater services are affordable for domestic ratepayers and commercial and industrial operators. These customers form a key part of the local, regional and national economy. Further positive economic effects include making cost effective use of the existing WWTP infrastructure and the production of biosolids through the ATAD process. The existing system also has the ability to provide for future growth for residential, business and industrial development, which is a positive effect.

The efficient use of the existing wastewater infrastructure is an important positive effect, as it provides the Tasman and Nelson communities with an economically sustainable wastewater treatment system. The value of the investment made in existing infrastructure is a key matter which the consent authority must consider in determining the applications¹⁸. In addition, implementing alternatives comes with its own costs, both financial and environmental (for example, carbon emissions).

The application of biosolids to forestry has positive benefits in terms of providing a source of nitrogen fertiliser and improving forestry growth. Biosolids improves tree growth (by approximately 30%) and increases economic returns. This is ultimately a social and economic benefit for the ratepayers of the Tasman and Nelson region.

¹⁸ Section 104(2A) of the RMA.

8.3 Effects on cultural values

8.3.1 Values

There are many diverse cultural values across Te Tau Ihu o te Waka a Māui that will be specific to whānau, hapū and iwi and the whenua that they connect to that are integral to the identity of iwi and their association with Moturoa/Rabbit Island and the surrounding area.

Some iwi have previously provided recommendations in Environmental Plans and/or previous Cultural Impact Assessments that outline their concerns with respect to Moturoa/Rabbit Island and wastewater treatment and discharges in the Waimea Inlet. Two of these past reports are summarised in Section 8.3.2 to provide an overview of potential cultural values and/or concerns that may be shared by iwi in relation to these applications.

The iwi consultation process (see section 10.3.2) refers to next steps and how Te Tau Ihu iwi will develop CIA(s), which may include a waka approach. This will enable iwi to refine and develop their respective values specific to them, as well as particularise the effects that the biosolids activity will have on these values.

8.3.2 Related cultural impact assessments

In recent years there have been a number of CIA reports completed in relation to activities at Moturoa/Rabbit Island and surrounding areas, including the Waimea Inlet. Recent reports directly relevant to Moturoa/Rabbit Island are summarised below.

8.3.2.1 Forestry harvest on Moturoa/Rabbit Island

In 2015 a CIA was prepared in response to a resource consent application by PF Olsen to harvest area RABB-4514 of Moturoa/Rabbit Island¹⁹. The CIA report identified the historical and cultural context, the proposed activities, manawhenua iwi values and issues, as well as the recommendations to the applicant. Significant cultural, archaeological sites and wāhi tapu were provided to ensure the applicant avoided these areas during the excavation of trees.

Manawhenua iwi supported the application on the basis that PF Olsen met the recommendations ensuring:

- Iwi are part of the resource consent process,
- The mauri and ecological health of Moturoa/Rabbit Island is protected,
- That wāhi tapu and taonga are protected, and
- That further consultation with manawhenua was maintained during the activity.

8.3.2.2 Tasman Cycleway

In 2011 a CIA²⁰ was prepared to provide the Cycleway Trust with an assessment of effects of the proposed cycleway trail, part of which crosses Moturoa/Rabbit Island, on manawhenua iwi cultural values. This assessment included recommendations for avoiding, remedying and mitigating significant adverse effects.

¹⁹ *Cultural Impact Assessment – PF Olden Ltd. Harvest of Moturoa Island*, Tiakina te Taiao Limited, 2015.

²⁰ *Cultural Impact Assessment – Tasman Cycleway Trust*, Tiakina te Taiao Limited, 2015.

The following issues were highlighted in that report:

- Recognition and protection of the cultural heritage of the land proposed for the cycleway,
- Construction activities and land disturbances,
- Potential contamination of māhinga kai/mataitai and the impacts on the cultural landscape,
- Continuance of māhinga kai/mataitai and customary use activities,
- Impacts on the general (uninformed) members of the public using the proposed cycleway trail, and
- Protection of indigenous biodiversity.

The cycleway trail now runs through Moturoa/Rabbit Island and there has been follow up CIA reports to cater for new trails that have been added to the original proposal and consents. Manawhenua iwi were part of creating interpretation panels for some locations along the trail to educate the public on the cultural significance of Moturoa/Rabbit Island.

8.4 Effects on recreational values and access

Key recreational areas on Moturoa/Rabbit Island are excluded from the biosolids application area. These include the main domain area, conifer park mountain bike track and the grade 2 mountain bike trail area on the northern extent of the island, Ken Beck Drive, and the boat ramp area on the south of the island. These exclusion zones are shown in Figure 4.1 earlier in this AEE. In addition, no biosolids are applied within 50 m of MHWS, which covers the entirety of the coastal margin. As such the proposed activities do not impinge on the general public's ability to access those areas that are open to the public to undertake active or passive recreation.

Biosolids application is undertaken on commercial forestry land to which the public has either no access, or controlled access. Where controlled access applies (for example, mountain bike tracks) biosolids application is managed to limit any inconvenience or potential nuisance effects for recreational users. The procedures for this are set out in the BMP, but by way of summary involves:

- Maintenance of an up-to-date plan of all areas to which the public have access, including walking and biking tracks,
- Maintenance of a public information sign at the corner of Bullivant Road and Ken Beck Drive providing general information on the biosolids operation,
- Strategic planning (at least 12 months in advance) of all upcoming application areas with due consideration to a number of factors, including any upcoming planned recreational events, including consideration of seasonal recreational demands (biosolids application is avoided on the western end of the Island during the summer months where the beach, domain and mountain bike tracks are in high use),
- Avoiding work in weekends and public holidays (unless in the event of an emergency),
- Completion of a pre-spray check covering identification of public access areas which might be affected, erection of public warning signs, closure of any physical barriers and gates, and demarcation of application sites, and
- Completion of post-spray checks including removal of signage and barriers.

The public are not permitted to enter any area where biosolids have been applied for at least one month after application.

Overall, the use of exclusion zones, buffer areas, and management procedures greatly minimises any potential adverse effects on access and recreational use, to the extent they are considered **less than minor**. The potential effects from odour are addressed separately in Section 8.8 below.

8.5 Effects on forestry and soils

A detailed assessment of the actual and potential effects on forestry and soils is contained in **Appendix G**. Key information is summarised below.

8.5.1 Assessment method

Biosolids application has occurred within the commercial forestry area, under existing consents, for the last 24 years. Comprehensive monitoring and assessment of the activity under those consents, as well as research trials, has led to the effects on soils and forestry being well understood.

The existing consent requires that soil samples be taken on an average of two samples every 10 ha in areas where biosolids have been applied. In practice, sampling is carried out in all stands that have been treated on an on-going basis and every six months, samples are taken at some locations.

Samples are analysed for:

- pH,
- Organic matter,
- Elements: N, P, K, Ca, Mg and Na, and
- Heavy metals: As, Ca, Cr, Cu, Pb, Hg and Ni.

A long-term biosolids research trial was established in October 1997 in a pine stand planted in 1991. The stand was established at a stocking rate of 1000 stems per hectare and all trees in the trial were pruned in four lifts up to 6 m height during the period November 1996 - August 2001. Treated biosolids from the WWTP were applied in 1997, 2000, 2003, 2006, 2009 and most recently in November 2012 at three application rates: 0 (Control), 300 (Standard) and 600 kg N ha⁻¹ (High). The growing trees were then monitored for changes in height, stem diameter, and nutrient uptake.

8.5.2 Benefits to forestry

Analysis of the data has demonstrated that the application of biosolids to the low fertility sandy soil of Moturoa/Rabbit Island has led to:

- Improved soil fertility through increased total soil carbon (C), nitrogen (N) and phosphorus (P) and their availabilities in soil, with an increase in pine growth of upwards of 30% being mainly the result of improved soil N supply and tree N nutrition,
- Significantly increased C sequestration in forest biomass and soil, which has transformed the forest site from relative low productivity to an average or above average productivity and improved forest profitability, and
- A small decrease in structural wood quality (5-7%), however, this does not devalue the logs.

The biosolids also provides a sustainable source of Nitrogen and avoids the use of other commercial fertilisers (and related costs and impacts).

Overall, the biosolids application has a positive effect on the economic output of the forest.

8.5.3 Metals

The average (1999-2019) concentrations of cadmium, chromium, copper, lead, mercury and zinc are below the soil limits defined in the Biosolids Guidelines 2003 and the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.

The average (1999-2019) concentrations of arsenic and nickel were lower than the NZ Biosolids Guidelines 2003 but the maximum values for these metals were greater than the limits on occasion. For arsenic, most of the high values were found during earlier testing when the analytical detection

limits were higher than in recent times. Since 2005, no soil arsenic values have exceeded the NZ Biosolids Guidelines 2003. The soils at Moturoa / Rabbit Island are naturally high in nickel concentration due to the influence of the nickel-rich Dunn Mountain mineral belt within the upper estuary catchment. The soils of control plots in the biosolids research trial showed comparable nickel concentrations to the biosolids applied soils from operational areas. In addition, the loading of nickel from the biosolids are well under the Biosolids Guidelines 2003, indicating a low impact of biosolids application.

8.5.4 Nutrients

Foliar analysis has consistently shown that natural soil N supply in the Moturoa/Rabbit Island radiata pine forest is not enough to meet the growth requirements for optimal productivity. Successive applications of biosolids have produced a consistently positive response in foliar N concentration in the subsequent assessment when compared with trees with no application.

Research trials show that the cumulative amount of N taken up by live biomass and forest floor of pine trees increased sharply from age 2 to age 6 and gradually from age 7 to age 15 and then flattened off for all three biosolids treatment rates. The cumulative amount of N uptake for Standard and High biosolids treatments was 751 and 786 kg ha⁻¹, respectively, increasing by 18.9% and 24.5% when compared to the trees with no application.

Movement of N and P down the soil profile indicates a potential risk of groundwater contamination. The report in **Appendix G** recommends ongoing soil and groundwater monitoring to manage effects of biosolids application on the receiving environment. Effects on groundwater are addressed in Section 8.6 below.

8.5.5 Organic and microbiological

The collembolan reproduction test with *Folsomia candida*²¹ (soil insects) is commonly used as a tool to evaluate the ecotoxicological potential of organic wastes applied to soil. Biosolids application and soil layer (litter vs surface mineral soil) had a significant effect ($P < 0.05$) on production of *Folsomia candida* neonates, which increased significantly in the High (600 kg N ha⁻¹) treatment). Results reported in the **Appendix G** indicate that the long-term repeated application of biosolids did not have any negative ecotoxicological effects on collembolan reproduction.

Triclosan is present in personal care products, and is a priority organic contaminant with antimicrobial effect. In 2010, the tolerance of soil microbes to triclosan stress was assessed with results showing no significant differences among the biosolids treatment rates. This indicates that the level of triclosan required to influence the soil microbial community was higher than the levels contained in the biosolids applied to the soil at Moturoa/Rabbit Island.

A recent investigation based on the biosolids research trial at Moturoa/Rabbit Island has found no evidence for long-term repeated applications of biosolids to result in accumulation of perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) in the surface soil (0-25 cm) sampled in November 2019.

8.5.6 Summary of effects

Overall, the application of biosolids is considered to have a **positive** effect on the commercial forestry operation, a **positive** effect on overall soil fertility and nutrition, and **less than minor** adverse effects with respect to contaminants.

²¹ A species of springtail in the family Isotomidae. It is found in soil in many locations around the world, having been spread inadvertently by humans. It reproduces by parthenogenesis and has been used as a model organism in research – source Wikipedia.

8.6 Effects on groundwater

A detailed assessment of the actual and potential effects on groundwater is contained in **Appendix H**. Key information is summarised below.

8.6.1 Assessment method

Source contaminants in the biosolids were categorised into three major groups: metals, nutrients, and organic and microbiological contaminants. Monitoring data was reviewed from the comprehensive records held for Moturoa/Rabbit Island, including the network of 11 groundwater bores installed under the existing resource consents.

Groundwater quality data has been assessed against the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018* (ANZECC Guidelines). Groundwater on Moturoa/Rabbit Island is not abstracted for potable (or any other) purpose therefore no assessment has been undertaken against the *Drinking-water Standards for New Zealand 2005*.

8.6.2 Metals

Groundwater chemistry data indicates that 95th percentile concentrations of some metal contaminants are above ANZECC guideline concentrations, but that median concentrations for these contaminants are below the guideline values (see Table 8.1 below).

Table 8.1: Source contaminants in groundwater - metals²²

Contaminant	Measured dissolved concentrations in groundwater [mg/L]		Guideline concentrations in receiving environment waters ^a [mg/L]
	Median	95 th percentile	
Arsenic	0.009	0.02	-
Cadmium	0.0005	0.005	0.0007
Chromium	0.0010	0.050	0.0044
Copper	0.0010	0.010	0.0013
Lead	0.0036	0.05	0.0044
Mercury	0.0001	0.0010	0.0001
Nickel	0.0038	0.050	0.007
Zinc	0.0050	0.034	0.015

^a ANZG/ANZECC guideline values for slightly to moderately disturbed marine ecosystems unless otherwise stated.

The metals concentrations in groundwater in Table 8.1 are considered indicative of background concentrations for the region. The introduction of additional metals through biosolids application is unlikely to pose a risk to environmental or human health because of the generally low metals concentrations in the biosolids, the immobilisation of metals within the forest litter layer and underlying soils, and the retardation of metals transport in groundwater through partitioning to the aquifer matrix. Overall, any adverse effects on groundwater from metals in biosolids is considered **less than minor**.

²² Sourced from Table 2.3 in Appendix H of this AEE.

8.6.3 Nutrients

High levels of nutrients in municipal biosolids are beneficial to the growth of pine forests, particularly in soils that have low soil fertility, including sandy coastal soils. A study of ammonium-nitrogen in a similar environmental setting and application rate indicates that up to half of the organic nitrogen applied in a soil will be converted to inorganic nitrogen. The average annual uptake of mineralised nitrogen by pine forest is expected to be 40 kg/ha/year.

However, it is important that biosolids application is commensurate with the uptake of nitrogen by the forest in order to avoid leaching of nutrients into groundwater and the associated environmental impacts.

Nutrient concentrations are monitored in the biosolids, soil and groundwater at Moturoa/Rabbit Island, and the nutrient loading of forestry stands is recorded daily during application operations. Testing indicates that high levels of nitrogen are present in the municipal biosolids, mainly in organic and ammoniacal forms. Trace to low levels of nitrite and nitrate are also present.

Based on the monitoring data in Table 8.2 below, concentrations of ammoniacal nitrogen reported in groundwater are generally within expected background ranges and well within the ANZECC guidelines. Biosolids ammonia is expected to partially volatilise and be mineralised into forms that can be taken up by forestry. Ammonia will transform to nitrite and nitrate under aerobic conditions. Low concentrations of nitrite and nitrate are generally within expected background ranges. Overall, any adverse effects on groundwater from nutrients is considered **less than minor**.

Table 8.2: Source contaminants in groundwater - nutrients²³

Contaminant	Measured concentration in biosolids [mg/L]		Measured concentration in soils [mg/kg]		Measured concentration in groundwater [mg/L]		Guideline concentrations in the receiving environment waters ^a [mg/L]
	Median	95% percentile	Median	95% percentile	Median	95% percentile	
Ammoniacal Nitrogen (as N)	895	1295	-	-	0.01	0.15	2.84
Total Kjeldahl Nitrogen (as N)	1800	2195	-	-	-	-	-
Nitrite (as N)	0.74	2.09	-	-	0.002	0.031	-
Nitrate (as N)	1.28	2.00	-	-	0.082	3.80	-
Total Nitrogen (as N)	1900	2490	0.09	750	-	-	-
Total Phosphorus	310	458	18	84	-	-	-

^a ANZG/ANZECC guideline values for slightly to moderately disturbed marine ecosystems unless otherwise stated.

8.6.4 Organic and microbiological contaminants

Organic contaminants have not been assessed given the trace to low values in the biosolids.

Concentrations of microbiological contaminants are generally undetectable or very low due to the ATAD biosolids processing requirements. If microbiological contaminants are present in the biosolids at concentrations below detection, these contaminants are likely to be buffered or filtered in the subsurface such that concentrations at receptors are **negligible**.

²³ Sourced from Table 2.4 in Appendix H of this AEE.

8.6.5 Nutrient loading to coastal environment

Nitrate can move readily through unconfined aquifers and into the coastal environment. A fate and transport modelling exercise has been undertaken to understand potential adverse effects of nitrate. A conservative mass-balance approach was used to estimate the annual loading of nitrogen into the Waimea Inlet based on mean concentrations of Total Kjeldahl Nitrogen and Ammoniacal nitrogen reported for the biosolids, as well as mean annual biosolids application volumes and rates.

The annual loading of nitrogen potentially available to discharge into the surrounding environment is estimated to be approximately 14 tonnes per year. This mass would represent 3% and 0.8% of the reported mean annual cumulative nitrogen loads for the Waimea Inlet and Tasman Bay catchments, respectively. This is a conservative estimate of annual loading of nitrate, as it does not consider attenuation of nitrogen in the unsaturated zone or in groundwater. It is assumed that ammonium and other nitrogen is converted to nitrate.

The maximum nitrate-N concentration predicted in groundwater at 50 m from the source is approximately 18 mg/L, with the peak concentration expected to occur between four and five years after the release. Mixing of affected groundwater with marine water in the Waimea Inlet will reduce the peak nitrate-N concentrations significantly. Conservative estimates of the estuary flow adjacent to Rabbit Island indicate the nitrate-N concentrations would be approximately 0.00035 mg/L in the Waimea Inlet. Potential effects of these concentrations in the coastal environment is considered in the following section.

8.7 Effects on coastal values

A detailed assessment of the actual and potential effects on the coastal environment is contained in **Appendix I**. Key information is summarised below.

8.7.1 Assessment method

The present assessment has adopted the assumption that any adverse ecological effects will be most detectable at the point where groundwater enters the coastal environment. To identify any such effects, consent monitoring data collected to date has been reviewed.

Monitoring of the coastal environment under the existing consent consists of intertidal surveys along the southern side of Moturoa/Rabbit Island. The monitoring is focussed here because groundwater flow is towards the southwest. Sediment samples are collected 6-yearly at each of 12 locations and analysed for grain-size, nutrients and trace metals, and the salinity of seepage water is measured. To identify possible ecological effects, the amount of micro- and macroalgae on the sediment surface is recorded in situ and the composition of the assemblages of animals living in the sediment is quantified. Concentrations of trace metals and faecal indicator bacteria are measured in shellfish. A baseline survey was done in 1996 and subsequent surveys in 2003, 2008, 2014 and 2019.

Water-quality data in the Waimea Inlet is also collected on behalf of NRSBU as part of the assessment of effects and monitoring for discharges from the Bell Island WWTP. The compliance of these data with TDC water-quality standards is assessed to provide a general assessment of water quality in the Inlet, to which groundwater from Moturoa/Rabbit Island contributes.

The relative contribution of biosolids application, via groundwater seepage, to the nitrogen budget of Waimea Inlet is also assessed. The estimated nitrogen load from groundwater seepage is derived from measured concentrations from the groundwater monitoring programme and estimated rates of groundwater flow. The latter is described in the groundwater report in **Appendix H**.

8.7.2 Metals

The intertidal monitoring to date has shown no symptoms of organic enrichment (e.g. excessive algal growth, sediment anoxia and presence of hydrogen sulphide) at most transects, including reference transects. Evidence of enrichment has been recorded at some sites near biosolids application areas, but this has not been consistent among surveys. Furthermore, extensive algal mats were reported in the channel between Moturoa/Rabbit Island and Rough Island during the baseline survey before application of biosolids began. Blooms have also been found in other, localised areas of Waimea Inlet unrelated to application. This spatial and temporal variability suggests that periodic, local evidence of enrichment is likely to represent natural seasonal and interannual patterns of algal growth.

Consistent changes in sediment texture have occurred over successive surveys at some transects, but comparisons of application and reference transects suggest that they are not related to biosolids application. Changes in organic matter and TN tend to reflect changes in sediment texture over time, and there was no pattern of change that would suggest an effect of biosolids application. Rather, the increases in mud and organic matter at some sites is likely to reflect the generally increasing muddiness of Waimea Inlet over time, identified from state-of-the-environment monitoring.

Increases or decreases in the concentrations of arsenic and some trace metals over time at some transects do not show patterns that might suggest that application of biosolids was causing an accumulation of these metals. For example, concentrations of copper, nickel and zinc have increased at reference transects in addition to some application transects. Concentrations of most metals are lower than guideline values for the protection of aquatic life, the notable exceptions being chromium and nickel. These latter metals occur naturally at relatively high concentrations in coastal sediments in the Nelson region and derive from mineral-belt soils in the catchment. Observed variations in their concentrations among monitoring transects is likely to reflect proximity to the mouth of the Waimea River, the main source of sediment.

Concentrations of arsenic and nickel have been consistently elevated in cockles during the monitoring programme, and often exceed guidelines for human consumption. The fact that this is observed at both reference and application transects (and at other locations in Waimea Inlet) suggests that natural background contamination is the cause, rather than an effect of biosolids application.

Overall, the results of the monitoring programme indicate that application of biosolids to land on Moturoa/Rabbit Island has **less than minor** adverse effects on the enrichment or contaminant status of intertidal habitats around Moturoa/Rabbit and Rough islands.

8.7.3 Nutrients

Nutrient concentrations in the waters of Waimea Inlet do not exhibit an effect of biosolids application and are below levels that would be expected to occur in estuaries with high frequency of phytoplankton blooms or problematic benthic algal growths. Most parts of Waimea Inlet experience strong tidal flushing and short water retention times, which mitigate the risk of nutrient enrichment.

Based on groundwater monitoring and modelling, the estimated potential concentration of 18 mg/L of nitrate-N in groundwater at the point of discharge into the coastal environment suggests a biosolids contribution of approximately 3% and 0.8%, respectively, to the reported mean annual cumulative nitrogen loads to Waimea Inlet and Tasman Bay from their catchments. Modelled nitrate concentrations in groundwater suggest that this source contributes < 0.2% to measured concentrations of Dissolved Inorganic Nitrogen (DIN) at reference sites in Waimea Inlet.

Although the discharge of some organic matter and nitrogenous compounds to Waimea Inlet from biosolids application is of moderate likelihood, the rate and load are likely to be small, both in absolute terms and relative to other inputs to the Inlet and the magnitude of effect is therefore expected to be low / minor. Consistent with these expectations, there is no evidence of accumulation of organic matter and nitrogen adjacent to application areas, relative to the general increase in muddiness and associated organic matter over time throughout Waimea Inlet. The spatial scale of potential effects is medium (hundreds of metres) in the case of effects on the intertidal area adjacent to application areas but large (kilometres) in terms of effects on Waimea Inlet. Any enrichment that might occur will persist for the duration of the application programme to particular areas, but will then be degraded by microbial activity in the sediments and water column. Consequently, the risk of adverse effects from cumulative nutrient enrichment of intertidal sediments and the wider Waimea Inlet due to future application of biosolids is likely to be **less than minor**.

8.7.4 Microbiological

Potential microbiological effects, insofar as they area potential risk to human health, are considered further in Section 8.9 of this report.

8.7.5 Effects on marine ecology values

The receptors most likely to be affected are the adjacent intertidal areas and the communities of organisms living in them. Around Moturoa/Rabbit Island these do not contain any organisms of special ecological or conservation value, but they do provide food for fish and birds, some of which are listed as Threatened or At Risk. The area potentially affected is small, relative to the total intertidal area available to fish and birds in Waimea Inlet, so the value of the potentially affected area is considered moderate. Waimea Inlet as a whole, is considered to be of high value, notably the diversity of habitats including those that support Threatened and At Risk species.

The level of ecological risk is derived from a combination of the value of the ecological feature and the magnitude of the effect. The approach to risk assessment was based on modifications of those proposed by the Environment Institute of Australia and New Zealand (EIANZ, 2015) and Burgman (2005). The levels of risk were derived from the sequential consideration of the following factors:

- The ecological value of the organisms or habitats affected,
- The spatial scale and duration of the effect,
- The magnitude, or consequences, of the effect occurring, and
- The likelihood of the effect occurring.

Table 8.3 overleaf provides a summary of the potential ecological effects on the coastal receiving environment as a result of the proposal. Overall, all potential effects on ecological values from nutrients, organic matter, and metals – irrespective of whether they are sourced from groundwater or surface runoff sources – are assessed as less than minor. The ongoing use of a 50 m buffer from MHWS for applying biosolids, ensures that any potential adverse effects from surface runoff effects will remain at a **negligible** level.

Table 8.3: Summary of potential ecological effects on the coastal receiving environment of the application of biosolids

Source: Table 7 in the report in Appendix I. Please refer to the report for the full definitions of the terms used in the table.

Potential environmental effect	Ecological feature	Value	Spatial scale of effect	Duration of effect	Magnitude of effect	Likelihood of effect	Level of risk	Mitigation options	Residual risk
Inputs of nutrients and organic matter via groundwater seepage	Biota of intertidal sediments adjacent to application areas	Moderate	Medium	Persistent (duration of activity)	Low / minor (based on monitoring)	Moderate	Less than minor	NA	
	Habitats and biota of wider Waimea Inlet	Very high	Large	Persistent (duration of activity)	Negligible (based on relative load)	Moderate	Less than minor	NA	
Inputs of trace metals and other toxicants via groundwater seepage	Biota of intertidal sediments adjacent to application areas	Moderate	Medium	Persistent (beyond duration of activity)	Low / minor (based on monitoring)	Moderate	Less than minor	NA	
	Habitats and biota of wider Waimea Inlet	Very high	Large	Persistent (beyond duration of activity)	Negligible (based on relative load)	Moderate	Less than minor	NA	
Inputs of nutrients and organic matter via surface runoff	Biota of intertidal sediments adjacent to application areas	Moderate	Medium	Persistent (duration of activity)	Low / minor (based on monitoring)	Moderate	Less than minor	Existing buffer zones	Negligible
	Habitats and biota of wider Waimea Inlet	Very high	Large	Persistent (duration of activity)	Negligible (based on relative load)	Moderate	Less than minor	Existing buffer zones	Negligible
Inputs of trace metals and other toxicants via surface runoff	Biota of intertidal sediments adjacent to application areas	Moderate	Medium	Persistent (beyond duration of activity)	Low / minor (based on monitoring)	Moderate	Less than minor	Existing buffer zones	Negligible
	Habitats and biota of wider Waimea Inlet	Very high	Large	Persistent (beyond duration of activity)	Negligible (based on relative load)	Moderate	Less than minor	Existing buffer zones	Negligible

8.8 Effects on air quality (odour)

A detailed assessment of the actual and potential effects of odour generation from biosolids application is contained in the report in **Appendix L**, entitled “*Environmental Effects of Discharges of Odour to Air from Moturoa/Rabbit Island Biosolids Application to Land*”. Key information is summarised below.

8.8.1 Assessment method

An odour assessment has been undertaken using the industry recognised “FIDOL” factors, where:

- **F** refers to the frequency of odour impact,
- **I** to the intensity,
- **D** to the duration of exposure,
- **O** to the extent of offensiveness, and
- **L** to the location of the nuisance, having regard to the sensitivity of the receiving environment.

Contributing to this assessment has been a review of the environmental setting (including sensitive receptors as highlighted in 6.1 of this AEE), current biosolids application method, and the complaint history with respect to records held by NRSBU and TDC.

8.8.2 Evaluation

The key sensitive receptors who may be impacted by odour releases arising from the application of biosolids are:

- Recreational users of Moturoa/Rabbit Island,
- Mapua residents (during easterly and south-easterly winds), and
- Best Island residents (from the north-westerly or westerly quarters. although noting these conditions are relatively infrequent).

With respect to the recreational users and Mapua residents, the odour complaints register identifies no complaints from these groups. While complaints have been received from Best Island residents, the records are punctuated by doubt about the precise cause of many of the individual odour events. Investigation of these events has also often not been able to ascertain a conclusive source of odour. In a considerable number of cases it has been established that the WWTP has been the source of odour initially described as being “likely to be from biosolids disposal” on Moturoa/Rabbit Island.

Any adverse environmental effects of odour from biosolids application process are linked to the prevailing climatic conditions, principally with respect to wind speed and direction, which may carry odour plumes towards the sensitive receptor locations. Based on the limited complaints history, as outlined above, and the successful operation of the biosolids disposal activity over a 24-year period, the adverse effects of odour emissions from the activity can be described as minor.

The application method and location is flexible so that further improvements can be made where these may assist to limit odour releases but still achieve the same end results with respect to assisted growth of the forest tree stands.

Further certainty as to the ongoing effectiveness of odour management from the biosolids disposal activity can be ensured by the application of odour management procedures in the BMP, supplemented by the adoption of various additional mitigation measures, including:

- That the application method is managed to reach a balance between the extent of pressure applied to facilitate an efficient biosolids application methodology and any over-pressure which results in excessive aerosol droplet formation,
- The development of a management app to allow proactive and effectively instantaneous management of the biosolids application process with positive implications for effective odour control,
- The planned installation of covers on the holdings tanks at the BAF,
- Two travelling-irrigator kits which promote greater ability for the biosolids operation to adapt to changes in wind direction, and
- An operational commitment to not apply biosolids to those parts of the Island that are frequented by recreational users during the summer months.

The **Appendix L** report concludes that with respect to odour, the existing operation has only minor adverse environmental effects based on a limited odour complaints history over a lengthy (24-year) period of operation, and that these effects can be mitigated through a combination of:

- The standard “no offensive or objectionable” odour condition,
- A robust, detailed and regularly reviewed stand-alone chapter in the BMP, and
- The further aspects of mitigation now proposed.

With the mitigation applied the adverse effects resulting from odour emissions from the biosolids operation at Moturoa/Rabbit Island will be reduced to **less than minor**.

In addition to the mitigation outlined above NRSBU volunteers to extend the odour patrol condition imposed on the WWTP suite of consents to the biosolids operation on Moturoa/Rabbit Island.

8.9 Effects on public health

A detailed assessment of the actual and potential effects on public health is contained in **Appendix M**. Key information is summarised below.

Recreational water quality at and around Moturoa/Rabbit Island is recorded at the sites identified in Figure 8.1 overleaf.

Recreational water quality at the two sites on Moturoa/Rabbit Island (‘Main Beach’ and ‘Back Beach’ in Figure 8.1) is generally good to very good. The Main Beach site has the highest recreational water quality in the Nelson-Richmond area. Recreational water quality at the Back Beach site is likely to be influenced by the Waimea River, but is similar to that at Monaco Beach and Tahunanui, Nelson. Under typical conditions, health risks range from:

- “no observable adverse effect level” (Main Beach site) to, and
- 1–5% gastrointestinal illness risk, 0.3–1.9% acute febrile respiratory illness risk at the Back Beach site (consistent with “good” recreational water quality).

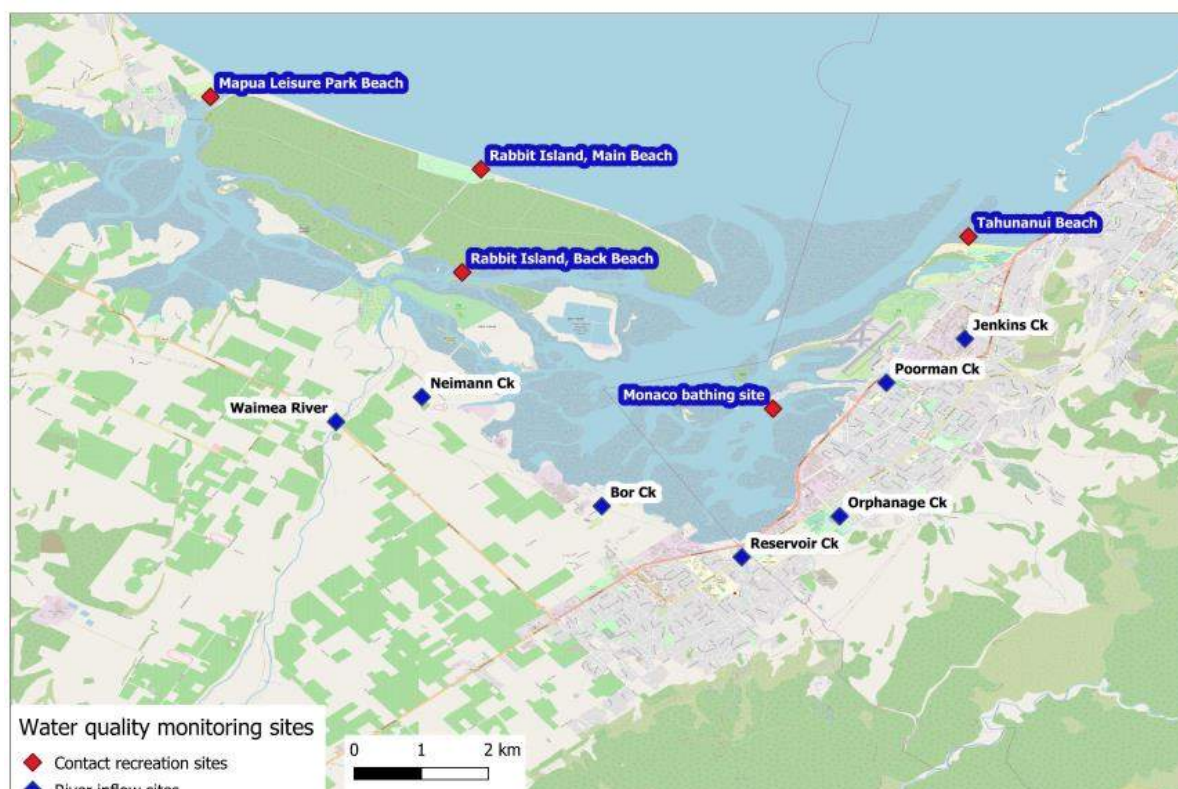


Figure 8.1: Recreational water quality monitoring sites²⁴.

Monitoring data at the WTPP indicates that biosolids are consistently stabilised, and that concentrations of key viral pathogens are less than the analytical limit of detection. Recent *E. coli* concentrations have consistently complied with guideline standards and measurable effects on coastline water quality is very unlikely.

Salmonella concentrations are consistent and low (<10 MPN/g), but the sensitivity of the analytical test has not made it possible for NIWA to determine whether the recommended guideline standards are being met. This is not a serious limitation as several international studies have indicated that *Salmonella* have sensitivity to elevated temperatures as *E. coli*. Protozoan concentrations (*giardia* and *cryptosporidium*) are likely to be reduced through the stabilisation process, but no “before” data exists to assess removal efficacy and there is no standard against which to assess the results.

The hydrogeological assessment (**Appendix H**) suggests that groundwater moves from the north east to the southwest, discharging either into the west branch of the Waimea Inlet (which passes the Mapua settlement), or to the east branch of the Waimea Inlet to the north of Bell Island. The low concentration of most measured faecal contaminants in the stabilised biosolids suggest that a relatively small load of microbial contaminants is applied to the forests, and these contaminants are unlikely to have a measurable effect on coastal water quality. Existing recreational monitoring indicates that this is the case.

From the data and information available, the application of stabilised biosolids to forests on Moturoa/Rabbit Island have not had a measurable effect on coastal microbial water quality. There is no detectable risk to recreational water users in Waimea Inlet or southern Tasman Bay.

Within the forested area, several factors, including the very small concentrations of residual microbial contaminants in the heat-treated stabilised biosolids, the use of relatively low-pressure

²⁴ Sourced from Figure 2-2 in Appendix M of this AEE.

spray systems, the presence of trees that operate as shelterbelts, and the physical barriers and signage used to exclude and warn the public, combine to reduce public health risks to **less than minor**.

8.10 Effects on terrestrial ecology

8.10.1 Significant values outside application area

As noted in Section 6.10, all Significant Native Habitats on Moturoa/Rabbit Island have previously been mapped for the purposes of the RMP. These are currently excluded from the biosolids application area under the existing consents and will remain so under the proposed consents. Therefore, any adverse effects on terrestrial ecology in these excluded areas can be expected to be **negligible**.

8.10.2 Native vegetation

The *pinus radiata* plantation forestry to which biosolids are applied is a highly modified environment. Any native vegetation is limited and subject to regular removal or disturbance during forestry operations. The biosolids application occurs via travelling irrigators and does not significantly increase that level of disturbance. On this basis, any adverse effects on native vegetation are considered **less than minor**.

8.10.3 Birds

There are no 'Threatened' or 'At Risk' birds occurring in the plantation forest on Moturoa/Rabbit Island. While there are significant nesting and roosting sites at both the western and eastern ends of the island the biosolids application occurs at distance from both these locations.

Other native and introduced species (including game birds) within the plantation forest have the potential to be affected by biosolids spraying, particularly in the nesting season. However, the overall populations are unlikely to be affected by biosolids spraying.

While there is potential for emerging organic contaminants to impact birds, monitoring completed to date has identified no accumulation of per- and poly-fluoroalkyl substances and perfluorooctanoic acid in the top-soil. On this basis such there is no immediate concern for these substances to pose a risk to birds on Moturoa/Rabbit Island. The potential effects of pharmaceuticals on birds are little studied, but based on current knowledge do not appear to be cause for concern at present.

On the foregoing basis, any adverse effects on birds can be expected to be **less than minor**.

8.10.4 Lizards

When considering the history of disturbance and severe environmental modification within the proposed disposal footprint, including the application of biosolids since 1996, as well as the periodic disturbance associated with forest harvesting, it is unlikely that ongoing biosolid application within the proposed disposal footprint will result in any significant additional loss of potential lizard habitat or populations from this area.

The potential habitat proposed to be disturbed by ongoing biosolids application has a paucity of lizard records, and species are most likely to occur in less disturbed areas on the Moturoa/Rabbit Island coastal margins, outside of the proposed application footprint.

A standard tool used to assess significance of effects is the matrix approach is described by the EIANZ. The EIANZ matrix approach, and the guidelines within which it is included, has been developed as a guide for ecologists undertaking effects assessments under the RMA.

The actual or potential adverse effects on native lizard values that may result from the proposed works programme are considered to be very low under the EIANZ criteria. Under the RMA this should be interpreted as a **negligible** ecological effect.

8.11 Effects on landscape and natural character

Effects of the proposed activities on landscape and natural character are already established and have existed under the existing resource consents since 1996. In addition, the BAF and biosolids application facility coincide with a commercial forestry operation, which has existed since the 1960's and has modified the landscape from its natural state.

The BAF is contained within a small forest clearing which is not accessible by the general public. External views of the site are not possible except from the air.

The biosolids application process currently utilises up to two heavy duty travelling irrigators operating within an overall application area of 778 ha. In general, these operations are not visible to the public or from the coastal marine area except when they are located close (adhering to the set buffer area setbacks) to recreation areas. The use of these machinery within the forest is similar to what could be expected for the commercial forestry operation. The 50 m buffer from the coastal marine area is expected to limit any adverse effects on that area.

Overall, the activity is considered to have **less than minor** adverse effects on landscape and natural character within the context of a commercial forestry environment which is highly modified from its natural state.

8.12 Effects from natural hazards

As discussed in Section 6.12, at the present time approximately 6% of the biosolids application area on Moturoa/Rabbit Island is potentially affected by a 1 in 100 year storm-tide event. Storm-tide events include the effects of storm surges and wave setup during storms. An event extending into the biosolids application area has not occurred in the last 24 years. Should such an event occur in the future then NRSBU would review, in conjunction with any wider mitigation proposed by TDC and PF Olsen, whether the affected area should remain in the biosolids application area. NRSBU also proposes a six-yearly monitoring and technology review, as a condition of consent, which would provide an ongoing assessment of any impacts from climate change, and any subsequent adjustments required to the biosolids application activity, throughout the consent term.

Based on guidance from the Ministry for the Environment, approximately 0.5 m of sea level rise may occur by approximately 2060. Based on the 35-year consent duration sought (to 2055) this scenario could partly progress within that term.

The extent of MHWS inundation and 1% AEP storm-tides under the 0.5 m scenario is shown in Figure 6.6 of this AEE. Again, it is important to note that this modelling assumes the present day Moturoa/Rabbit Island landform is not modified by accretion or erosion and no mitigation (coastal protection) is implemented to reduce the magnitude and extent of those effects. Under this scenario, only 2% of the biosolids application area is potentially affected by inundation and 14% by a 1% AEP storm-tide. The BAF facility remains unaffected. However, the coastal margins and access to the island are affected to a greater degree. As above, should this impact eventuate then NRSBU would review whether the affected area should remain in the biosolids application area. Removal of this area would not impact on the ability of the remaining obligations and environmental bottom lines of the consent to be met.

The NZCPS requires Councils to avoid risk from coastal hazards of at least 100 years. Importantly, the biosolids application activity involves moveable plant and machinery and is therefore readily adaptable. The BAF infrastructure also largely consists of portable facilities although there are some

more permanent components. However, the BAF only begins to be potentially impacted towards the 1.5 m SLR scenario and if necessary, it could be relocated or disestablished long before that scenario played out.

The continued use of a 50 m buffer from MHWS, which is dynamic in that it will continue to move according to any future sea level rise, is considered an appropriate mechanism to continue limiting the potential for any adverse effects from surface runoff to the coastal marine area. The assessment in Table 8.3 earlier in this AEE concludes that with that buffer in place those effects will be negligible.

As discussed further in Section 11, and noted above, NRSBU proposes a 6-yearly monitoring and technology review which includes, among other things, an ongoing assessment of the impacts of climate change. This will ensure that any movements of MHWS as a result of climate change can be factored into the future application of biosolids.

9 Statutory assessment

9.1 Section 104 of the RMA

Section 104(1) of the RMA sets out the matters to which a consent authority must have regard to, subject to Part 2 of the RMA, when considering an application for resource consent. These are:

- Any actual and potential effects on the environment of allowing the activity (refer Section 8 above),
- Any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity,
- Any relevant provisions of:
 - A national environmental standard,
 - Other regulations,
 - A national policy statement,
 - A New Zealand coastal policy statement,
 - A regional policy statement or proposed regional policy statement, and
 - A plan or proposed plan.
- Any other matter the consent authority considers relevant and reasonably necessary to determine the application.

These matters are considered further in the sections below.

Section 104(2A) states that the consent authority, when considering an application affected by section 124 for a new consent to replace an existing consent, must have regard to the value of the investment of the existing consent holder. The value of the investment has been discussed under the positive effects of the proposal in Section 8.2 of this AEE.

9.2 Sections 105 and 107 of the RMA

Sections 105 and 107 are relevant to applications for discharge permits under section 15. Section 105 requires the consent authority to have regard to:

- (a) *the nature of the discharge and the sensitivity of the receiving environment to adverse effects* – refer to Sections 3, 4, 6 and 8 of the report; and
- (b) *the applicant's reasons for the proposed choice* – refer to Sections 2 and 3 of this report
- (c) *any possible alternative methods of discharge, including discharge into any other receiving environment* – refer to Section 5 of this report.

Section 107 restricts the granting of discharge permits in certain circumstances, namely if, after reasonable mixing, the contaminant or water discharged (either by itself or in combination with the same, similar, or other contaminants or water), is likely to give rise to all or any of the following effects in the receiving waters:

- The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials,
- Any conspicuous change in the colour or visual clarity,
- Any emission of objectionable odour,
- The rendering of fresh water unsuitable for consumption by farm animals, and
- Any significant adverse effects on aquatic life.

The effects of the discharge have been considered in Section 8 above and in the appended technical reports. The discharges are considered to meet the tests set out in section 107(1)(c) to (g).

9.3 Part 2 of the RMA

Part 2 of the RMA sets out the purpose and principles of the Act. The purpose of the RMA under Section 5 is to promote the sustainable management of natural and physical resources.

Recent Court of Appeal case law (*RJ Davison Family Trust v Marlborough District Council* [2018] NZCA 316) has found that the decision in the *Environmental Defence Society Inc v The New Zealand King Salmon Co Ltd* [2014] 1 NZLR 593 does not extend to preventing recourse to Part 2 in the case of resource consent applications under s104. The reference to Part 2 in section 104(1) “enlivens ss 5-8 in the case of applications for resource consents”. But, where a plan is clear and directive and clearly deals with Part 2 subject matter, then recourse to Part 2 may not add much in the final judgement.

While acknowledging *Davison* [2018], we have not undertaken an assessment of whether the plans have been competently prepared. Therefore, an assessment against Part 2 is provided below, to assist in the event that it is determined a Part 2 assessment is required.

The proposal is considered to be consistent with the purpose of principles of the Act as set out in Part 2. The applications provide for the continued application of biosolids at Moturoa/Rabbit Island, which is a beneficial use of a product generated from the treatment and management of wastewater at the WWTP. The activity enables people and communities to provide for their social, economic and cultural well-being and for their health and safety while safeguarding the life-supporting capacity of air, water, soil and ecosystems. Any potential adverse effects on the environment will be appropriately avoided, remedied and mitigated as outlined in Section 8 of this AEE.

Section 6 of the RMA sets out the matters of national importance and is addressed in Table 9.1 below.

Table 9.1: Section 6 RMA Assessment

Section 6 matter	Assessment
(a) The preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:	Addressed in Sections 8.7 and 8.11 of this AEE. The assessment concludes any adverse effect on the coastal marine area to be less than minor or negligible, meaning the activity does not impinge on the preservation and protection of the coastal environment.
(b) The protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development:	Not applicable. The relevant planning documents do not identify Moturoa/Rabbit Island as having any outstanding natural features or landscapes.
(c) The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:	Addressed in Sections 8.7 and 8.10 of this AEE. The biosolids application area is on commercial forestry land which is highly modified from its natural state. All identified significant native habitats are excluded from the biosolids application area.
(d) The maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:	Addressed in Section 8.4 of this AEE. Public access to the coastal marine area on Moturoa/Rabbit Island is not affected by the proposed activities. There are no lakes or rivers.

Section 6 matter	Assessment
(e) The relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:	Addressed in Section 8.3 of this AEE. Guidance contained in the relevant iwi management plans is also addressed in Section 9.10. Consultation with iwi is ongoing.
(f) The protection of historic heritage from inappropriate subdivision, use, and development:	Addressed in Section 4.3.5 and 8.3 of this AEE. All archaeological sites are excluded from the biosolids application area.
(g) The protection of protected customary rights:	Addressed in Section 8.3 of this AEE. Guidance contained in the relevant iwi management plans is also addressed in Section 9.10. Consultation with iwi is ongoing.
(h) The management of significant risks from natural hazards.	Addressed in Section 8.12 of this AEE. The biosolids application area is not subject to a significant risk from natural hazards within the consent term sought.

Section 7 of the RMA sets out other matters to be considered. Table 9.2 below considers matters of particular relevance to the proposed activities.

Table 9.2: Section 7 RMA Assessment

Section 7 matter	Assessment
(a) Kaitiakitanga:	Addressed throughout several sections of the AEE, notably Sections 8.3 to 8.10. Guidance contained in the relevant iwi management plans is also addressed in Section 9.10. Consultation with iwi is ongoing.
(aa) The ethic of stewardship:	
(b) The efficient use and development of natural and physical resources:	The beneficial reuse of biosolids is the continuation of an activity which has occurred for the past 24 years and eliminates any investment in alternatives which may use other natural and physical resources.
(c) The maintenance and enhancement of amenity values:	Addressed in Sections 8.4 and 8.11 of this AEE. The use of exclusion zones and other environmental controls significantly reduces any impacts on amenity values.
(d) Intrinsic values of ecosystems:	Addressed in Sections 8.7 and 8.10 of this AEE. The biosolids application area on Moturoa/Rabbit Island has highly modified habitats (commercial forestry). Any adverse effects on terrestrial or coastal ecosystems have been assessed as less than minor or negligible.
(f) Maintenance and enhancement of the quality of the environment:	Addressed throughout Section 8 of this AEE. Comprehensive monitoring of the activities over the last 24 years, within a commercial forestry setting, has not shown any reduction in the quality of the environment.
(g) Any finite characteristics of natural and physical resources:	Potential effects on soil, groundwater and coastal resources have respectively been addressed in Sections 8.5, 8.6, and 8.7 of this AEE. Subject to ongoing monitoring the continued application of biosolids does not affect any finite characteristics of those resources.
(i) The effects of climate change:	Addressed in Section 8.12 of this AEE. Within the term of the consents sought any effects of climate change are anticipated to be limited.

Section 8 directs that the principles of the Treaty of Waitangi (Te Tiriti o Waitangi) are taken into account when managing the use, development and protection of natural and physical resources. Iwi have been consulted during the preparing of this application and this will continue into the future. Section 9.10 of this AEE considers the proposal relative to iwi management plans.

9.4 National Environmental Standards

9.4.1 National Environmental Standards for Air Quality 2004

The National Environmental Standards for Air Quality (NESAQ) places restrictions on discharges of a number of combustion derived contaminants, specifically in relation to the concentrations of fine particulate matter. The discharge to air associated with the application of biosolids will not involve any contaminants listed in Schedule 1 of the NESAQ, and therefore the NESAQ is not relevant to this application.

9.4.2 National Environmental Standards for Plantation Forestry 2017

The forestry operation on Moturoa/Rabbit Island, managed by PF Olsen on behalf of TDC, is subject to the National Environmental Standards for Plantation Forestry (NES-PF). The purpose of the standards is to maintain or improve the environmental outcomes associated with plantation forestry activities and increase the efficiency and certainty of managing plantation forestry activities. The forestry operations are not directly relevant to the resource consents being considered under this AEE.

9.4.3 National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health

The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES Soil) apply to earthworks that take place on land that is known or suspected to be contaminated. Moturoa/Rabbit Island is not listed on the TDC's Hazardous Activities and Industries List (HAIL) and no soil disturbance is proposed as part of these applications. Given this, the NES Soil is not considered relevant to this application.

9.4.4 National Environmental Standard for Sources of Human Drinking Water

The National Environment Standard for Sources of Human Drinking Water (NES-HDW) provides a regulatory framework to reduce the risk of contaminating drinking water sources such as rivers and groundwater. This does not apply to the water source itself, rather, considers the effects of other activities within the catchment on drinking water supply.

As noted in Section 8.6, there are no groundwater bores used for drinking water purposes on Moturoa/Rabbit Island. All potable water supply on the island is sourced from a water main linked to Mapua. Therefore the NES-HDW is not considered relevant to this application.

9.5 National Policy Statements

9.5.1 New Zealand Coastal Policy Statement 2010

The New Zealand Coastal Policy Statement 2010 (NZCPS) applies to these applications as the proposed works are located within and adjacent to the coastal marine area. The NZCPS seeks to protect the characteristics, qualities and uses of the coastal marine area, while continuing to promote sustainable management.

An assessment of the relevant objectives and policies of the NZCPS is included in **Appendix N**. The proposed activities are considered consistent with the objectives and policies of the NZCPS.

9.5.2 National Policy Statement for Freshwater Management

The National Policy Statement for Freshwater Management (NPS-FM) directs regional councils, in consultation with their communities, to set objectives for the state of freshwater bodies in their regions and to set limits on resource use to meet these objectives. The NPS-FM is relevant to the potential effects of groundwater on Moturoa/Rabbit Island.

An assessment of the relevant objectives and policies of the NPS-FM are included in **Appendix N**. The proposed works are considered consistent with the objectives and policies of the NPS-FM.

9.6 Regional Policy Statements

The Tasman Regional Policy Statement (TRPS) became operative on 1 July 2001. It provides a strategic direction in which to promote sustainable resource management in the Tasman district. The Nelson Regional Policy Statement (NRPS) is relevant to the applications in part, due to it being relevant to some of the coastal waters within Waimea Inlet and Tasman Bay.

The proposed works are considered consistent with the objectives and policies of the TRPS and NRPS. For a full assessment of all the relevant objectives and policies, see **Appendix N**.

9.7 Tasman Resource Management Plan

The TRMP contains objectives, policies, and rules in which to manage issues affecting people and communities, ecosystems, land, rivers and air and water in the Tasman district.

The proposed activities are considered consistent with the objectives and policies of the TRMP. For a full assessment of all of the relevant objectives and policies, see **Appendix N**.

TDC are currently undertaking a review of the TRMP (and TRPS) with the intent of producing a new Tasman Environment Plan. This review is likely to include the necessary changes to give full effect to the NZCPS. Similarly, TDC are embarking on the preparation of an adaptive planning strategy to respond to climate change impacts in the region. However, at the current time these documents have not been released so have not been assessed in this AEE.

9.8 Moturoa/Rabbit Island Reserve Management Plan

Moturoa/Rabbit Island is identified as a reserve area and hence is managed in accordance with the Reserves Act 1977. The RMP sets out the vision, objectives, policies and priorities for Moturoa/Rabbit Island, Rough Island and Bird Island for the next ten years.

As has been discussed throughout this AEE, the activities subject to the current applications are fully consistent with the RMP. The RMP provides for biosolids application occurring on Moturoa/Rabbit Island and includes a detailed section covering the related issues and opportunities, objectives, and policies. A detailed assessment of the proposal against relevant provisions in the RMP is contained in **Appendix N**.

9.9 Waimea Inlet Strategy

The Waimea Inlet Strategy (2010) brings together the communities of Tasman and Nelson and the many groups who have an interest in and a commitment to the Waimea Inlet and its sustainable future. It assists with guiding the decision making of TDC and NCC across all departments influencing not only statutory resource management but also provision of infrastructure, services and all areas of council involvement. Given the effects assessments earlier in this report, which conclude less than minor or negligible effects on the ecosystem and water quality values of Waimea Inlet, the proposed activities are consistent with the strategy.

9.10 Iwi Management Plans

The following iwi management plans have been lodged with TDC:

- Pakohe Management Plan 2015 (Ngati Kuia),
- Nga Taonga Tuku Iho Ki Whakatū Management Plan 2004 (Ngati Rarua, Rangitira, Te Atiawa, Ngati Koata, Ngati Tama),
- Iwi Management Plan 2002 (Ngati Koata),
- Te Tau Ihu Mahi Tuna (Eel Management Plan) 2000 (all Iwi), and
- Environmental Management Plan 2018 (Ngāti Tama).

The plans set out the iwi's values, interests and priorities for natural resource management. They are a tool for iwi and local authorities, government agencies and natural resource users to identify and acknowledge the relationship of iwi to ancestral land, water, fisheries, forests, and wāhi tapu and wāhi taonga.

For example, and of particular relevant to the present applications, the matters set out in section 12.4 of the Ngāti Tama Environmental Management Plan relate to the iwi's aspirations in relation to wastewater management. The following aspirations are of particular relevance:

- Active protection of Ngāti Tama wāhi tapu and resource gathering areas from wastewater contamination and degradation,
- Protection of cultural values in the management of wastewater infrastructure across the rohe,
- Areas where wastewater is treated and disposed of are:
 - Maintained or enhanced to protect the mauri of surrounding wāhi taonga,
 - Actively rehabilitated/restored in order to give something back to the environment, and
 - Develop and implement cultural health indicators to collect data and inform the management of areas.

As set out in Section 4, the application of biosolids will only be undertaken in designated forestry blocks on the island and will not result in the discharge of contaminants into the coastal marine area, hence protecting the mauri of surrounding wāhi taonga. Further, the annual hui condition proposed by NRSBU will provide a forum for Te Tau Ihu iwi to provide input into potential works or measures that could be undertaken to maintain natural character and ecological values of Moturoa/Rabbit Island and protect the Mauri of the Waimea Inlet.

9.11 Marine and Coastal Area (Takutai Moana) Act 2011

The Marine and Coastal Area (Takutai Moana) Act (MACAA) acknowledges the importance of the marine and coastal area to all New Zealanders and provides for the recognition of the customary rights of iwi, hapū and whānau in the common marine and coastal area. Public access to the common marine and coastal area is guaranteed by the Act.

Applications for recognition of customary interests had to be filed by 3 April 2017. Applications which include the coastal area surrounding Bell Island have been received from Ngāti Tama ki Te Tau Ihu and Te Atiawa o Te Waka-a-Maui Trust.

Relevant iwi authorities have been consulted through the preparation of the resource consent applications and this AEE. In response, iwi authorities will prepare Cultural Effects Assessments in due course.

10 Consultation

10.1 Overview

The NRSBU recognises that consultation is a key component of the resource consent application process. Accordingly, the NRSBU has undertaken consultation in a way that provides opportunities for key stakeholders to identify issues of concern, and to clarify, where possible, any such issues during the pre-consenting process.

10.2 Consultation objectives and outcomes sought

NRSBU has undertaken consultation in relation to re-consenting the biosolids application at Moturoa/Rabbit Island to achieve the following objectives:

- 1 Provide information on the project including environmental investigations, findings, and environmental effects,
- 2 Encourage involvement from all parties in the pre-consenting consultation stage of the project,
- 3 Actively engage with all parties to encourage them to convey in sufficient detail any issues and concerns that they may have,
- 4 Respond to feedback received and convey how their issues and concerns have been considered by the NRSBU, and
- 5 Ensure compliance with the statutory and legal requirements and best practice guidelines that govern the consultation process.

The desired outcomes sought are:

- An opportunity to participate in the consultation process is provided for all people and organisations interested in or affected by the project and that useful feedback is received to assist NRSBU decision making,
- Māori are consulted in accordance with the status afforded to them by way of legislative requirements, rather than just as the general public, and in a manner that meets their cultural or organisational needs,
- NRSBU provides quality information, delivered in simple language, to allow participants to understand the particulars of the project,
- Reliable, useful, and informed responses to consultation are received,
- All participants are satisfied that the consultation process has been conducted in a genuine and open-minded manner,
- All participants are satisfied that their responses have been considered and understand how their responses have been addressed,
- The NRSBU has a full record and an audit trail of a comprehensive consultation process to support any future actions, and
- The consultation process promotes open lines of communication between NRSBU and key stakeholders, potentially affected parties and interested parties past lodgement of the application and into the future.
- Compliance with the NRSBU strategic goals, and
- The Tasman District Council is satisfied that appropriate and effective consultation has been undertaken in accordance with Resource Management Act 1991 (RMA) best practice.

10.3 Tangata whenua

10.3.1 Iwi groups consulted

NRSBU recognises the status and importance of tangata whenua/Te Tau Ihu iwi and the important value they bring to resource management process. NRSBU engaged Aneika Young, cultural advisor and iwi liaison, to assist with facilitating discussion with the following iwi groups:

- Ngāti Koata,
- Ngāti Kuia,
- Ngāti Tama ki te Waipounamu,
- Ngāti Apa ki te Rā Tō,
- Te Rūnanga o Ngāti Rārua,
- Ngāti Toa,
- Te Ātiawa o te Waka a Māui, and
- Te Rūnanga a Rangitane ki Wairau.

10.3.2 Iwi consultation process

To date there have been multiple engagement processes with Te Tau Ihu iwi to ensure iwi understand the resource consent application and process:

- 1 An introductory email was sent to iwi in April 2020 highlighting the commencement of the engagement process, introducing NRSBU, outlining the feedback sought, and querying how iwi would like to be involved in the process,
- 2 A letter was sent to the above groups providing project information and seeking feedback on 7 May 2020. A copy of this letter is contained in **Appendix O**,
- 3 An Engagement Strategy was developed to provide an overview of consultation and best practice for engagement with Te Tau Ihu iwi, stakeholders, potentially affected parties and other interested parties for the resource consent application. The Engagement Strategy was sent to iwi and a copy is contained in **Appendix O**,
- 4 Iwi were invited to an initial information online hui held on 4 June 2020. The full minutes of this meeting are included in **Appendix P**. NRSBU delivered a presentation and Iwi had an opportunity to meet with the NRSBU project team and technical experts and ask questions about the project and process, and
- 5 Further email correspondence was sent out to iwi to respond to requests for further information and to gain their feedback on whether they would like to be involved in the preparation of CIAs.

Iwi consultation is still on-going. As a result of the engagement to date there has been discussion to look at developing a collaborative Te Tau Ihu iwi CIA report. It was agreed by some of the iwi groups that a waka approach to dealing with the CIA would be appropriate. If all iwi are in favour of a waka approach this would entail each of the respective iwi producing a report to best reflect their waka grouping²⁵. It is understood that these separate reports would then be incorporated to one CIA for these applications. Some iwi may wish to prepare an independent CIA and NRSBU will work with iwi to confirm the preferred approach. The expectation is that CIA will be developed following the lodgement of these applications so as to allow adequate time for iwi to confirm the approach to CIA, and to enable respective cultural values, issues and recommendations to be addressed.

²⁵ Ngāti Koata, Ngāti Toa and Ngāti Rārua affiliate to the Tainui waka. Te Ātiawa and Ngāti Tama affiliate to the Tokomaru waka and Ngāti Apa ki te Rā Tō, Ngāti Kuia, and Rangitane affiliate to the Kurahaupō waka.

10.3.3 Issues raised and NRSBU response

NRSBU recognises and acknowledges the long history and strong association of Te Tau Ihu iwi with Moturoa/Rabbit Island. It is clear from the discussions to date that Moturoa, and the surrounding environment including Waimea Inlet, holds very special significance to iwi.

Archaeological sites have been identified through prior processes; firstly, in the original consent application in 1994, and most recently updated in the RMP (September 2016). All identified archaeological sites continue to be excluded from biosolids application (refer Figure 6.3 earlier in this AEE). However, NRSBU acknowledges from the feedback received that the entire island is wāhi tapu and there may be other sites which have not been identified.

Feedback was received that an annual hui between NRSBU and iwi would facilitate ongoing dialogue about the effects of biosolids application and any remediation or enhancement actions required. Such a condition was recently included in the WWTP resource consents at Bell Island. NRSBU agrees this is a positive step and has proposed a similar condition on the consents subject to the current applications (see Section 11 and **Appendix Q** for proposed wording).

Several queries were raised at the pre-application hui around the availability of monitoring data, especially with respect to soils and the coastal environment. Monitoring data from the past 24 years of operation is comprehensive and has been assessed throughout this report and appended assessments; in particular the forestry and soils report in **Appendix G** and coastal environment report in **Appendix I**. Into the future this data will be shared with iwi through mechanisms such as the annual hui.

As noted earlier, NRSBU views the relationship and engagement with iwi as continuous and ongoing; the above feedback is not an endpoint. NRSBU looks forward to receiving the CIA(s) and continuing to work alongside iwi to facilitate positive outcomes for Moturoa/Rabbit Island and the wider environment.

10.4 Stakeholders and interested parties

10.4.1 Groups consulted

A letter was sent to the stakeholders and affected parties outlined below providing project information and seeking their feedback on 8 May 2020. A copy of the letter is included in **Appendix O**.

Stakeholders - Statutory bodies

- Nelson City Council
- Tasman District Council
- Department of Conservation
- Nelson Marlborough Conservation Board
- Nelson/Marlborough Fish and Game Council
- Nelson/Marlborough District Health Board (Public Health Department)
- Ministry for Primary Industries

Stakeholders - Environmental groups

- Friends of Nelson Haven and Tasman Bay
- Forest and Bird Protection Society
- Waimea Inlet Forum

Stakeholders – Significant Industry

- Nelson Pine
- Turners and Growers Global Limited
- Cedenco Foods New Zealand Limited
- Alliance

Potentially affected landowners and occupiers (in proximity)

- Best Island Residents
- Mapua Leisure Park
- Mapua Wharf commercial centre – including bike hire
- Greenacres golf club
- PF Olsen Limited

Other interested parties

- Mapua and Districts Community Association
- Mapua Ferry operator/Kiwi Journeys Bike Tours
- Mapua Boat Club
- Monaco Boat Club
- Vortex Wind Karting
- Rough Island Equestrian Park
- Nelson mountain bike club
- Nelson Orienteering Club
- Athletics Nelson

10.4.2 Issues raised and NRSBU response

From the 76 individual parties consulted a total of 14 parties provided written feedback. Despite the low response rate quality feedback was received which has assisted to inform the applications and NRSBU’s proposed consent conditions. Consultation was undertaken during the level 4 Covid-19 restrictions which may have presented challenges for those consulted. Table 10.1 below provides a summary of the issues raised along with NRSBU’s response and a summary of feedback received is contained in **Appendix P**.

Table 10.1: Key issues raised by stakeholders and interested parties and NRSBU response

Issue	NRSBU response
Positive effects associated with resource reuse and improved economic return from forestry	NRSBU agrees the proposal has many positive effects and is consistent with NRSBU's strategic objectives. Further discussion is contained in Sections 2 and 8.2 of this AEE.
Consistency with Moturoa/Rabbit Island Reserve Management Plan, Waimea Inlet Strategy, and other strategies/guidelines	NRSBU carries out the biosolids application in full compliance with the RMP and Waimea Inlet Strategy throughout the implementation of the existing consents and will continue to do so under the proposed consents. A full assessment against statutory and other relevant documents has been undertaken in Appendix N of this AEE. This assessment concludes the proposal is consistent with the policy direction in those documents.
Potential impacts on recreational users of Moturoa/Rabbit Island	Application of biosolids is limited to the commercial forestry area. Exclusion zones and buffer areas in relation to recreational activities will continue to be implemented. Potential odour concerns are acknowledged; procedures in the Biosolids Management Plan in relation to odour are to be made more robust, and the NRSBU has volunteered several conditions of consent which specifically address odour effects.
Potential impacts from odour	A detailed assessment of odour has been undertaken in support of this AEE (Appendix L). NRSBU accepts the recommendations in that report, which includes a condition requiring offensive or objectionable effects to be confined to the boundary of the site, more robust procedures in the Biosolids Management Plan and a 6-yearly monitoring and technology review condition to ensure application method remains the best practicable option.
Potential impacts on ecology and the coastal environment	The biosolids application activity has been carefully monitored over the last 24 years and updated specialist assessments have been prepared in support of this AEE. As covered in detail in Section 8 of this report any adverse effects are anticipated to be less than minor.

10.5 TDC pre-application meeting

NRSBU held a pre-application meeting with TDC on 11 June 2020. The online meeting was attended by:

TDC

- Leif Piggot (Team Leader, Natural Resources Consents),
- Richard Hollier (Reserves and Facilities Manager), and
- Anna Mackenzie (Resource Scientist).

NRSBU

- Nathan Clarke (General Manager), and
- Don Clifford (seconded to NRSBU).

NRSBU consenting team

- Katherine Forward (Senior Associate, Duncan Cotterill),
- Jessica Ottawa (Solicitor, Duncan Cotterill), and
- Daniel Murray (Technical Director – Planning, Tonkin + Taylor).

The purpose of the meeting was to introduce the biosolids re consenting project to TDC, seek preliminary feedback from TDC on issues and environmental effects which need to be considered in the AEE, and discuss the consenting framework and potential process. This AEE as submitted has taken on board the pre-application feedback. In particular a comprehensive set of draft consent conditions have been included in this application at TDC's request (refer Section 11 and **Appendix Q**).

11 Draft volunteered consent conditions

NRSBU has drafted a detailed set of proposed conditions of consent as set out in **Appendix Q**. These conditions incorporate the key operational parameters, controls, and measures which have been discussed throughout this AEE and which will avoid, remedy or mitigate any adverse effects of the proposed activities on the environment. While acknowledging that the conditions are draft, and subject to further development once these applications are lodged, their general intent is accepted by NRSBU.

Many of the proposed conditions are founded on the condition set from the existing discharge permit (NN940379V3). This is considered appropriate on the basis the activity has been operating for the last 24 years under those conditions with only minimal adverse effects (as covered elsewhere in this AEE and appended reports). Where appropriate the proposed conditions incorporate updates and changes as a result of recommendations made in the specialist assessments or to meet current standards and guidelines, including the Biosolids Guidelines 2003.

New conditions have been added to align the conditions with the recent consents granted for the WWTP and build on the significant consultation and assessment work completed under that package of consents. Notably, the new proposed conditions include:

- The convening of an annual hui with Te Tau Ihu iwi to ensure cultural concerns are understood, an opportunity for iwi to assess sites of cultural significance and confirm that archaeological sites are adequately protected, and to seek input into any potential remediation or enhancement activities,
- An annual report (current consent contains a six-yearly review) to TDC providing, among other things, a summary of monitoring results, any non-compliances with the consents (and related corrective actions), and complaints received,
- A 6-yearly monitoring and technology review report to TDC which provides an assessment of:
 - Forecast biosolids quality and quantity throughout the remainder of the consent term,
 - Implications of climate change for the remainder of the consent term,
 - Ability of the proposed activity to continue complying with the conditions of consent (in particular taking into account the two previous points),
 - Consistency of the activities with any new guidelines or standards (for example, any update to the Biosolids Guidelines 2003),
 - Technological changes and advances to biosolids production or application, and
 - Whether the proposed application of biosolids on Moturoa/Rabbit Island continues to represent the BPO.
- A requirement for a detailed Biosolids Management Plan, including robust procedures for odour management and minimisation,
- Maintenance of a complaints register including notification procedures to TDC,
- Requirement for odour to not result in an adverse effect that is offensive or objectionable beyond the line of mean high water springs around the perimeter of Moturoa/Rabbit Island, and
- Requirement for NRSBU to engage an odour patroller to visit the site, at least once a month, and make assessments of any odour issues.

As a result of the more robust and comprehensive condition set there are some conditions from the existing discharge permit which are considered to be superseded or no longer required. These are also addressed in **Appendix Q**.

12 Conclusion

This AEE report has been prepared on behalf of NRSBU to accompany resource consent applications to continue the application of biosolids on Moturoa/Rabbit Island. The consents sought are:

- A discharge permit for the application of biosolids to land,
- A discharge permit for the discharge of odour to air as a result of the application of biosolids to land and the operation of the BAF,
- A land use consent to operate and maintain the BAF and all other land use activities associated with the application of biosolids to land, and
- A discharge permit to discharge stormwater and washdown water to land at the BAF.

The overall status of the activities under the TRMP is a discretionary activity.

NRSBU seeks a 35-year duration on the three primary consents. This term reflects the positive reuse of resources, limited adverse effects on the environment observed under the existing consents, and predicted into the future, and provides certainty and financial security to NRSBU. A robust set of monitoring and review conditions are promoted by NRSBU to manage any new information or environmental effects (including cumulative effects) which come to light during the term of consents. A five-year term is sought on the stormwater and washdown consent to allow sufficient time for a collection system to be implemented.

Overall, the activities assessed in this AEE report are considered to:

- Be consistent with the purpose and principles under Part 2 of the RMA;
- Be consistent with the relevant objectives and policies of the New Zealand Coastal Policy Statement, National Policy Statement for Freshwater Management, Tasman Regional Policy Statement, Nelson Regional Policy Statement, Tasman Resource Management Plan, and the Moturoa/Rabbit Island Reserve Management Plan,
- Provide for the continued beneficial reuse of biosolids in accordance with best practice under the Biosolids Guidelines 2003 and other relevant documents, and
- Subject to proposed conditions, have less than minor adverse effects on the environment.

Accordingly, we respectfully consider the applications can be granted subject to the conditions proposed in this report.

13 Applicability

This report has been prepared for our client Nelson Regional Sewerage Business Unit, with respect to the particular brief given to us. With the exception of its use within the resource consent process, It may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:

Reviewed for Tonkin & Taylor Ltd by:



.....
Daniel Murray
Technical Director - Planning

.....
Tim Ensor
Principal Planner

Authorised for Tonkin & Taylor Ltd by:



.....
Neville Laverack
Project Director

6-Aug-20

Appendix A: Resource Consents Application Form

Appendix B: Existing Resource Consents

Appendix C: Plan of biosolids application area and exclusion zones

Appendix D: Biosolids process alternatives

Appendix E: Biosolids application alternatives

Appendix F: Biosolids Management Plan

Appendix G: Effects on forestry and soils

Appendix H: Effects on groundwater

Appendix I: Effects on the coastal environment

Appendix J: Effects on birds

Appendix K: Effects on lizards

Appendix L: Effects on air quality

Appendix M: Effects on public health

Appendix N: Objectives and Policies Assessment

Appendix O: Consultation material

Appendix P: Consultation feedback

Appendix Q: Draft Volunteered Consent Conditions

Attachment A

Form 9: Applications for resource consent

Section 88 of the Resource Management Act 1991

To: **Tasman District Council (TDC)**

1. The **Nelson Regional Sewerage Business Unit** applies for the following types of resource consent:

<i>Activity</i>	<i>Resource consent type</i>
Application of biosolids to land at Moturoa/Rabbit Island	Discharge permit
Discharge of odour to air as a result of applying biosolids to land and the operation of the Biosolids Application Facility (BAF) at Moturoa/Rabbit Island	Discharge permit
Operation and maintenance of the BAF and all other land use activities associated with the application of biosolids to land at Moturoa/Rabbit Island	Land use consent
Discharge of washdown water and stormwater at the BAF to land at Moturoa/Rabbit Island	Discharge permit

2. The activity to which the application relates (the proposed activity) is as follows:

The activity is the application of biosolids on Moturoa/Rabbit Island (as summarised in the activity descriptions in the table above). A detailed description of the activity is contained in Section 4 of the Assessment of Effects on the Environment (AEE) prepared by Tonkin + Taylor Limited, entitled “Moturoa/Rabbit Island Biosolids Reconsenting”, dated August 2020.

3. The site at which the proposed activity is to occur is as follows:

The location of Moturoa/Rabbit Island is illustrated in the map below. A detailed description of the site and its environment is contained in Section 6 of the AEE.



- 4 The full name and address of each owner or occupier (other than the applicant) of the site to which the application relates are as follows:

Moturoa/Rabbit Island is vested in Tasman District Council as Local Purpose (Plantation) Reserve and Recreation Reserve under the Reserves Act 1977. TDC's address is 89 Queen Street, Private Bag 4, Richmond, Nelson 7050.

The principal occupier is PF Olsen Limited, who manages the commercial forestry operation on Moturoa/Rabbit Island under a license arrangement with TDC. PF Olsen's address is PO Box 3353, Richmond, Nelson 7050.

- 5 The other activities that are part of the proposal to which the application relates are as follows:

The principal 'other activity' to which the application relates is the commercial forestry operation on Moturoa/Rabbit Island. This activity is subject to its own statutory requirements and regulations which fall outside the scope of these applications.

Permitted activities relating to the current applications are addressed in Section 7 of the AEE.

- 6 No additional resource consents are needed for the proposal to which this application relates.

Further details are contained in Section 7 of the AEE.

- 7 I attach an assessment of the proposed activity's effect on the environment that—

- (a) includes the information required by clause 6 of Schedule 4 of the Resource Management Act 1991; and
- (b) addresses the matters specified in clause 7 of Schedule 4 of the Resource Management Act 1991; and
- (c) includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

The preceding matters are addressed throughout the AEE.

- 8 I attach an assessment of the proposed activity against the matters set out in Part 2 of the Resource Management Act 1991.

Please refer to Section 9.3 of the AEE.

- 9 I attach an assessment of the proposed activity against any relevant provisions of a document referred to in section 104(1)(b) of the Resource Management Act 1991, including the information required by clause 2(2) of Schedule 4 of that Act.

Please refer to Section 9 of the AEE.

10 The value of the investment of the existing consent holder is:

Please refer to Section 8.2 of the AEE.

11 I attach the following further information required to be included in this application by the district plan, the regional plan, the Resource Management Act 1991, or any regulations made under that Act:

Please refer to Section 9 of the AEE.

Date: 4 August 2020



(Applicant/person authorised to sign on behalf of applicant)

Nathan Clarke

General Manager

Nelson Regional Sewerage Business Unit

Contact details

Address for service during resource consent processing period:

Duncan Cotterill

148 Victoria Street, PO Box 5

Christchurch 8140, New Zealand

Attention: Katherine Forward, Senior Associate

Phone: +64 3 379 2430

Email: katherine.forward@duncancotterill.com

Address for service for applicant:

Nelson Regional Sewerage Business Unit

c/o Nelson City Council

110 Trafalgar Street, PO Box 645

Nelson, New Zealand

Attention: Nathan Clarke, General Manager

- Schedule (refer to condition 7.1)
- Figure 1. (refer to condition 5.1)
- Figure 2. (refer to condition 7.2)

3 December 2008

NN940379V3

Writer's Direct Dial No. (03) 543 8474

Writer's E-mail: Michael.Durand@tdc.govt.nz

Nelson Regional Sewerage Business Unit
C/- Donna Hills
Opus International Consultants Limited
Private Bag 36
Nelson 7042

Dear Madam

DECISION ON APPLICATION TO CHANGE CONDITIONS FOR RESOURCE CONSENT NO. NN940379V3 – DISCHARGE OF BIOSOLIDS TO LAND (FORESTRY BLOCKS) AT RABBIT ISLAND

Pursuant to Section 114 of the Resource Management Act 1991 (“the Act”), please find enclosed a copy of the Council’s decision on your application to change consent conditions of the resource consent referred to above.

Section 357A of the Act provides you with the right to lodge an objection with the Council in respect of this decision and/or any associated conditions. Any such objection must be made in writing setting out the reasons for the objection and must be lodged with the Council, together with a fixed fee of \$175.00 (GST inclusive), within 15 working days of receiving this letter.

At this stage the Council has not calculated the final costs of processing your application. Should the final costs exceed the deposit already paid, then as previously advised, you will be invoiced separately for these costs. Should the final costs be less than the deposit already paid, then you will receive a refund. Where the costs are equal to the deposit already paid, no further action is required. You will receive a letter shortly regarding the final costs of processing your application.

The changes to your consent take effect immediately unless you lodge an objection to this decision.

Please feel free to contact me if you have any questions regarding any aspect of your consent or its conditions. My contact details are listed at the top of this letter.

Yours faithfully

Michael Durand
Co-ordinator Natural Resources Consents

FULL SET OF AMENDED CONSENT CONDITIONS FOR RMNN940379V3

1.0 Records to be Kept

- 1.1 The Permit Holder shall keep such records as may be reasonably required by Council and shall, if so requested, supply this information to the Council. If it is necessary to install measuring devices to enable satisfactory records to be kept, the Permit Holder shall, at his or her own expense, install, operate and maintain suitable devices.
- 1.2 A flowmeter of an accuracy to within $\pm 5\%$ shall be installed between the pumps on Bells Island and the receiving facilities on Rabbit Island and the daily volume of biosolids transferred recorded.

2.0 Access for Council Staff and Agents

Access by Council staff or its officers or agents to the land subject to this discharge permit is reserved pursuant to Section 332 of the Resource Management Act.

3.0 Review of Conditions

- 3.1 Council may at any time over the duration of this consent review its conditions pursuant to Section 128 of the Resource Management Act, for any of the purposes stated in the Act, to require additional remedial works following monitoring of effects, to modify the exercise of the consent to reduce potential effects on the environment, or to review the monitoring requirements placed on this consent.
- 3.2 On every sixth anniversary of the granting of this consent, the Permit Holder shall provide the Council with a written assessment of all monitoring, identifying any trends and problems so that the need for a review of conditions can be determined by Council. Copies of this report shall be made available to all organisations who made submissions.

4.0 Application of Biosolids

- 4.1 Biosolids shall be applied at an average depth of no greater than 40mm per application.
- 4.2 Biosolids shall not be applied within 24 hrs of a 10 mm rainfall event occurring in a 24 hr period.
- 4.3 Biosolids shall not be applied if a rainfall of more than 50mm is forecast within the following 24 hrs by a recognised meteorological forecasting service.
- 4.4 If even application of biosolids is not possible due to wind, then application shall cease in the area affected.
- 4.5 Soil pH shall be maintained at pH 5 or greater at all times during biosolid application.
- 4.6 Biosolids application to any given forestry block shall be limited to the following:
 - (a) During the time period from the last prior-to-harvest biosolid application to 12 years after replanting, biosolids shall be discharged at an average rate of no more than 150 kilograms of nitrogen per hectare per year, calculated using a three year rolling average, and no single discharge shall exceed 450 kilograms nitrogen per hectare per year.
 - (b) During the time period from 12 years following replanting to the last prior-to-harvest biosolid application, biosolids shall be discharged at an average rate of no more than

100 kilograms of nitrogen per hectare per year, calculated using a three year rolling average, and no single discharge shall exceed 300 kilograms nitrogen per hectare per year.

- (c) No more than one application of biosolids shall occur to any given forestry block during the period following harvest and prior to replanting.

And

- (d) As provided for in Condition 13.

Advice Notes:

Definition for clarification: “kilograms nitrogen per hectare” describes a proportional rate of discharge that is independent of the actual area of forestry undergoing biosolids application. Example: a biosolids discharge could occur at a rate of 300 kilograms per hectare in an area of 100 square metres. In such a case, 3 kilograms of nitrogen would have been discharged to land. Conversely, if 300 kilograms nitrogen had been applied to that 100 square metres, yet the remainder of that hectare had received no biosolids discharge, then the rate of discharge would be correctly described as 30,000 kilograms per hectare, not 300 kilograms per hectare.

4.7 [Repealed]

5.0 Exclusion Zones

- 5.1 Exclusion zones (no spray areas) shown in the attached Figure 1 shall be marked clearly by use of wire, or other means as approved by Council so that the biosolids contractor is quite clear which areas are not to be sprayed.
- 5.2 An archaeological survey is to be undertaken in construction areas before works begin. Any archaeological sites in addition to those already excluded that are discovered during this survey or during subsequent biosolids operations are to be brought to the immediate attention of a representative nominated by tangata whenua and the Historic Places Trust for assessment and advice. Council shall also be notified. Works in the immediate vicinity of any such site are to cease until advice is offered. Such sites may be excluded from the biosolids operation.
- 5.3 Council may exclude such further areas from the biosolids consent area as are considered necessary should further areas of ecological significance be subsequently identified. Operations in such areas shall cease upon Council’s request to allow for further assessment and shall not continue without Council’s agreement.
- 5.4 Gravel lenses identified pursuant to Condition 8 are excluded from biosolid disposal, and shall be marked in the same manner as 5.1.

6.0 Buffer Zones

- 6.1 If biosolids meet Class A sludge standards, the following buffer zones (no spray areas) shall be observed:
 - (a) Around the entire coastal edge of Rabbit Island a buffer zone of 15 metres in from the edge of the forest, or 50 metres from Mean High Water Springs, whichever is the greater, is to be maintained. No biosolids disposal is to take place in this buffer zone.
 - (b) A buffer zone of 15 metres in from the edge of the forest shall be maintained around all areas to which the public have unrestricted access.

- (c) Around the perimeter of the Rabbit Island Domain the buffer zone shall be increased to 20 metres in from the edge of the forest canopy or 30 metres in from the domain perimeter, whichever is the greater.
- (d) In the months, November to March inclusive, the buffer zone around the perimeter of Rabbit Island Domain shall be increased to 100 metres in from the edge of the forest canopy.

6.2 If biosolids do not meet Class A standards then the buffer zones given in Condition 6.1(a), (b), (c) and (d) shall be increased to 400 metres in from the edge of the forest canopy and public access shall be restricted for a period of one year after application.

7.0 Monitoring

Biosolids

7.1 Biosolids shall be sampled and analysed as follows:

- (a) A continuous record of biosolids temperature shall be made and recorded for the duration of the consent and plotted on a continuous record to enable compliance to be readily visible. Biosolids shall be held at 50°C or higher for a minimum duration as determined by the USEPA equation given in the attached schedule.
- (b) Microbial monitoring of biosolids shall be undertaken five times over a two-week period, following the first two weeks of operation for faecal coliforms, E.Coli, salmonella, helminths, protozoa and viruses. If the microbial standards for Class A sludge as defined by the United States Environmental Protection Agency (USEPA) standards are met (refer to the schedule attached to this consent), then the frequency of monitoring may be decreased to fortnightly for a two month period.

If Class A sludge standards are not met at any time, sampling frequency shall return to five times a fortnight for a minimum period of two weeks until compliance is achieved. If Class A standards are met consistently during this two-month period then the frequency and type of bacterial monitoring may be further reviewed in consultation with Public Health Services and the Council's District Resource Analyst.

- (c) At three month intervals dry solids, organic matter, pH, total and ammoniacal nitrogen, phosphorous, potassium and the following heavy metals, arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc shall be measured.
- (d) Screening of the biosolids for persistent synthetic organochlorine and organophosphate compounds shall be carried out five yearly.

Groundwater

7.2 Nine existing shallow piezometers on Rabbit Island and two additional piezometers to be installed at the locations shown in Figure 2 attached to this consent shall be monitored as follows:

Before application commences:

- (a) Representative samples shall be taken from all eleven piezometers, filtered and analysed for the following heavy metals; arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, aluminium.

After application has commenced:

- (a) At three month intervals groundwater levels shall be measured and recorded at all eleven piezometers.

- (b) At three month intervals representative samples shall be taken from all eleven piezometers for pH, conductivity, nitrate-nitrogen, ammonium-nitrogen and chloride.
- (c) Once a year representative samples shall be taken from all eleven piezometers, filtered and analysed for the following heavy metals; arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, aluminium.
- (d) If the microbiological standards for Class A sludge are not met at any time then the Council's District Resource Analyst may require the Consent Holder to monitor groundwater for microbial contamination.

Soils

7.3 Soil samples will be taken within the topsoil (0 to 20 cm) and subsoil (20 to 40 cm), on an average basis of two samples every 10 ha in areas where biosolids have been applied as follows:

- (a) Every three years pH, organic matter, total nitrogen, available phosphorous, potassium, calcium, magnesium, sodium and a minimum of the following heavy metals; arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc and aluminium shall be measured.
- (b) Heavy metal annual loadings and cumulative loadings shall be within the limits recommended in the Department Of Health 1992 Guidelines for arable land as follows:

Element	Maximum Annual Loading (kg/ha/yr)	Maximum Cumulative Loading (kg/ha)	Maximum Soil Concentrations (mg/kg dry weight)
Arsenic	0.2	2.5	10
Cadmium	0.2	2.5	3
Chromium	15	125	600
Copper	12	100	140
Lead	15	125	300
Mercury	0.1	1	1
Nickel	3	20	100
Zinc	30	250	300

- (c) Once any maximum cumulative loading limit or maximum soil concentration limit in the above table is reached then the application of biosolids on Rabbit Island must cease in that area.

Coastal

- 7.4 Prior to commencement of disposal operations, and after a period of rain, the Consent Holder shall map groundwater seepage areas along the Waimea Inlet estuarine perimeter of Rabbit Island.
- 7.5 A survey of benthic micro and macro algal cover shall be undertaken prior to disposal, as agreed with Council's District Resource Analyst or his agent, to provide baseline data. This survey shall be repeated every six years.
- 7.6 Transect surveys along the foreshore are to be undertaken adjacent to the coast, particularly along the Waimea Inlet coastline, prior to disposal of sludge. The survey is to include sediment profile descriptions, sediment nutrient assessment and habitat classification. These surveys shall be repeated every six years.
- 7.7 Visual checks along Rabbit Island foreshore within Waimea Inlet shall be undertaken by a suitably qualified person at six-monthly intervals for the first three years of operation of the consent, after which visual checks will be carried out at three-yearly intervals for the duration of this consent.

Photographic records shall be taken at each inspection. Should this visual inspection indicate any adverse effects on the foreshore, further analysis and tests are to be undertaken at the discretion of the Council's District Resource Analyst or his agent.

8.0 Identification of Gravel Lenses

8.1 As part of the preparation work for biosolids disposal on each new area, identified areas of gravel are to be recorded and mapped on a plan of the Island by a suitably qualified person.

8.2 For gravel lenses which are greater than one hectare in extent a short borehole (or similar) shall be installed and supervised permeability testing shall be performed. Biosolids application rates to the gravel lens shall be reduced as follows, depending on the measured horizontal permeability (K):

$K \leq 10^{-4}$ m/s 7.8 tonnes of dry solids per hectare every three years

$10^{-4} < K \leq 10^{-2}$ m/s the three-yearly application rate shall be reduced proportionally from 7.8 to 0 tonnes of dry solids per hectare

$K > 10^{-2}$ m/s no biosolids shall be applied.

8.3 All gravel lenses which are to receive no biosolids at all or biosolids at a reduced application rate shall be clearly marked and identified to the operator applying the biosolids.

9.0 Contingency and Management Plan

9.1 A contingency and management plan for biosolids disposal shall be developed to the satisfaction of the Manager, Environment & Planning Department prior to application of biosolids. This plan shall be reviewed annually and shall include details of:

- (a) records to be kept including time of application, weather conditions, quantities applied, location of application, any operational problems experienced and monitoring results;
- (b) procedures to be followed to ensure compliance with all conditions of this permit;
- (c) how application rates are to be limited to the permitted rates;
- (d) areas to be used each year for biosolids disposal for the following three year period;
- (e) response to equipment failures;
- (f) response to accidental spillages of sludge or biosolids;
- (g) staff responsible for the management of biosolids disposal shall be identified and their specific roles outlined;
- (h) the provision of facilities and protection for employees to satisfy health and safety requirements.

Any contractor involved with biosolids treatment or disposal shall be made fully aware of their responsibilities as set out in the above plan.

10.0 Monitoring Charges

The applicant will be required to meet Council's actual and reasonable charges incurred as a result of monitoring compliance within the terms of this consent.

11.0 Notification of Problems

The Environment & Planning Department of the Tasman District Council is to be notified as soon as possible, and within 24 hours, of any problems which arise during the biosolids disposal which may result in adverse environmental effects.

12.0 Remedial Works

Council's District Resource Analyst or his/her agent may require remedial works to be implemented if monitoring shows unacceptable environmental impacts; such works may include application of biosolids at reduced loading rates, or the addition of lime if soil pH at any soil sampling site falls below 5.0.

13.0 Spray Trials

Biosolids spray trials are permitted near the centre of Rabbit Island with a location and monitoring programme acceptable to the Environment & Planning Manager provided that the trial area shall not exceed 10 hectares and the nitrogen application rate shall not exceed 400 kg/hectare.

14.0 Expiry

This resource consent expires on 8 November 2020.

SCHEDULE:

The USEPA Guidelines, part 503.32 provide guidelines required to be met to produce a Class A sludge with respect to pathogens based on exposure to a temperature above 50°C for a set time governed by the following equation:

For a %DS of <7% (expected) the sludge shall be held at 50°C or higher for a minimum duration as determined by the equation:

$$\text{Minimum Duration} = \frac{50,070,000}{10^{0.14t}} \text{ (days)}$$

where t = temperature in °C and is greater than 50°C

TABLE 3: DURATION VS TEMPERATURE OF A SLUDGE WITH ,7% DS

TEMPERATURE °C	RETENTION TIME (Days)
50°	5 days
55°	1 day
60°	5 hours
65°	1 hour
67°	30 minutes

USEPA microbiological standards for Class A Sludge are:

- ≤ 1000 MPN faecal coliforms/g Total Solids (dry weight)
- ≤ 3 Salmonella spp./g VSS
- ≤ 1 plaque forming virus unit/g VSS
- ≤ 1 protozoan organism/g VSS
- ≤ 1 helminth egg/g VSS

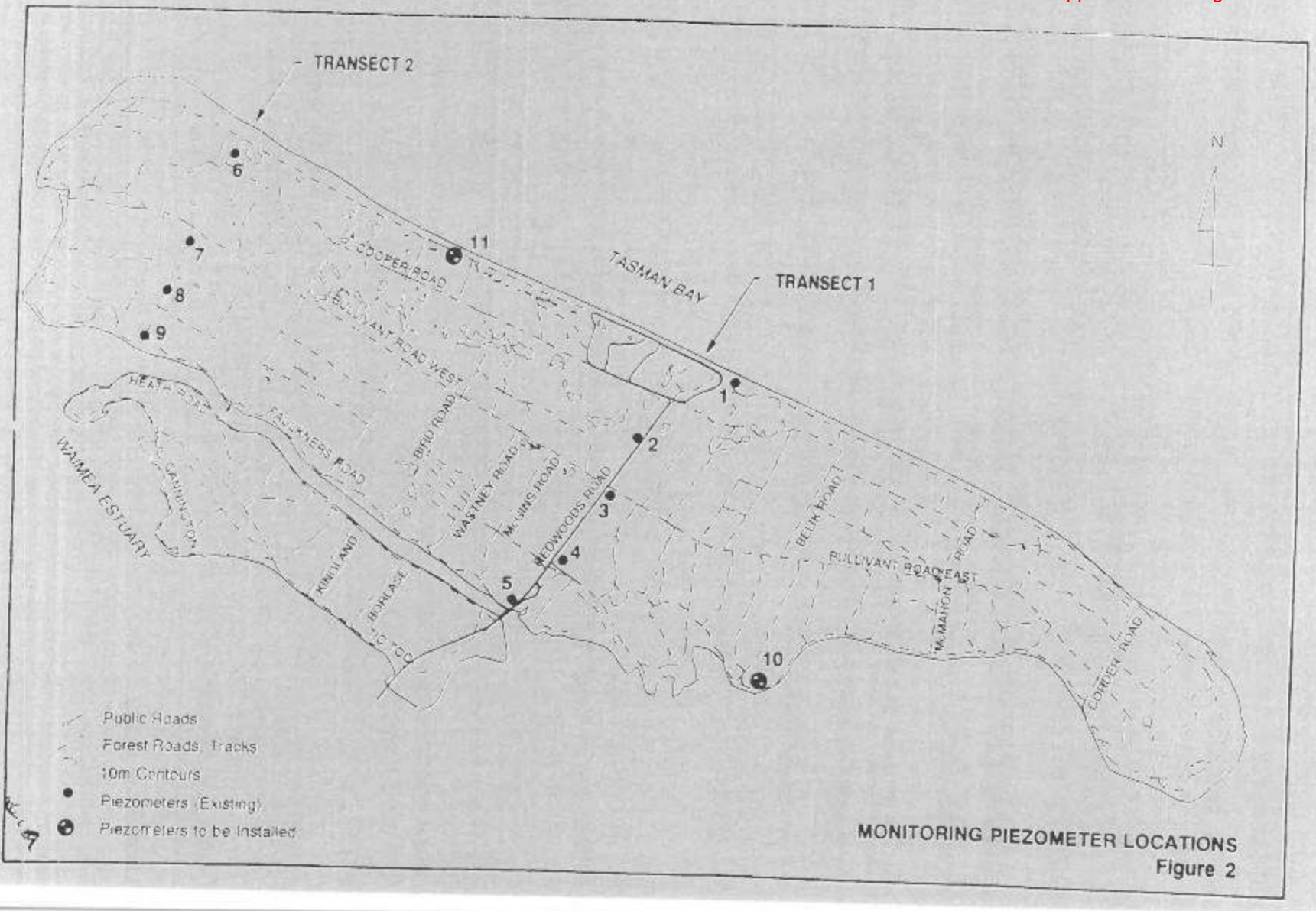
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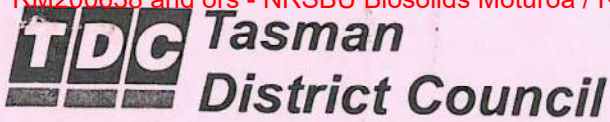
Figure 1.



Figure 1.
 RABBIT ISLAND BIOSOLIDS PROPOSAL
 AMENDED KEY PLAN FOLLOWING
 CONSULTATION WITH KAMATUA
 SHOWING FACILITIES AND AREAS
 EXCLUDED

BECA
 2808005 JH LG
 2nd December 1994





Reference:

RM940534

NN940379 NN940380

Writer's Direct Dial: (03) 544 3390

17 October 1995

1`

Dear Sir/Madam

RESOURCE CONSENT APPLICATIONS NO: RM940534 NN940379 NN940380

In accordance with Section 114 of the Resource Management Act 1991, I enclose a copy of the Council's decisions on the above application.

Your attention is drawn to your rights of objection to the conditions of these consents pursuant to Section 121 of the Resource Management Act 1991, the applicant, any person or party who made a submission may appeal to the Planing Tribunal against the Council's decision.

Any appeal of the decision must be made within 15 working days of you receiving this letter. The appeal must state, in accordance with Form 7 of the Resource Management (Forms) Regulations 1991, the reasons for the appeal and with relief sought. It should be sent to the Planning Tribunal, Justice Department, Private Bag, Wellington. A copy must be supplied by the applicant, to all those who made submissions and the Council.

In terms of Section 125 of the Resource Management Act 1991, this consent shall expire two years after the date of consent (by this given Council or, if relevant, the planning Tribunal) unless:

- (a) The person to whom it was granted has within that period given effect to the consent; or
- (b) The Council has, on an application made within three months after the expiry of that period, satisfied itself that the circumstances in Section 125(b) apply.

Yours faithfully

Suzanne Westley
Consents Officer

Main Office

189 Queen Street
Private Bag 4,
Richmond 7031 N.Z.
Tel (03) 544-8176
Fax (03) 544-7249

**Murchison
Service Centre**

92 Fairfax Street
P.O. Box 53, Murchison
Tel (03) 523-9004
Fax (03) 523-9004

**Motueka
Service Centre**

7 Hickmott Place
P.O. Box 123, Motueka
Tel (03) 528-7700
Fax (03) 528-9751

**Golden Bay
Service Centre**

78 Commercial Street
P.O. Box 74, Takaka
Tel (03) 525-9516
Fax (03) 525-9972

8.0 SUMMARY:

The balance is clearly in favour of the application. The reasons for this statement have been outlined in the text of my report but in summary they are:

- (i) Properly controlled and operated, the biosolids disposal should have minor effects. The applicant has, through volunteering of buffer and exclusion zones, mitigated or avoided any adverse effects on the other users of the resource, archeological and ecological sites.
- (ii) The applicant has worked with and will continue to work with other users of the resource to achieve an integrated programme.
- (iii) The application does not offend the policies/objectives of the District Plan or Regional Policy Statement. In fact, the application of biosolids to land is in accordance with Regional Policy Objectives/Policies.
- (iv) The proposal properly controlled and operated does not conflict with Part II of the Resource Management Act 1991.

Accordingly I recommend that the application be approved subject to the following conditions:

9.0 CONDITIONS:

Biosolids Facility:

1. That the biosolids disposal facility ~~are~~ be generally as located on the plan submitted with the application. All buildings and structures associated with the Biosolids facility are to be finished in recessive colours. DUSA
2. That the applicant meets the requirements of Council with regard to all buildings and health bylaws, regulations and acts.
3. The biosolids storage reservoirs shall be sited within a bunded compartment which has a containment capacity of 1.25 times the volume of all storage reservoirs.
4. Fire conditions:
 - (i) Tankers working in the forest must comply with the Forest and Rural Fires Regulations 1979, Section 31 - Spark Arresters.
 - (ii) These vehicles are to carry a chemical fire extinguisher and be fitted with ashtrays or have a "No Smoking" policy while in the forest.

- (iii) At the receiving facility one standard hose reel shall be installed in an easy accessible position with sufficient hose to reach all parts of the complex. In the lunchroom/office, a chemical extinguisher shall be installed. If welding or grinding is to be carried out in the workshop then a further extinguisher will be required.
 - (iv) An area of at least 30 metres shall be kept clear around the receiving facility. This 30 metres shall be grass or similar ground cover that can be mown or kept short.
5. A truck crossing sign shall be erected on Ken Beck Drive at the intersection of Ken Beck Drive and Bullivant East to the satisfaction of Council's Transport Engineer. The sign is to be erected before the operation commences.

Biosolids Disposal

1. Before operations commence a management plan must be developed for disposal of the biosolids. This plan is to be agreed upon by the Nelson Regional Sewerage Authority, the Tasman District Council (Community Services and Environment and Planning Departments) and their forestry consultants. This plan is to be reviewed at yearly intervals. Matters to be assessed under this plan include:
- Removal of undergrowth.
 - Exclusion of further recreation land as required from biosolids disposal.
 - Maintenance/construction of forestry tracks.
 - Construction of biosolids access tracks.
 - Fire fighting coordination.
 - Provision of information on excluded areas so that access permits issued by Council are not in conflict with biosolids disposal.
 - Areas of forestry to be excluded because they have been cleared or because trees are less than three years old.
 - The provision of facilities and protection for employees to satisfy health and safety requirements.

DEK

2. Access for Council Staff and Agents

Access by the Council or its agents to the land subject to this resource consent is reserved pursuant to Section 332 of the Resource Management Act 1991.

3. Smell and Noise

If, in the opinion of the Council's District Environmental Health Officer, either the noise or the smell resulting from disposal operations becomes offensive, the consent holder shall take such steps as are necessary to remedy the problem to the satisfaction of this Officer.

4. Insect Nuisance

If, in the opinion of the Council's District Environmental Health Officer, insect infestation occurs as a result of biosolids disposal, appropriate measures will be taken to remedy the nuisance and reduce potential for insect nuisance. The Council Officer shall be notified of any insect nuisance.

5. Erection of signs

- 5.1 Two notice boards shall be installed near the forestry gates at the west and eastern ends of the Domain. They shall clearly state what parts of the island are closed to the public and what the operation involves. The design and text shall be to the satisfaction of the Community Services Manager. In addition the information kiosk at Rabbit Island Domain is to be utilised to provide information about the proposal and areas at present excluded. The design and text shall be to the satisfaction of the Community Services Manager.
- 5.2 At commencement of the biosolids disposal operation, signs are to be erected at no greater than 200 metre intervals (with wording to the satisfaction of the Council's District Environmental Health Officer) along the outer margins of the buffer zones identifying the biosolids disposal area and forbidding public entry to the area. A visual barrier in the form of appropriately plastic coloured tape shall be provided between each sign around the outer margin of the biosolids disposal area.
- 5.3 The sign and tape shall be erected a minimum of one month prior to disposal on new areas and removed to allow public access to the spraying areas after an initial period of six months provided USEPA Class A sludge quality standards are met. If the USEPA Class A sludge quality standards are constantly met during the initial six month period, then public access shall be permitted after an exclusion period of not less than one month following application of the biosolids. Any non-compliance

with the Class A sludge standards will automatically impose a one year public exclusion requirement.

6. Buffer zones

6.1 If biosolids meet Class A sludge standards, the following buffer zones (no spray areas) shall be applied:

- (i) Around the entire coastal edge of Rabbit Island a buffer zone of 15 metres in from the edge of the forest, or 50 metres from the MHWS, whichever is the greater, is to be maintained. No biosolids disposal is to take place in this buffer zone.
- (ii) A buffer zone of 15 metres in from the edge of the forest shall be maintained around all areas to which the public have unrestricted access.
- (iii) Around the perimeter of the Rabbit Island domain the buffer zone shall be increased to 20 metres in from the edge of the forest canopy or 30 metres in from the domain perimeter, whichever is the greater.
- (iv) In the months, November to March inclusive, the buffer zone around the perimeter of the Rabbit Island Domain shall be increased to 100 m in from the edge of the forest canopy.

6.2 If biosolids do not meet Class A standards then the buffer zones given in (i)-(iv) shall be increased to 400 metres in from the edge of the forest canopy and public access shall be restricted for a period of one year after application.

7. Exclusion zones

7.1 Exclusion zones (no spray areas) shown in the attached Figure 1 shall be marked clearly by use of wire or other means as approved by Council so that the biosolids contractor is quite clear about the areas that are not to be sprayed.

7.2 (i) An archaeological survey is to be undertaken in construction areas before works begin. Any archaeological sites discovered during this survey or during subsequent biosolids operations are to be brought to the immediate attention of a representative nominated by tangata whenua; and the Historic Places Trust for assessment and advice. Council shall also be notified. Works in the immediate vicinity of any such site are to cease until advice is offered. Such sites may be excluded from the biosolids operation.

(ii) Council may exclude such further areas from the biosolids consent area as are considered necessary should further areas of ecological significance be subsequently identified. Operations in such areas shall cease upon Council's request to allow for further assessment and shall not continue without Council's agreement.

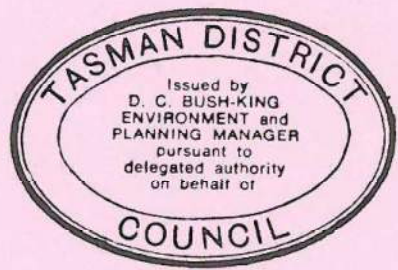
8. *Review of Conditions*

8.1 Council may at any time over the duration of this consent review its conditions pursuant to section 128 of the Resource Management Act, for any of the purposes stated in the Act, to require additional remedial works following monitoring of effects, to modify the exercise of the consent to reduce potential effects on the environment, or to review the monitoring requirements placed on this consent.

8.2 On every sixth anniversary of the granting of this consent, the permit holder shall provide the Council with a written assessment of all monitoring, identifying any trends and problems so that the need for a review of conditions can be determined by Council. Copies of this report shall be made available to all organisations who made submissions.

Approved: D C Bush-King
For Tasman District Council

Date: 10/10/95



PM 11: 48:10:15 RM00531A1

RM940534

In the matter of the Resource Management Act 1991

and

In the matter of the application lodged by Nelson Regional Sewerage Authority

for a variation of consent under Section 127 of the aforesaid Act

PROPOSAL:

To vary a condition previously imposed on Resource Consent RM950434 as follows:

To vary condition 4 (iv) which reads:

“4 (iv) an area of at least 30 metres shall be kept clear around the receiving facility. This 30 metres shall be grass or similar ground cover that can be mown or kept short”.

to read

“4 (iv) an area of at least 15 metres shall be kept clear around the receiving facility. This 15 metres shall be grass or similar ground cover that can be mown or kept short”.

DECISION:

That condition 4 (iv) be amended to read:

“4 (iv) an area of at least 15 metres shall be kept clear around the receiving facility. This 15 metres shall be grass or similar ground cover that can be mown or kept short”.

REASONS FOR THE DECISION:

1. The applicant has requested the variation on the grounds that a 30 metre strip requires an onerous level of maintenance and removes an area from production unnecessarily.

2. The original conditions were imposed with a view to reducing fire\windthrow hazard to the biosolids facility. Councils Fire Officer R Lonsdale and, Councils Forestry Consultant PF Olsen are of the opinion that the suggested 15 metres break would be sufficient to address these concerns.
3. All affected parties, Councils Fire Officer, Councils Forestry Consultant PF Olsen and the N.R.S.A. have agreed to the variation. No other submitters had concerns about the fire/windthrow hazard in relation to the Biosolids Receiving Facility and is therefore considered under Section 127 (3) (b) (ii) of the Resource Management Act that their consent to the variation need not be sought.

Dated in Richmond this 5th day of August 1996

DC Bush-King
ENVIRONMENT AND PLANNING MANAGER

In the matter of the Resource Management Act 1991

and

In the matter of the application lodged by
Nelson Regional Sewerage Business Unit

For a resource consent for a discretionary activity and a decision under the provisions of Section 104B of the aforesaid Act

APPLICATION DETAILS

Applicant: *Nelson Regional Sewage Business Unit*
Postal Address: *C/o Michael Schruer, P O Box 645, Nelson*
Legal Description: *Crown Land (Coastal marine area)*
Location: *Waimea Estuary, between Bells and Rabbit Island*
Eastings: *25231392523003*
Northings: *59912015991357*

TASMAN RESOURCE MANAGEMENT PLAN AFFECTED RULE

25.1.6 Controlled Activities (Other Structures or Occupation)

DECISION

This application for a resource consent to occupy and disturb the coastal marine area to install an underground wastewater pipeline by way of directional drilling in the coastal marine area in the Waimea Estuary between Bell and Rabbit Island, has been considered in accordance with Sections 104 and 104B of the Resource Management Act 1991 (RMA) by the Consent Planner, Coastal. Acting under authority delegated from the Tasman District Council, this application is granted for the period expiring on 14 October 2040, subject to the following conditions:

CONDITIONS

- 1 The pipe shall be installed by way of directional drilling and in accordance with the information supplied with application RM050862.
- 2 The pipe shall be laid at a depth no less than 1.0 metre below the seabed.
- 3 The consent holder shall ensure that the seabed within Waimea Estuary at the connection site is left as close to its natural state as possible following completion of the works.
- 4 The works shall be undertaken in a manner that avoids disturbance of the seabed (including disturbance of existing estuarine vegetation). In particular, all practical measures shall be taken during construction works to avoid introducing silt and other contaminants into the coastal marine area. The measures to be adopted should include, but are not limited to, the use of bunds, settling ponds, straw bales, and/or other sediment retention devices as required.
- 5 All machinery used shall be refuelled and maintained on land at least 10 metres from mean high water springs.

- 6 Council may, for the duration of this consent and within the three month period following 31 May each year, review the conditions of the consent pursuant to Section 128 of the Resource Management Act 1991 for the purposes of dealing with any adverse effect on the environment which may arise from the exercise of the consent and which is appropriate to deal with at a later stage or to comply with the requirements of a relevant operative rule in the Tasman Resource Management Plan or its successor.

NOTATIONS

- 1 Monitoring of this resource consent is required under Section 35 of the Resource Management Act 1991, and a deposit fee is payable at this time. Should monitoring costs exceed this initial fee, the Council will recover the additional amount from the resource consent holder. Monitoring costs are able to be minimised by consistently complying with the resource consent conditions.

REASONS FOR THE DECISION

STATUTORY CONSIDERATIONS

Section 12 of the Resource Management Act, 1991, requires that a resource consent be obtained to erect a structure in, on, under, or over the coastal marine area unless expressly allowed by a rule in a regional plan and in any relevant proposed regional plan or resource consent. The activity is a discretionary activity under Rule 25.1.7 in the Proposed Tasman Resource Management Plan.

SECTION 94 – NON-NOTIFICATION

Section 93(1)(b) of the RMA allows for a resource consent application relating to a discretionary activity to be processed on a non-notified basis subject to the requirements of Section 94 of the RMA.

The effects of the proposal are deemed to be no more than minor. Written approval has been obtained from Manawhenua ki Mohua and the Department of Conservation. No other parties are considered to be affected by this application.

Therefore, in the opinion of the Consent Planner, Coastal the requirements of Section 94(2) of the RMA have been satisfied and this coastal permit has been processed and issued without public notification.

ASSESSMENT OF THE APPLICATION

The application involves the replacement of 420 metres of the existing sewerage pipeline beneath the tidal channel between Bell and Rabbit Islands with a 10 millimetre HDPE pipe. The existing pipe is considered to be unfit to use due to persistent failures in the old pipeline and a resin sock which was subsequently inserted to reduce blockages. The new pipeline will be direct drilled 1 metre beneath the seabed adjacent to the existing pipe. The drilling and connection will take place over a three day period.

It is considered that the use of directional drilling to lay the pipe will have a minimal effect on the environment. It is expected that the only significant disturbance will be within the estuary adjoining the channel where the replacement line will connect to the existing line. The disturbance is considered to be localised and of short duration. The area affected by the proposed activity lies within the mudflats which adjoin the channel, the area experiences some mobility with each tidal cycle. It is anticipated that disturbed sand will settle quickly after excavation and will have no more than minor adverse effects on the flora and fauna beyond the small excavation and deposition area. The natural tidal flushing of the estuary is expected to redistribute the disturbed material within a few tidal cycles. The proposed works will be undertaken at a time of the year when there are fewer birds feeding within the intertidal area than during early summer months. Any birds in the area affected will be able to move to accommodate any temporary disturbance and do so daily as they retreat to higher levels as the incoming tide covers their feeding grounds.

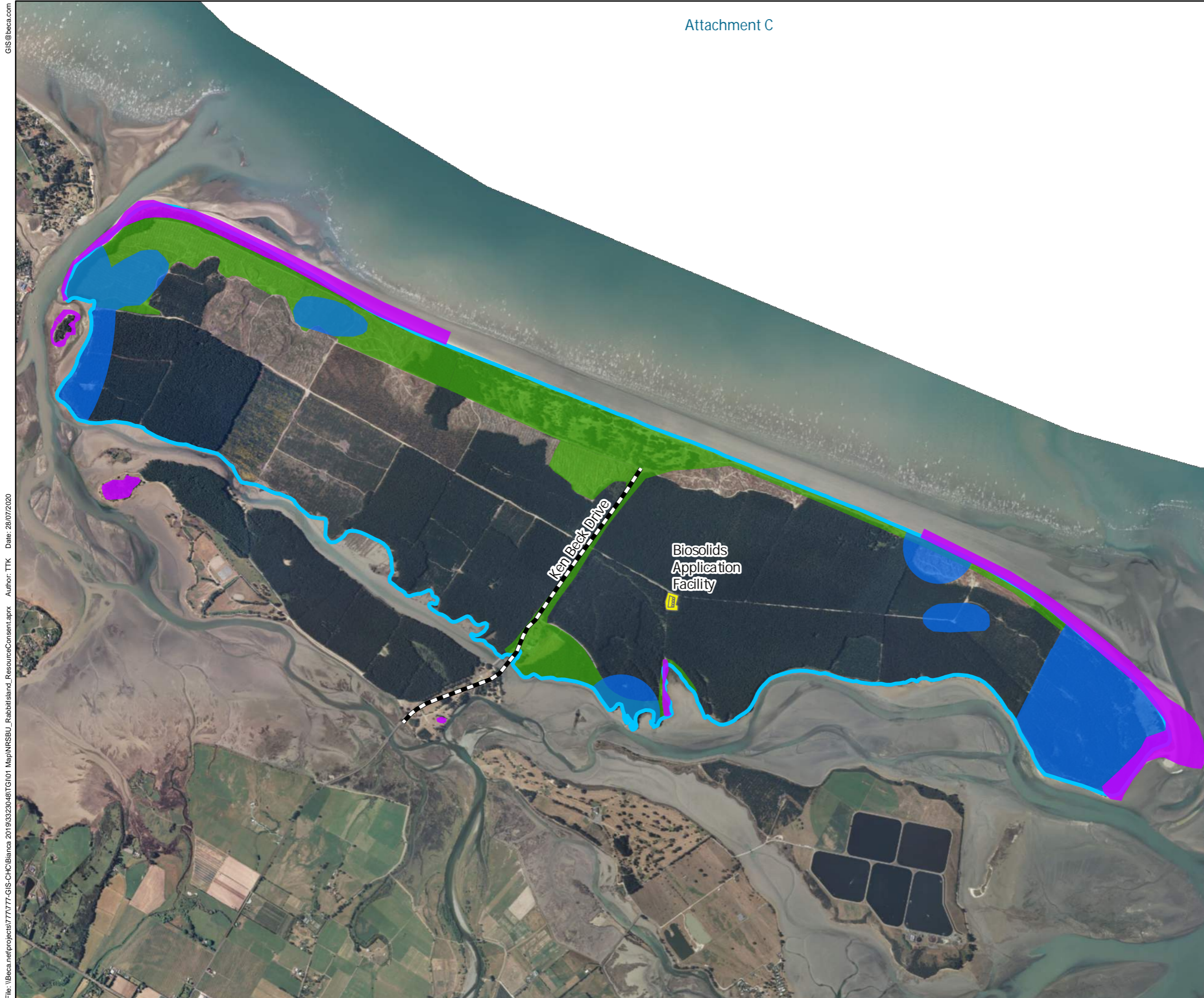
DURATION OF THE CONSENT

Consent to occupy the coastal marine area is granted with a 35 year expiry date.

Dated at Richmond this 14th day of October 2005

Rosalind Squire
Consent Planner, Coastal

Attachment C

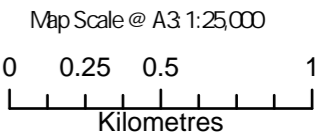


Biosolids Application Area and Exclusion Zones
Moturoa / Rabbit Island

Legend

-  Ken Beck Drive
-  Biosolids Application Area
-  Biosolids Application Facility
- Exclusion Zones**
-  Cultural and Archaeological
-  Recreation Areas
-  Significant Native Habitats

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Revision	Author	Verified	Approved	Date
1	TTK	BDJ2		23/07/2020



Client	NRSBU	Discipline:	GIS
Project	Rabbit Island Resource Consent	Drawing No:	GIS-3323048-12

