Nelson Regional Sewerage Business Unit

Wastewater Asset Management Plan 2007

Quality Record Sheet

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Nelson Regional Sewerage Business Unit

Wastewater Asset Management Plan 2007

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2 Levels of Service: outlines goals of the NRSBU in providing the recommended levels of service that the NRSBU wished to achieve. Assesses the current levels of service and actions required to achieve the recommended levels.

3 Future Demand: outlines existing demand, demand forecasts, growth and contributors expectations.

4 Emergency and Risk Management: Risk Management: overview, process and treatment along with emergency management carried out by the NRSBU.

5 Lifecycle Management Plan: provides detail on planning to monitor the performance of the Asset Management Plan, to improve asset management systems that will improve the level of confidence in the Asset Management Plan, asset details (including capacity, performance condition and valuations).

6 Financials: operations, maintenance, renewal and capital programmes.

7 Asset Management System: contains details of the information systems, asset details, and maintenance strategy.

8 Asset Management Plan Improvement and Monitoring: outlines areas for improvement.

9 Action Plan: A summary of the action points identified in this AMP and the long term programme for capital, renewals and asset management.

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SECTION 2

1.0 INTRODUCTION

1.1 Background

1.1.1 Nelson Regional Sewerage Business Unit

The Nelson Regional Sewerage Business Unit (NRSBU) is a joint committee of the Tasman District Council (TDC) and the Nelson City Council (NCC) and was instigated to look after the owner's (the two Council's) interests in the Regional Sewerage Scheme. It was set up as a business unit in October 2000 and previously operated as the Nelson Regional Sewerage Authority. A Memorandum of Understanding that was signed by the two Mayors and CEO's in December 2000 governs the operation of the NRSBU.

1.1.2 Conception of the NRSS

In the early 1970's poor water quality in the Waimea Inlet meant that there was a requirement to move towards better treatment of the area's waste streams. Several of the area's major industries, along with the Councils, discharged partially treated effluent direct to the Waimea Inlet.

After five years of investigation, and much discussion, Bells Island was chosen as the best site for a region wide treatment facility. The NRSBU treatment plant, comprising pump stations, rising mains, aeration basins and oxidation ponds was commissioned in 1983. The treatment plant was upgraded in 1996 to include a clarifier and ATAD plant and in 2006 that included improvements/replacements in the aeration basin, clarifier, sludge storage tank and the ATAD plant and the installation of the DAF component.

1.1.3 Contributing Councils

Nelson City Council

The Nelson City Council and its forebears have been responsible for sewage disposal in the city since the first piped disposal system was put in place in approximately 1907. The City has expanded by amalgamation of adjoining areas. Tahuna Town Board joined the City in 1953 and Stoke was transferred from Waimea County Council in 1960.

Tasman District Council

Tasman District Council and its forebears have been responsible for sewage disposal in the area since the first piped disposal system was put in place in the late 1940's and early 1950's. The Tasman District was formed by the amalgamation of adjoining Boroughs and Districts in 1989. Before amalgamation Richmond Borough and Waimea District, along with Nelson City Council, were the major stakeholders in the Regional Scheme.

1.1.4 Purpose of the Plan

In terms of NRSBU planning processes, the Asset Management Plan (AMP) is set at a tactical level between the Business Plan (a strategic document) and numerous process plans (operational documents). It is the NRSBU's intention that the AMP, once adopted by the Board, will be a significant management tool that will guide and influence decision-making.

The objectives of this AMP are to demonstrate that NRSBU:

- Understands what asset capacity will be required in the future, and what issues drive this capacity requirement
- Has shown how it will proactively and continually improve knowledge of its assets

- Has robust and transparent processes in place for managing, operating, maintaining, renewing and extending assets
- Has adequately considered the class of risks its activities face, and has systematic processes in place to mitigate identified risks
- Has made adequate provision for funding asset operations, maintenance, renewals and upgrades
- Outcomes delivered by the assets are increasingly aligned to the five contributors wishes and to other internally and externally imposed levels or standards

1.1.5 Previous AMP's

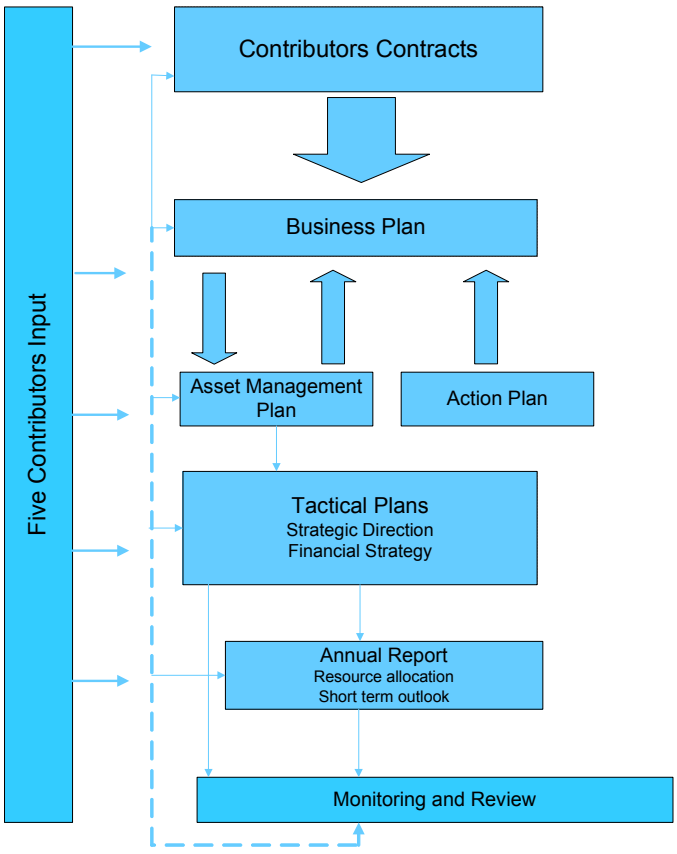
The first asset management plan was completed in June 1999 and further refined in August 2003 to meet minimum requirements. Asset management changes since 1999 include:

- NRSBU instigated
- Significant Asset Management awareness at Board level
- Increase understanding and implementation of risk management
- Asset register implemented into Hansen

1.1.6 Relationship with Other Documents

The AMP is a key component of the NRSBU's strategic planning function. Financial projections from the AMP will support and justify the financial forecasts in the Business Plan. Similarly the AMP provides the basis for preparation of each Annual Report.

Table 1-1: Corporate Links to the Asset Plan



1.1.7 Area Covered

The NRSBU treats municipal wastes (mainly domestic sewage) from (refer Figure 1-1):

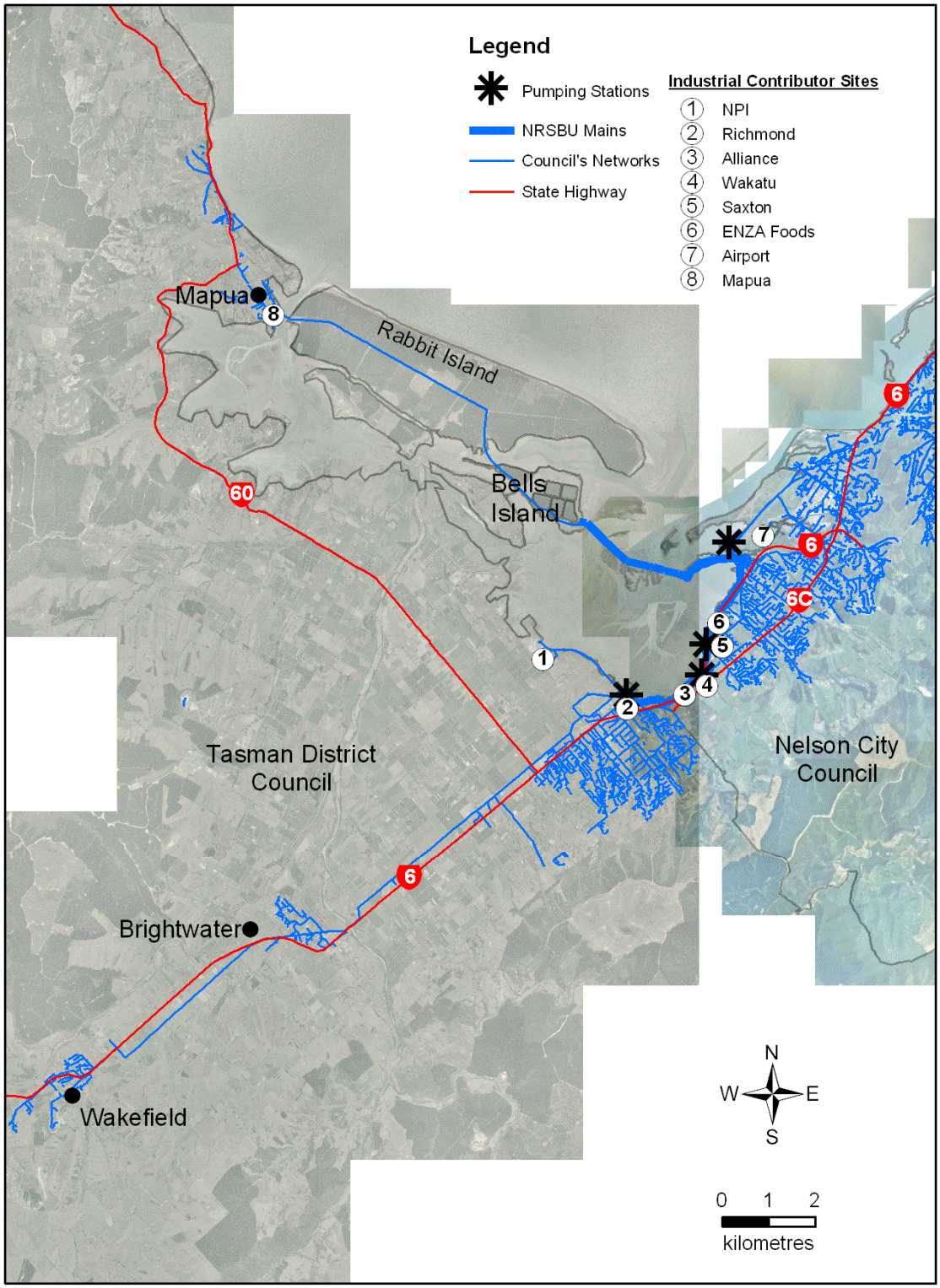
- Nelson City - Stoke and Tahuna areas
- Tasman District - Richmond, Wakefield, Brightwater (the Waimea Basin) and Mapua

Industrial wastewater from:

- Alliance Nelson
- ENZA Food
- Nelson Pine Industries

Nelson City Council and Tasman District Council have additional sewerage schemes and associated treatment and disposal schemes. Sealord, within Nelson City, discharges fish processing water via the Nelson City Council's Boulder Bank outfall.

Figure 1-1: Extent of Area Covered by NRSBU



1.1.8 Asset Description

The Nelson Regional Sewerage Scheme (NRSS) was commissioned in 1983 and upgraded in 1996 and 2006. NRSS includes 15.5km of rising mains, 4 pump stations, sewerage treatment plant (STP) and biosolids application facility. The layout of the Scheme, showing the location of the Sewerage Treatment Plant, contributors, pump stations and pipes is shown in Figure 1-1. The total assets of NRSBU have an estimated replacement cost of $30m.

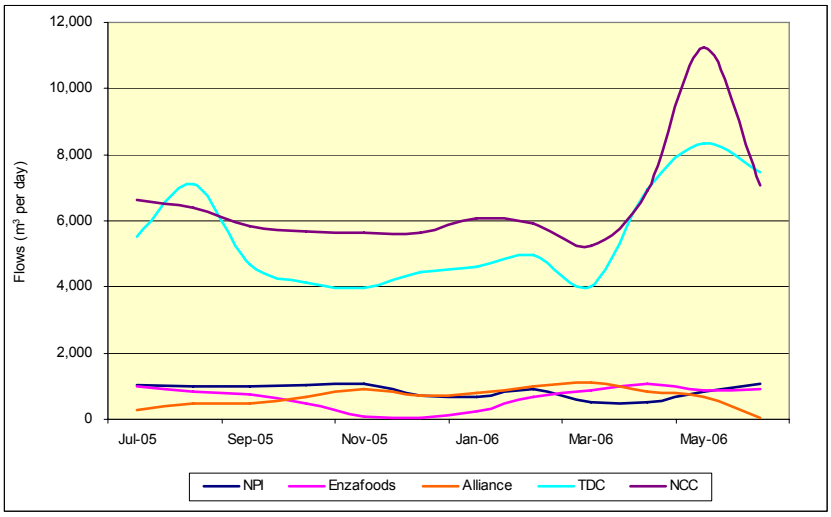
The rising mains range in size from 150mm to 800mm diameter. Of this 9.9km, now consists of HDPE following replacement of AC pipe that occurred during 2001 to 2005.

There are three major pump stations each with two variable speed drive pumps, with alternative duty, as well as a third, larger pump on standby for storm flows. A fourth, smaller pump station is located at the Wakatu Industrial site.

The STP is located on Bells Island, Waimea Inlet. Treated effluent is discharged into the inlet on the outgoing tide. Stabilised sludge (biosolids) is beneficially applied to forests on Rabbit Island. The treatment plant consists of an aeration basin, clarifier, Dissolved Air Flotation System (DAF) and an autothermal thermophilic aerobic digestion (ATAD) plant that treats captured solids to produce biosolids. A system of pumps and pipework transfers biosolids to Rabbit Island. The oxidation pond system of Bells Island consists of three facultative ponds in parallel and two maturation ponds in series. Effluent from the last maturation pond is discharged into the Waimea Inlet via a 120 metre HDPE 630mm diameter outfall pipeline and diffuser.

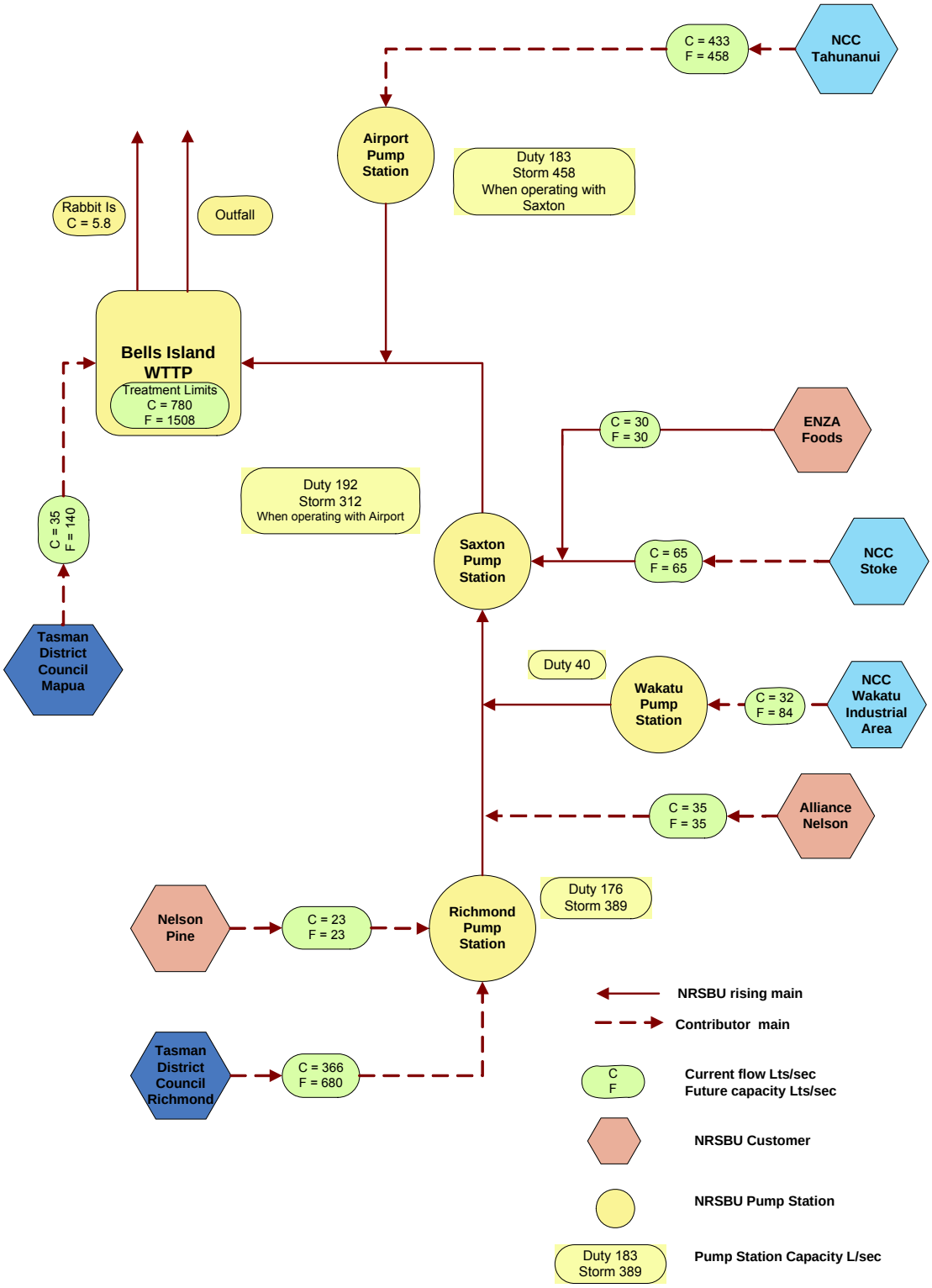
The contributor flows to the treatment plant for 2005-06 are detailed in Figure 1-2 and has been shown as an indicator only. There are other critical loadings (BOD_5, COD and TSS etc) that are used in the design and charging criteria.

Figure 1-2 Contributor Flows 2005-06



Files in AMP\AMP graphs and $ costs.xls

Figure 1-3: Schematic of System

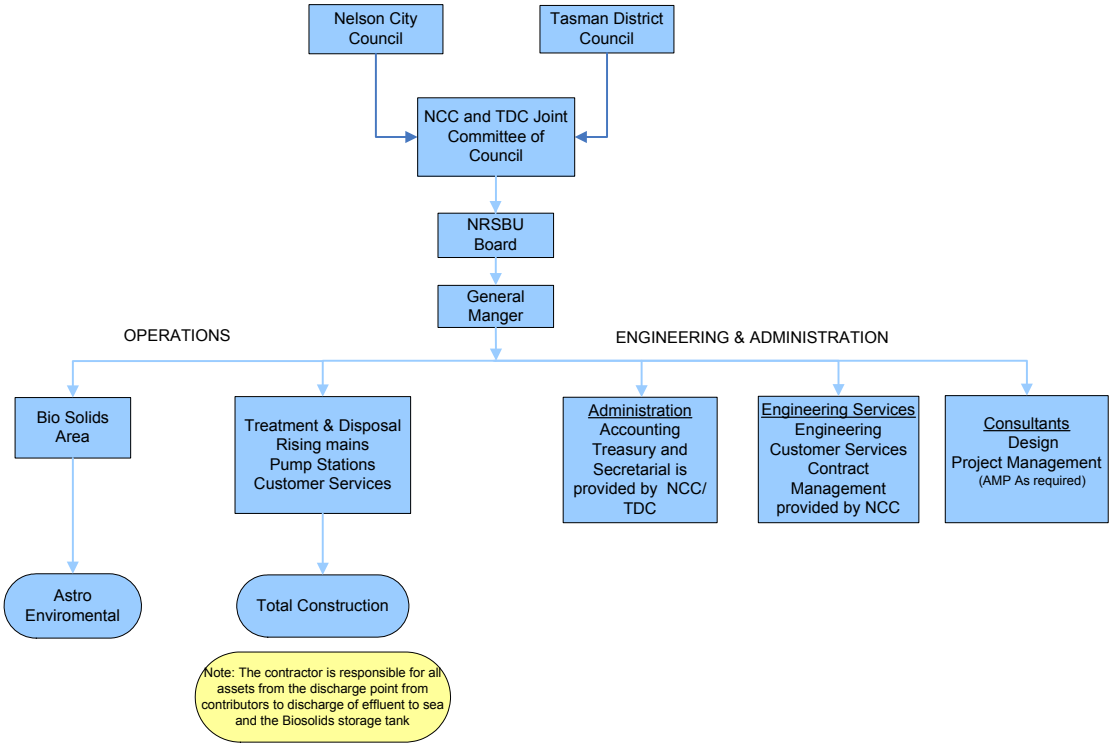


Copies of diagrams associated with plan\System Layout Version 2.vsd

Data for Figure 1-3 sourced from Treatment Plant Capacity Testing report dated November 2006, pump station testing April 2007 and Contract Agreements.

1.1.9 Organisations Structure

The NRSBU organisation structure is detailed below. The board is comprised of six members, two from of each of TDC and NCC, industry representative (with no voting powers) and an independent member.



1.1.10 Key Stake Holders

The plan recognises the following external and internal stake holders:

External

- Nelson City Council and Tasman District Council
- Industrial contributors (Nelson Pine Industries, ENZA Foods and Alliance Nelson)
- Government departments and agencies, including Ministry for the Environment, Ministry of Health, Audit NZ
- Nelson Marlborough District Health Board
- Tangata Whenua comprising of six Iwi
- Consultants
- Contractors (Total Construction Ltd and Astro Environmental)

Internal

- NRSBU Board
- Nelson City and Tasman District Council Staff

1.2 NRSBU Outcomes

1.2.1 Mission Statement

The NRSBU's mission statement is as follows:

"*To manage the current treatment facilities and network efficiently and in accordance with resource consent conditions to meet the needs of the major contributors, and to plan for the future needs of the community in a cost efficient and environmentally sustainable manner."*

1.2.2 Strategic Goals

The strategic objectives as detailed below were developed in early 2005 and take due regard to the Mission Statement and the objectives detailed in the Memorandum of Understanding between NCC and TDC.

1 Collection System

1.1 To ensure that the reticulation system operated by NRSBU has sufficient pump and pipe capacity to meet the current and forecast requirements of the customers.

1.2. Implement appropriate operations, maintenance and renewal strategies to ensure that pumps and rising main pipelines meet their expected economic life.

2 Waste Treatment and Disposal

2.1 To ensure that the wastewater treatment and disposal systems fully comply with all resource consent conditions in relation to the discharges to air, land and to the Waimea Estuary.

2.2 To ensure that the scheme has sufficient treatment and disposal capacity to manage current and forecast increases such that the scheme provides for its customers in a cost effective and sustainable manner.

2.3 To ensure that as much of the treated effluent as possible from Bells Island is re-used to the benefit of the environment.

3 Management

3.1 Ensure that assets are operated, maintained, renewed and upgraded in a sustainable and cost effective manner and that they continue to provide the prescribed level of service for all customers.

3.2 To implement a charging structure that properly reflects both the short and long term costs to the NRSBU of any particular source of effluent, in terms of capital, plant maintenance, operational and administration costs.

3.3 To undertake risk assessments and develop contingency plans to ensure the impact of any abnormal or emergency event is minimised.

3.4 To ensure that the organisation make every effort to be fully informed on issues, current and future technology and trends in the industry.

3.6 To optimise costs of operation and maintenance of the NRSBU through effective management of contracts.

4 Administration

4.1 Effective financial management.

4.2 To provide the Board and Owners with up to date, co-ordinated and comprehensive financial management information.

5 Customer Relations

5.1 To develop and maintain good working relationship with all Customers and keep Customers informed of developments with the Regional Sewerage Scheme to enhance and optimise the overall performance of the Regional Sewerage facilities.

1.3 Memorandum of Understanding

The key statements for the memorandum of understanding are:

- NRSBU are a stand alone body
- Term of agreement with NRSBU terminates in 2010 (ten years after starting)
- The Councils have agreed that the Nelson Regional Business Unit is intended to be a self-funding body
- NRSBU shall ensure that all capital assets are appropriately depreciated to enable a fund to be established for the upgrade and replacement of capital assets and have the sole authority to determine what capital expenditure is made from the depreciation fund
- Capital expenditure that is required that exceeds the amount held in any depreciation fund (in the way of expansion or new technology which improves the

efficiency of performance of the plant, or any major upgrades required because of the increase in growth and users) requires the approval of the two Councils

- The responsibility for the administration of all capital assets administered by the Nelson Regional Sewerage Authority was transferred to the new Business Unit as at 1 July 2000 and that all such capital assets are owned equally by the two Councils

1.4 Significance Policy

Under the LGA 2002, every Council is required to have a Policy of Significance. A Significant Activity is one that has a high degree of significance in terms of its impact on either:

- The well-being of the people and environment of the District and/or
- Persons likely to be affected by or with an interest in that activity and/or
- Capacity of the Councils to provide for the well-being of the district

Wastewater schemes are considered by the Nelson City and Tasman District Council's to be a Strategic Activity.

1.5 Issues

The issues for the NRSBU are:

- Upgrading of treatment plant:
  - Existing reticulation peak flow may be exceeded around 2009
  - Exiting outfall capacity for peak flow may be exceeded by 2009
  - Treatment plant exceeding BOD, COD, TSS capacity over the next 20 years (as per the Upgrade Strategy Report)
- Balancing nitrogen level requirement in biosolids and outfall effluent to achieve compliance in both areas in the long term
- Upgrade strategy for rising mains that may include duplication of concrete rising main (located under the estuary) or installing ring main
- Storage capacity at NRSBU pump stations and contributors sites
- Finalisation of the contributor contracts
- Resource consent for extension of Biosolids application

1.6 Asset Management Planning

1.6.1 Benefits

The benefits to the NRSBU of asset management planning[1] are:

- Improved governance and accountability
- Enhanced service management and customer satisfaction
- Improved risk management
- Improved financial efficiency
- More sustainable decisions

1.6.2 Asset Management Plan Evolving

Asset management for the NRSBU will continue to evolve in a continuous cycle of review and improvements so that the quality of outputs matches the changing business and legislative needs. The 2003 AMP indicated that the "AMP will act as a vehicle for the development of advanced asset management practices". This plan advocates advances in asset management to levels that suit the risk profile of individual assets and the over all strategy of the NRSBU.

[1] 2006 IIMM Manual Section 1.1.4

2.0 LEVELS OF SERVICE

This section on Levels of Service is an integral part of any Asset Management Plan. The Levels of Service determine the amount of funding that is required to maintain, renew and upgrade the wastewater infrastructure in order to provide the contributors with the levels of service specified. Changes to the Levels of Service may drastically change funding requirements.

Levels of service for the NRSBU wastewater infrastructure are specified for the following:

- Environmental Impacts Section 2.3 Treatment & Disposal Facilities and Pump Stations
- Capacity Section 2.4 Treatment & Disposal Facilities, Pump Stations and Pipelines
- Reliability Section 2.5 Treatment & Disposal Facilities, Pump Stations and Pipelines
- Responsiveness Section 2.6
- Key Contributor Relationships Section 2.7

A summary review of the Levels of Service was carried out in the writing of this plan to ascertain if changes were required following the "design build and operate contract" for the treatment plant. Some minor changes were considered necessary from the levels of service agreed by the NRSBU in 2003.

Table 2-1: Levels of Service Summary

Level of Service	Function	Category	Technical Level of Service
Environmental Impacts	Treatment & Disposal	RMA Consent - Wastewater Discharge to Coastal Marine Area	100% compliance with consent conditions
		RMA Consent – Discharge of Contaminants to Air	100% compliance with consent conditions
		RMA Consent - Discharge of Contaminants to Land	100% compliance with consent conditions
		Equipment Failure of critical components within the treatment and disposal system	No equipment failures that impact on compliance with resource consent conditions
	Pump Stations	Odour complaints from pump stations	No odour complaints originating from pump stations
		Pump station wet weather overflows	No overflow events occurring for the agreed contributor flows
		Pump station overflows resulting from power failure	No overflow events occurring
		Pump station overflows resulting from mechanical failure	No overflow events occurring
	Pipelines	Reticulation Breaks	No reticulation breaks
		Air valve malfunctions	No air valve malfunction that result in wastewater overflows

Level of Service	Function	Category	Technical Level of Service
Capacity	Treatment & Disposal	Volume overloading system	Treatment and disposal of all agreed contributor limits Not to exceed upgraded design capacity of treatment plant and disposal system in order to comply with resource consent conditions
	Pump Stations	Volume overloading system	No overflows for all pump stations
Reliability	Treatment & Disposal Pump Stations Pipelines	Equipment failure of critical components	Zero equipment failures - compliance with Resource Consents conditions
Responsiveness	Treatment & Disposal	Speed of response for emergency and urgent maintenance works	Achievement of Response times specified in Maintenance Contract
	Pump Stations Pipelines	Speed of response for routine and programmable maintenance works	Achievement of Response times specified in Maintenance Contract
Key Contributor Relationships	Treatment & Disposal Pump Stations Pipelines	Overall satisfaction	Agreed levels of service provided to all Contributors. Robust charging structure in place Contributors Satisfied with Sewerage Scheme

2.1 Customer Research and Expectations

2.1.1 Background

The NRSBU provides services to the wider community in terms of an Agreement for Disposal of Trade Waste and Sewerage. The Levels of Service are determined by this Agreement along with the Resource Consents for discharge of contaminants. The levels of resident satisfaction of the performance of the NRSBU can be determined by reviewing Nelson City and Tasman District residents feedback in their respective resident surveys.

The **International Infrastructure Management Manual 2006** suggests that properly designed and conducted telephone (or face to face) survey research is the best option for obtaining qualitative results of whole population, users, households and business opinion of the service. Well structured surveys of contributors are carried out annually and these are linked with the NRSBU's Business Plan.

2.1.2 Survey of NRSBU Contributors

The NRSBU undertakes an annual survey **(AP 2.1)** of the contributors. Presently there are five contributors and two survey forms are sent to each organisation. Nelson City Council tends to return only one survey due to the involvement of key staff in both NCC and NRSBU. The small number of surveys involved has the usual issues around surveys with small sample sizes. The returns from one contributor represents 20% of the survey participants and this can skew the results. However the survey is seen as a useful tool as long as the results are interpreted in the context of the survey sample.

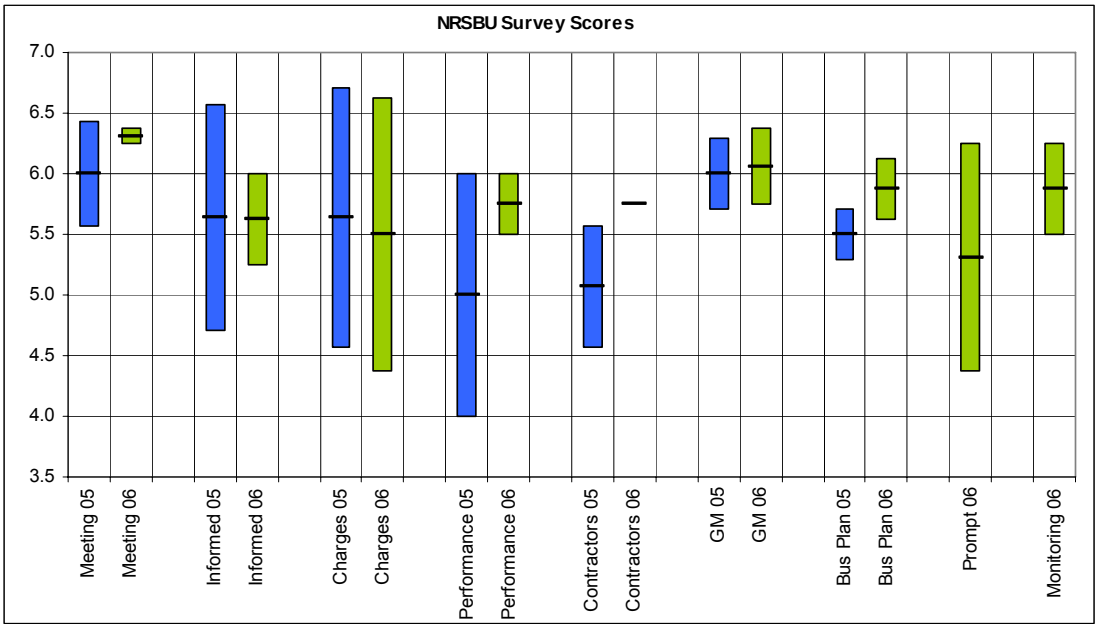
The survey measures the importance of issues to users as well as asks then to rate the NRSBU's performance in terms of each of these issues. This enables the NRSBU to ascertain both the expectations of contributors and their perception of performance.

Figure 2-1 compares the survey results for 2005 and 2006 and Table 2-2 details the survey requirements. The full survey results are detailed in the supplementary section.

Table 2-2: Survey Requirements

Meeting	User meetings are a useful forum for the exchange of information between users and staff and for resolving issues
Informed	Users are kept well informed of issues relating to the Regional Sewerage Scheme, which may affect them
Prompt	Feedback to users is prompt and timely
Charges	Data and information on user charges is accurate and provided in a timely fashion
Monitoring	Data and information on monitoring is accurate and provided in a timely fashion
Performance	Users are provided with timely and accurate advice on reticulation and treatment plant performances
Contractors	On site services, advice and follow up provided by the contractors is excellent
GM	The General Manager has an excellent working relationship with user representatives
Business Plan	The NRSBU business plan provides clear direction for the operation of the scheme and is relevant

Figure 2-1: Customer Survey Results 2005 and 2006 (Perception and Expectation)



Files in AMP\NRSBU Survey Scores.xls

The 2005/06 end of year contributor variable charge account was significantly greater than previously indicated by NRSBU staff, this resulted in some contributors marking the expectations questions lower in the areas of "Charges" and "Prompt".

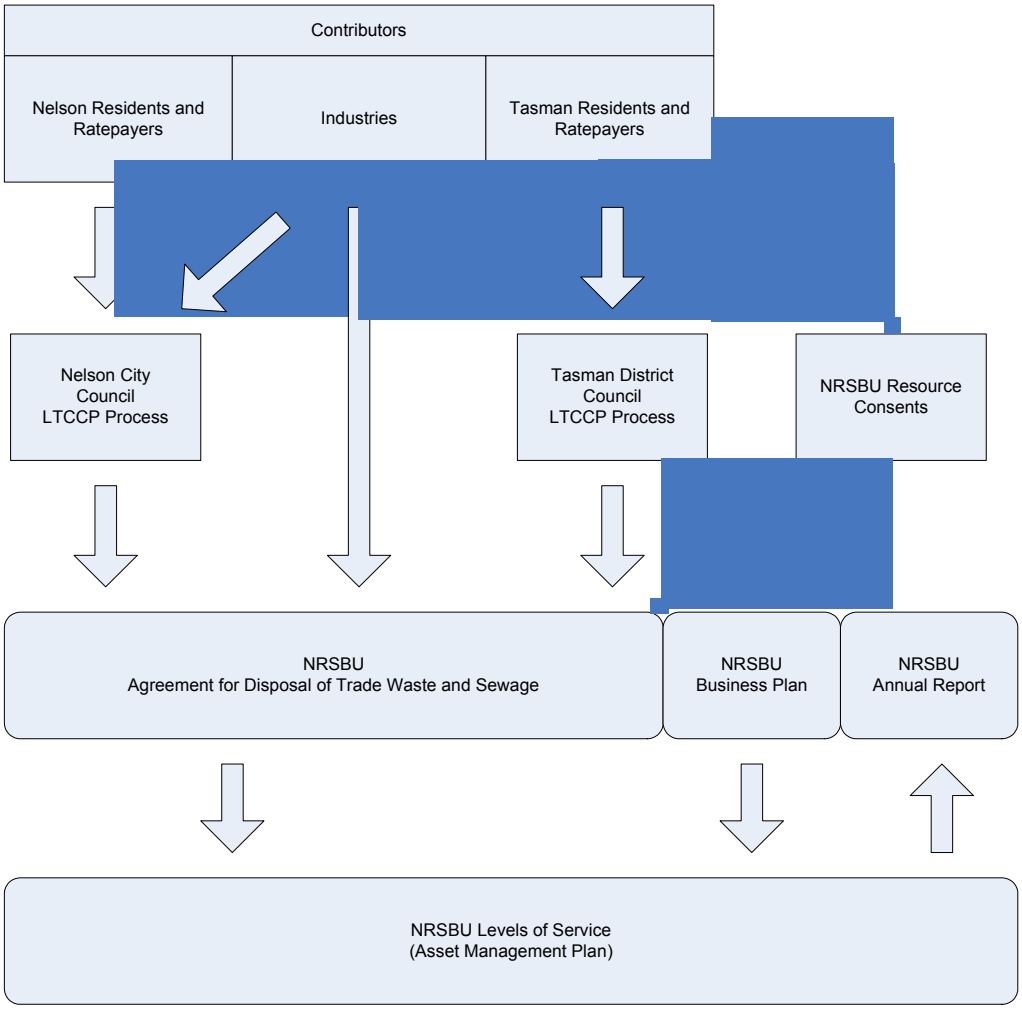
The survey will be revised prior to the next survey so that it represents the broad objectives of the Business Plan and to obtain a balanced view of the Unit's performance. It is proposed that the survey will be sent out in March, allowing contributors to base their replies on three-quarters of the year's performance. This timing then doesn't conflict with end of year charging adjustments **(IP 2–1)**

2.1.3 Consultation

The wider community has contributed to the Levels of Service adopted through the Nelson City and Tasman District Long Term Council Community Plans (Local Government Act 2002 consultation process) as well as the Resource Consent applications for the NRSBU (Resource Management Act 1991 consultation process).

The lines of community and contributor input are described in Figure 2-2 below.

Figure 2-2: Community Consultation



Levels of Service have been developed by Nelson City Council and Tasman District Council through their Long Term Council Communities Plans. These are summarised and compared with the NRSBU Agreement for Disposal of Trade Waste & Sewerage and the Service Criteria shown in the 2003 NRSBU Wastewater Asset Management Plan in Table 2-3.

Table 2-3: Service Criteria and Levels of Service

NRSBU - 2003 AMP	NRSBU – Contributors Agreement	NRSBU – Business Plan Function	NRSBU – Business Plan Level of Service	NCC - LTCCP	TDC - LTCCP
Capacity (Treatment & Disposal)	Receives waste (characteristics within specified limits) Monitoring to confirm limits are not exceeded	RMA Consent - Wastewater Discharge to Coastal Marine Area	100% compliance with consent conditions	Capacity (Amount of flow during wet weather)	
		RMA Consent – Discharge of Contaminants to Air	100% compliance with consent conditions		
		RMA Consent - Discharge of Contaminants to Land	100% compliance with consent conditions		
		Equipment Failure of critical components within the treatment and disposal system	No equipment failures that impact on compliance with resource consent conditions		
Environmental (Treatment & Disposal) (Pump Stations)		Equipment Failure of critical components within the treatment and disposal system	No equipment failures that impact on compliance with resource consent conditions	Environmental quality (Odour events)	All treatment plants and discharges into the environment properly consented and complying with consent conditions
				Environmental quality (Resource consents)	Council will operate all Wastewater activities in a sustainable manner in accordance with national environmental legislation (Resource Management Act), District Plans (TRMP) and their resource consent
Key Contributor Relationships/Customer Satisfaction	Keep the users informed of resource consent variations or associated procedures and processes	Customer Key Contributor Relationships	Agreed levels of service provided to all contributors Robust charging structure is put in place Contributors are satisfied with sewerage scheme	Resident satisfaction (Results from residents' survey)	Council Wastewater AMP in alignment with Council's vision and forward plans
					All customers will be treated in a fair, consistent and respectful way
					The community will have

NRSBU - 2003 AMP	NRSBU – Contributors Agreement	NRSBU – Business Plan Function	NRSBU – Business Plan Level of Service		NCC - LTCCP	TDC - LTCCP
						sufficient opportunity to provide input on strategic plans for Wastewater
Reliability (Treatment & Disposal)	Prudently Manage the System				Reliability (The number of pump station overflows)	Council manages the Wastewater services to a level that satisfies the community
Reliability/ Capacity (Pump Stations)		Pump Stations	Odour complaints from pump stations	No odour complaints originating from pump stations	Reliability (Sewer blockages)	To provide the reticulation necessary for every ratable property inside urban drainage areas to connect to the Sewerage System
			Pump station wet weather overflows	No overflow events occurring for the agreed contributors flow		
			Pump station overflows resulting from power failure	No overflow events occurring		
			Pump station overflows resulting from mechanical failure	No overflow events occurring		
		Pipelines	Reticulation Breaks	No reticulation breaks.		
			Air valve malfunctions	No air valve malfunction that result in wastewater overflows		
Responsiveness	Establish and Maintain an Emergency Management Plan	Speed of response for emergency and urgent maintenance works	Compliance with times specified in the maintenance contract		Customer Response (Speed of response to problems raised by public)	Adequate facilities are in place to avoid service faults
		Speed of response for routine and programmable maintenance works	Compliance with times specified in the maintenance contract			

From this comparison, it can be concluded that it is reasonable for the Levels of Service for the NRSBU wastewater infrastructure to be specified as follows:

- Environmental Impacts
- Capacity
- Reliability
- Responsiveness
- Key Contributor Relationships

These key criteria are as listed in the NRSBU Wastewater Asset Management Plan 2003, however these criteria now form the section headings rather than the format being determined by the facility components.

This approach to Levels of Service is consistent with those adopted by Nelson City Council with the addition of Key Contributor Relationships.

2.2 Statutory Obligations and Non-Statutory Standards

2.2.1 Statutory Obligations

The NRSBU has the responsibility to comply with the following legislative requirements:

- The **Local Government Act 2002** sets out the requirements of a long-term community plan that is to include the intended levels of service and how the maintenance, renewal and replacement of assets will be met to maintain the levels of service
- The **Resource Management Act 1991** prohibits the discharge of contaminants into water, air and land unless expressly allowed by a rule, consent or regulation

2.2.2 Non-Statutory Standards

The NRSBU has the responsibility to comply with the following requirements:

Requirement	Nelson City Council Reference	Tasman District Council Reference	AMP Section
Regional Policy Statements	Nelson City Council Regional Policy Statement	Tasman District Council Regional Policy Statement	2.2.2
Resource Management Plans	Nelson City Council Resource Management Plan 2004	Tasman District Council Resource Management Plan 1996	2.2.2
Engineering Standards 2003	Nelson City Council Engineering Standards 2003	Tasman District Councils Engineering Standards	2.2.2

Requirement	Nelson City Council Reference	Tasman District Council Reference	AMP Section
Resource Consents		Tasman District Council Wastewater Discharge to Coastal Marine Area (NN00539)	5.5 and Supplementary Plan
		Tasman District Council Discharge of Contaminants to Air (NN000541)	5.5 and Supplementary Plan
		Tasman District Council Discharge of Contaminants to Land (NN940379	5.5 and Supplementary Plan

The following commitments have been made in the **Regional Policy Statements** relating to the provision of sewerage facilities:

NCC Policy DH1.3.4: To ensure that any proposals for urban subdivision or development include adequate and appropriate provision of services including waste disposal.

TDC Section 5.4, Policy 5.1 (ii): The Council will develop service provision plans and will provide for private contributions to services in the District Plan, to manage the rate and location extent of utility services including roads, water supply, sewerage and stormwater extensions.

The **NCC Resource Management Plan** and **TDC Resource Management Plan 1996** imposes restrictions on the maximum quantities of trade waste that may be discharged from industrial zoned land.

The **NCC Trade Waste Bylaw** 181: 1984 and **TDC Trade Waste Bylaw** (comprised of Waimea County Council Trade Waste Bylaw No. 1:1985 and Richmond Borough Council Trade Waste Bylaw 1986) required that a consent be obtained before trade waste may be discharged to the sewer system. Control may be exercised over quality and quantity.

The NCC has made the following commitments in the **NCC Regional Policy Statement** relating to sewage disposal:

a. Policy WA1.3.3: To control point discharges through the use of resource consents and appropriate conditions in order to ensure that water quality classifications are met and sustained.

b. Method WA1.4.19: Council will require that resource consent applications to discharge any sewage to water include:

   i. Consultation with Tangata Whenua and the wider community and

   ii. Adequate consideration of land disposal alternatives in accordance with the 4th Schedule of the Act.

c. Policy SO1.3.3: the disposal of industrial, agricultural, domestic and other contaminants onto, or into, soil is carried out in such a way as to where possible avoid and otherwise to minimise contamination of soil and adverse effects on adjoining properties.

The TDC has made the following commitments in the proposed **TDC Regional Policy Statement** relating to sewage disposal:

a. Issue 10.1: Industrial, Agricultural or Urban Effluent Discharges to Water and Air:

…There is a need to advocate appropriate waste minimisation and treatment processes, and cleaner process or treatment technologies. There is also a need to regulate discharges to avoid, remedy or mitigate adverse contaminant effects.

b. Issue 10.2: Agricultural, Forestry and Other Industrial Discharges to Land

…As with the discharge of contaminants into water or air, there is a need to advocate appropriate waste minimisation and treatment assessment including the reuse or recycling of bulk organic wastes, use of effluent treatment systems and cleaner process or treatment technology.

The NCC Resource Management Plan 1996 and the TDC Resource Management Plan 1996 set quality standards for the coastal waters. The Nelson Fresh Water Management Plan forms part of the NCC Resource Management Plan.

The **NCC Engineering Standards 2003** sets out the requirements for the design and construction of sewerage systems.

2.3 Environmental Impacts

2.3.1 Background

Compliance with Resource Consents is a key deliverable for the NRSBU.

1. Wastewater Discharge to Coastal Marine Area

Compliance with coastal permit conditions over the past three years has been excellent. Prior to that, since 1995, there has been general compliance with minor issues from time to time.

2. Discharge of Contaminants to Air

The discharge to air consent was granted in 2003 and the NRSBU had two years to bring the treatment plant up to standard and comply with all conditions of this consent. The plant is now fully compliant with the consent conditions with one minor odour event in the last 12 months.

3. Discharge of Contaminants to Land

Compliance with biosolids consent conditions has been good except the levels of nickel in the soil for some stands of forestry, which exceeded the allowable levels before application commenced. This was only discovered in the first round of soil sampling, three years after the commencement of the consent. Initially there were some odour issues which have since been addressed. The areas of elevated nickel have now been excluded from biosolids application.

The allowable nickel limits in the soil were increased from 35 to 100ppm by means of a variation to the resource consent, which is in line with international practice, in April 2003. The areas that still had elevated nickel levels above this revised figure and areas of elevated arsenic levels have now been excluded from biosolids application.

2.3.2 Levels of Service for Environmental Impact

The Current Levels of Service as described in Table 2-4 below but one minor change was considered necessary (indicated in bold italics) from the levels of service agreed by the NRSBU in 2003.

Table 2-4: Current Levels of Service Environmental Impacts

Level of Service	Function	Category	Technical Level of Service
Environmental Impacts	Treatment & Disposal	RMA Consent - Wastewater Discharge to Coastal Marine Area	100% compliance with consent conditions
		RMA Consent – Discharge of Contaminants to Air	100% compliance with consent conditions
		RMA Consent - Discharge of Contaminants to Land	100% compliance with consent conditions
		Equipment Failure of critical components within the treatment and disposal system	No equipment failures that impact on compliance with resource consent conditions
	Pump Stations	Odour complaints from pump stations	No odour complaints originating from pump stations
		Pump station wet weather overflows	No overflow events occurring for the agreed contributor flows
		Pump station overflows resulting from power failure	No overflow events occurring
		Pump station overflows resulting from mechanical failure	No overflow events occurring
	Pipelines	Reticulation Breaks	No reticulation breaks
		Air valve malfunctions	No air valve malfunction that result in wastewater overflows

2.3.3 Performance Measurement and Monitoring

Current Performance Measurement is undertaken in terms of:

- Effects outside the mixing zone
- Effluent discharge standard
- Volume and timing of effluent discharge

Measurement and sampling is undertaken as required by the Resource Consents and to provide data to support compliance with the Resource Consents. The monitoring regime is explained fully in Section 5.5 and in the supplementary portion of this Plan.

2.3.4 Action Plan

- Monitoring and recording according to consent conditions
- Analyse monitoring data to identify trends and any possible areas of improvement

2.4 Capacity

2.4.1 Background

Volume Overloading of the Treatment and Disposal Components

This service criteria is looking at the capacity of the treatment and disposal system. The capacity of the treatment and disposal process can be broken down into the following components:

1. Reticulation
2. Inlet Screen
3. Aeration Basin
4. Clarifier
5. ATAD
6. Ponds
7. Biosolids Application

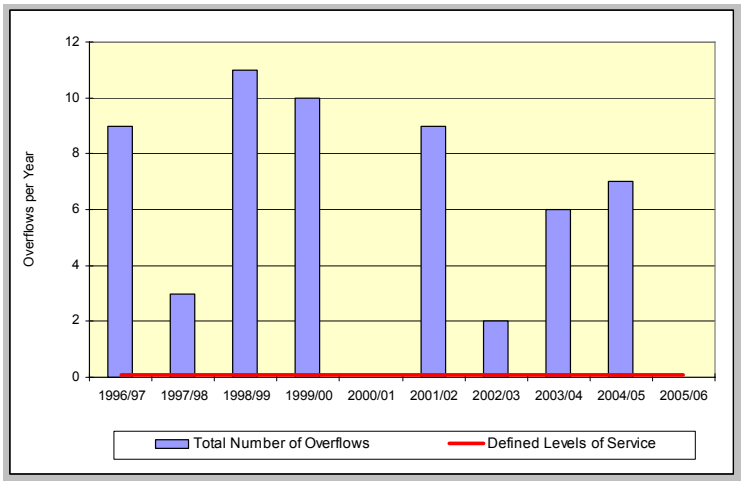
At present the treatment plant accepts all wastewater discharge from the contributors within the limits of the Contributors Agreements, and charges the contributors accordingly depending on the volumes and compositions.

The above seven areas make up the contributor's individual agreements.

Pump Station Overflows

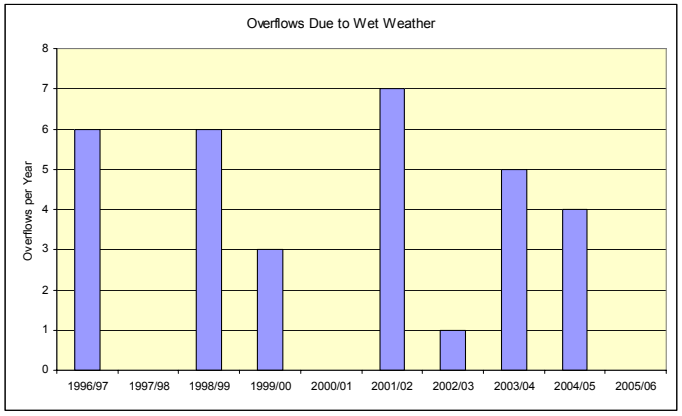
Each pump station is fitted with alarms to indicate overflows, pump failures and power outages. Three of the four main pump stations have two duty pumps with an additional high flow pump. The number of pump station overflows is recorded and reported in the Annual Report. A summary of the last 10 years pump station overflows due to wet weather, power failure and mechanical failure is shown in Figure 2-3 below.

Figure 2-3: NRSBU Overflows History



Overflows due to wet weather

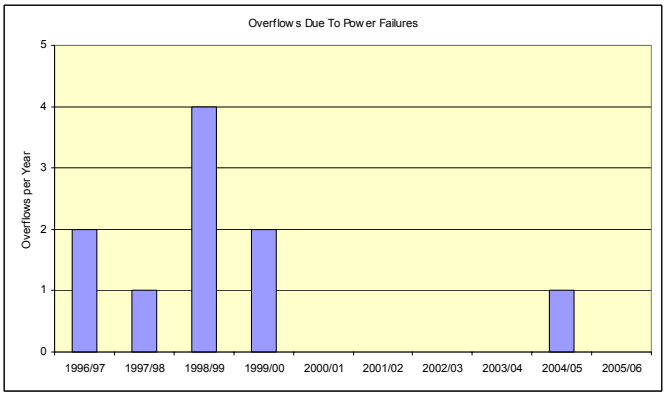
As the regional scheme boundary is at the contributors discharge to the pump stations, the wet weather overflows is a result of infiltration within the two Council (NCC & TDC) reticulation systems.



The NRSBU will provide wet weather storage only for what the contributors are prepared to pay for and agreed within their contributor contract. Any flows above those agreed in the agreements become the responsibility of the contributors. National guidelines suggest a storage allowance of 4 x ADWF at pump stations.

Overflows due to power failure

The options available to cope with the consequences of a power failure event are standby power and emergency storage.



The NCC owns a portable generator which is available to the NRSBU in an emergency, with a 300kVA capacity that is used in the event of a power failure and would provide power to operate one pump station at a time. It is unlikely that all four main pump stations would be without power at the same time. This is further discussed in Section 4.4.5.

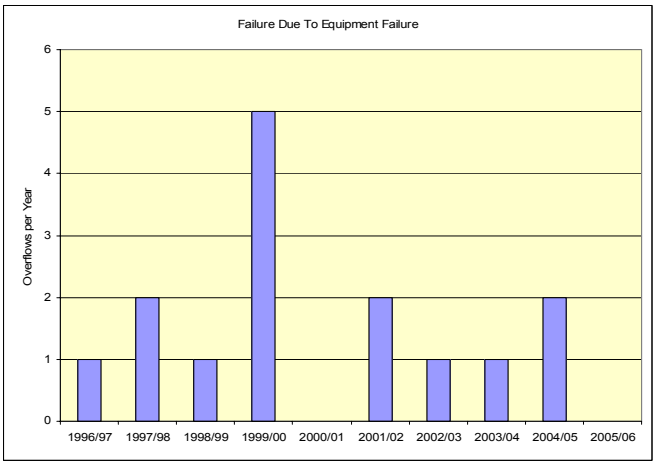
The only emergency storage available to the NRSBU at present is in the pump station wet wells, which provide storage as detailed in Section 5.2.3.

In the past three years there have been no overflows due to power failure, this is due to a reliable power supply and the power providers giving the NRSBU pump stations priority in the event of a power failure or limited power supply.

Overflows due to equipment failure

Overflows caused by equipment failures have occurred on a regular basis (one to two per year) until 2005/06. Resolution of these equipment failures included:

- Installation of new pumps in 2003 and 2004
- The rationalisation of SCADA for NRSBU and NCC. This entailed the replacement of existing system with a "Kingfisher" SCADA and "Intouch" system at the base station in 2005

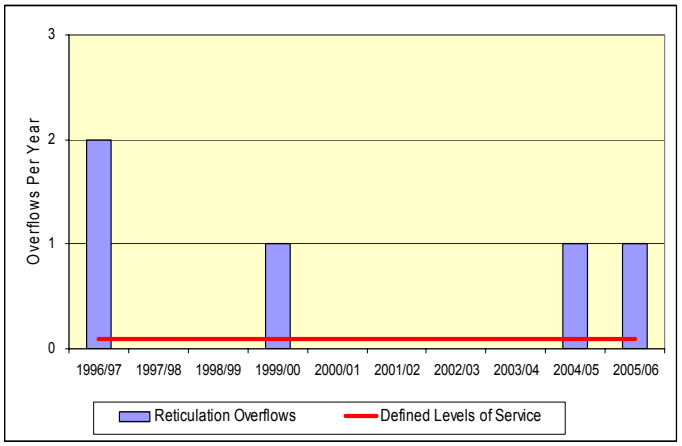


Reticulation Overflows

Overflows caused by reticulation failures have occurred on an irregular basis.

The 2004/05 overflow was caused by misalignment of pipe when new pipe installed at the completion of project.

The 2005/06 failure was caused by corrosion of bolts holding an air valve. This failure highlighted deficiency in the maintenance regime operated by the maintenance contractor. Changes in the maintenance process and inspections have been instigated to reduce the risk of this type of failure.



2.4.2 Level of Service for Capacity

The Current Levels of Service as described in Table 2-5 below but one minor change was considered necessary (indicated in bold italics) from the levels of service agreed by the NRSBU in 2003.

Table 2-5: Capacity Current Performance Measurement

Level of Service	Function	Category	Technical Level of Service
Capacity	Treatment & Disposal	Volume overloading system	Treatment and disposal of all agreed contributor limits
		Volume overloading system	Not to exceed design capacity of treatment plant and disposal system in order to resource consent conditions
	Pump Stations	Volume overloading system	No overflow events occurring for the agreed contributor flows

2.4.3 Performance Measurement and Monitoring

The capacity of the individual Treatment and Disposal components of the treatment and disposal system is currently not specifically identified, although daily, weekly and monthly monitoring and recording programmes, as set out in the maintenance contract, are currently being carried out. This testing is listed below:

- Contributor monitoring for adherence to agreed limits
- Resource consent recording and monitoring
- Annual review of actual flows and load against design flows/loads(taken from 2006 Upgrade Report)

2.4.4 Action Plan

- Encourage Councils to reduce stormwater infiltration and/or provide storage for flows in excess of agreed capacity before significant upgrade of pipes and storage occurs.

2.5 Reliability

2.5.1 Background

It is recognised that there will be some equipment failure that will affect the treatment process as all components cannot be 100% reliable or have full duplication of all equipment processes.

The recommended level of service is to have no critical component of the plant out of action that will impact on the compliance with the resource consents.

2.5.2 Level of Service for Reliability

The Current Levels of Service as described in Table 2-6 as follows

Table 2-6: Level of Service for Reliability

Level of Service	Function	Category	Technical Level of Service
Reliability	Treatment & Disposal	Equipment failure of critical components	Zero equipment failures compliance with Resource Consents conditions
	Pump Stations	Equipment failure of critical components	Zero equipment failures compliance with Resource Consents conditions
	Pipelines	Equipment failure of critical components	Zero equipment failures compliance with Resource Consents conditions

2.5.3 Performance Measurement and Monitoring

The approach to Performance Measurement and Monitoring will include recording and reporting the number of breakages and air valve malfunctions is provided in monthly reports from the maintenance contractor and use of the Hansen Asset Management System to record equipment or asset failure.

2.5.4 Action Plan

- Consider the options i.e. duplication of all critical components or early replacement, in terms of asset risk analysis (this is further discussed in Section 4)

2.6 Responsiveness

2.6.1 Background

Responsiveness is a measure of the speed of response for carrying out routine and emergency maintenance work on the system. The NRSS Design/Build/Operate Contract

requires that the contractor respond to call within specified times depending on the response classification as shown in Table 2-7 below.

Response times for emergency works shall apply 24 hours per day, every day of the year. Response times for non-urgent works shall be working days (Monday to Friday) excluding public holidays during normal working hours. The contractor shall respond to, and satisfactorily resolve, responsive maintenance and urgent works within the maximum response times.

Table 2-8 and Table 2-9 below describes urgent, non urgent maximum response times and response priority classifications.

Table 2-7: System Failure Response Times

Description	Investigation & Appraisal	Complete Repair
Investigations, inspections and reticulation monitoring	By arrangement	N/A
Minor leaks from fittings and connections	2 hours	1 working day
Flow meters	1 working day	5 working days
Other non-urgent works	N/A	10 working days
Burst pipes or major leakages	30 minutes	8 hours
Pump station failure	30 minutes	8 hours
Major sewage overflow that could endanger life or property or have an adverse effect on the environment	30 minutes	8 hours
Other emergency works	30 minutes	8 hours 90% of times Nil beyond 48 hours

Table 2-8: Response Priority Classification

Priority	Description	Definition of Typical Circumstances
1	Emergency	Failure to contain wastewater within the NRSS resulting in risk of flooding to any building, or Risk of loss of damage to assets of Principal or third parties, or Risk of injury to public or employees
2	Urgent	Failure to contain wastewater within the NRSS, or Risk of environmental damage, or Risk of adverse publicity
3	Routine	Malfunction of NRSS which is not sufficiently serious to meet above criteria
4	Programmable	Report, complaint or enquiry which does not reveal any malfunction of NRSS

Table 2-9: NRSS Response Times

Priority	Description	Attend site	Commence Resolution Works as Required	Complete Resolution
1	Emergency	0.5 hours	0.5 hours	As soon as practicable
2	Urgent	0.5 hours	2 hours*	1 day*
3	Routine	1 day	1 month	1 month
4	Programmable	1 day	By agreement	By agreement

* Or as directed by the General Manager

2.6.2 Performance Measurement and Monitoring

The approach to Performance Measurement and Monitoring is based around measurement and reporting of the speed of response and issue resolution. This information is collected and managed through the Design/Build/Operate Contract.

2.6.3 Action Plan

- Recording and assessment of compliance times using Hansen.

2.7 Key Contributor Relationships

2.7.1 Statutory Obligations

The NRSBU has the responsibility to comply with the following legislative requirements:

- The **Local Government Act 2002** sets out the requirements of a Long-Term Community Plan that is to include the intended Levels of Service and how the maintenance, renewal and replacement of assets will be met to maintain the Levels of Service
- The **Resource Management Act 1991** prohibits the discharge of contaminants into water, air and land unless expressly allowed by a rule, consent or regulation

2.7.2 Non-Statutory Standards

Maintaining good relationships with Key Contributors as well as other stakeholders is essential in the achievement of the Regional Policy Statements and compliance with Resource Consents.

2.7.3 Background

The NRSS has five customers or contributors. The NRSBU is committed to good working relationship with all contributors to enhance and optimise the overall performance of the regional sewerage facilities.

2.7.4 Level of Service for Key Contributor Relationships

The Recommended Levels of Service are as listed in the 2006 – 2007 Business Plan

- Agreed levels of service are provided to all contributors
- A robust charging structure is put in place
- Contributors are satisfied with the management and operation of the sewerage scheme

Table 2-10: Levels of Service for Key Contributor Relationships

Level of Service	Function	Category	Technical Level of Service
Key Contributor Relationships	Treatment & Disposal	Overall satisfaction	Agreed levels of service provided to all Contributors Robust charging structure in place Contributors Satisfied with Sewerage Scheme
	Pump Stations	Overall satisfaction	Agreed levels of service provided to all Contributors Robust charging structure in place Contributors Satisfied with Sewerage Scheme
	Pipelines	Overall satisfaction	Agreed levels of service provided to all Contributors Robust charging structure in place Contributors Satisfied with Sewerage Scheme

2.7.5 Performance Measurement and Monitoring

The approach to Performance Measurement and Monitoring includes measuring and reporting on feedback from the contributors during user group meetings, the contributor survey and other communication with the contributors.

2.7.6 Action Plan

Develop a robust charging structure that properly reflects both the short and long term costs of any particular source of effluent, in terms of capital, plant maintenance, operational administration costs.

- Ensure that the agreed levels of service are provided to contributors
- Carry out an annual contributor survey
- Renew Contributors Contracts prior to new treatment plant upgrades

3.0 FUTURE DEMAND

3.1 Existing Situation

3.1.1 Background

Bells Island Waste Water Treatment Plant (BIWWTP) has consistently been treating influent flows and loads (BOD, COD and TSS) in excess of its contracted limits.

BIWWTP has sufficient capacity to process existing average and short term peak flows and loads being delivered to the plant with the existing sewerage and pumping system. With average influent loads at current levels the existing BIWWTP can treat relatively high short term peaks because there is a reasonable amount of buffering capability within the process. However, as the average influent loads increase over time, the Maximum Sustainable Capacity of the plant (i.e. maximum influent loads the plant can treat without failure) will decrease to a point where the plant will not cope with additional peak loads.

Waste Solutions Ltd (WSL) estimated Flow, COD, BOD, TSS, TKN, over the period 2006 to 2025. This was compared against capacity measured for each process element within the existing BIWWTP. It has been estimated that the Maximum Sustainable Capacity of the BIWWTP will be exceeded in 2008. Further detail is provided in Table 3-1 and detailed in report Nelson Regional Sewage Business Unit Bells Island Wastewater Treatment Plant Treatment Capacity Testing Report by Waste Solutions Ltd, 14 November 2006.

Currently the sizing of the Bells Island WWTP is controlled by Quota Based Charging of its 5 customers: Nelson City Council, Tasman District Council, ENZA Foods, Alliance Nelson, and Nelson Pines.

Quota based charging caps quantity and quality of its contributors and allows NRSBU to control the timing of asset upgrades.

Should a particular contributor wish to increase its quota with significant downstream effects then they would be responsible for the costs of upgrading downstream assets. Contracts exist for all users except Nelson Pines Industries who are still in discussion with NRSBU; each contract consists of a term with review clauses. However all contributors have indicated that they wish to increase their quotas before the next upgrade.

All contributors have been approached jointly to confirm future requirements which will confirm the need and extent of planned upgrades and any additional upgrades.

A schematic diagram Figure 1-3 is provided as an overview of the system layout prior to Bells Island WWTP showing discharge information of each contributor.

3.1.2 Current Non-Asset Solutions

The use of non-asset or alternative solutions to meet future needs or capacity upgrades by NRSBU requires a willingness and cooperation from the five contributors. The RMA process for resource consents requires a sustainable approach to wastewater management and forms part of contractual agreements. The expectation for NRSBU to manage all waste is tempered by cost, contractual agreements and discussions at contributor group meetings. Throughout the above processes there are currently no non-asset solutions being utilised for the management and treatment of wastewater.

3.2 Future Demand

A report[2] was commissioned to review upgrade requirements, options and cost estimates. The demand projections have included contributor's initial projections, Table 3-1 identifies when current capacity will be exceeded and is the basis for proposed upgrades. Recent monitoring of Liquid Waste discharged at Bells Island from Liquid Waste Operators has revealed that this source is significantly higher in load and volume than anticipated, overwhelming the recently constructed Septage receiving facility and resulting in load spikes which are adversely affecting the treatment plant. It is proposed to construct an off-site facility which will have telemetry, smart card recording, automated screening and composite sampler.

At the time of finalising this AMP a major error in the Airport pump station flow meter was discovered, which is likely to impact on load and flow projections for this site and possibly even some of the upgrade design assumptions such as timing of upgrades and sizing of the components. This figure have now been accounted for and detailed in Table 3-2 below.

Table 3-1: Sustainable Capacity Exceeded

Criteria	Bells Island WWTP Estimated Maximum Sustainable Capacity	Predicted Date that Maximum Sustainable Capacity will be Exceeded
Flow	17,150m^3/day	2008
BOD	7,950kg/day	2008
COD	15,900kg/day	2008
TSS	9,500kg/day	2011
TKN	N/A	2007, 2010, 2015
Capacity Plant Peak Flow		2009
Outfall Capacity		2009

Table 3-2: System Design Assumptions

	Actual 2005/06[3]	Current Design Capacity	Projected (by NRSBU)
BOD (Kg/day)	13,550	7,947	12,410
TKN (Kg/day)	455	750[4]	1,360
TP (Kg/day)	115	230[4]	243
Flow – peak (Lts/sec)	672	950	1,508
Flow Average (m^3/day)	14,577	17,142	24,890
Flow Diurnal peak(Lts/sec)		324	n/a

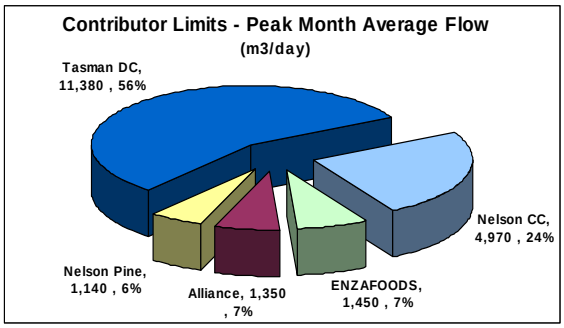
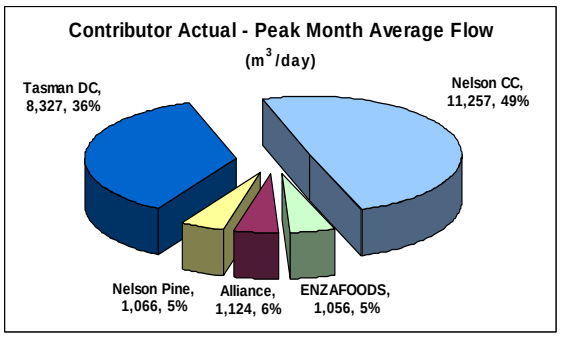
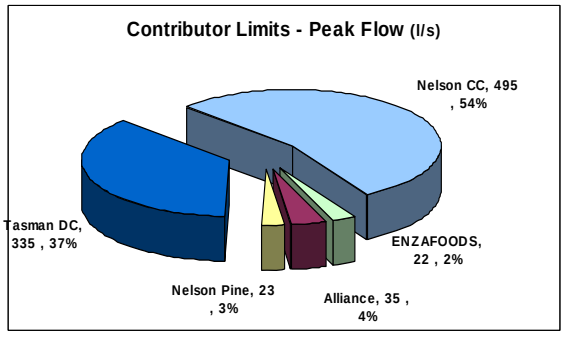
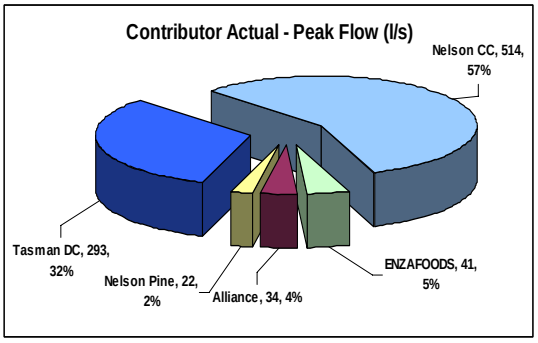
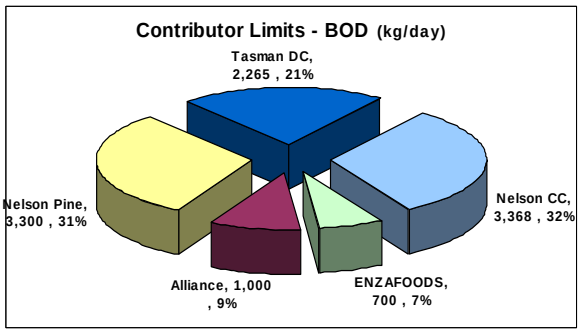
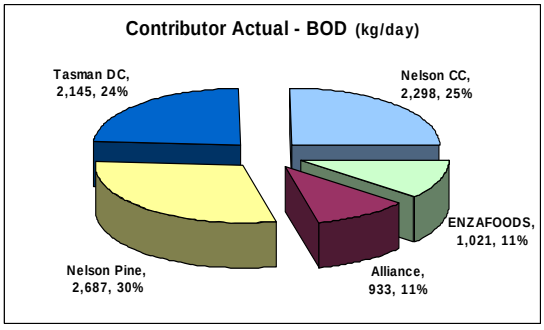
[2] Nelson Regional Sewage Business Unit Bells Island Wastewater Treatment Plant Treatment Capacity Testing Report, by Waste Solutions Ltd, 14 November 2006.

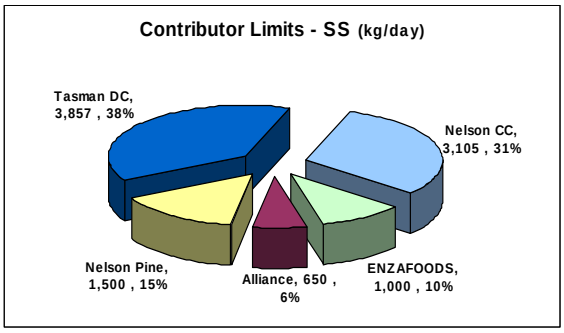
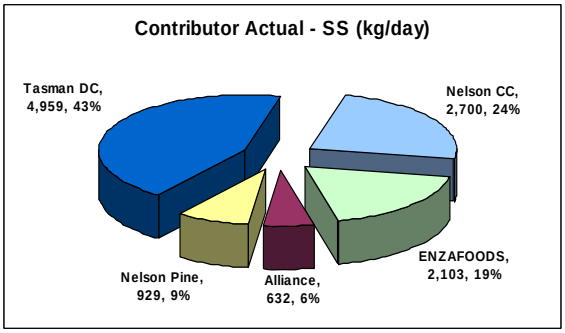
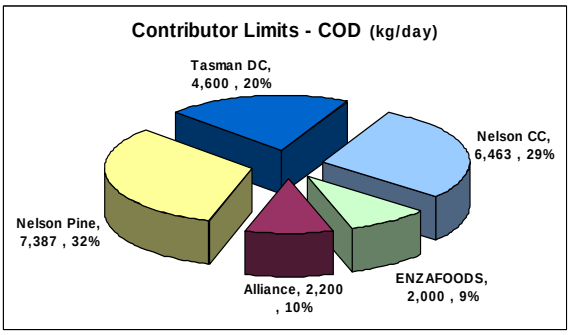
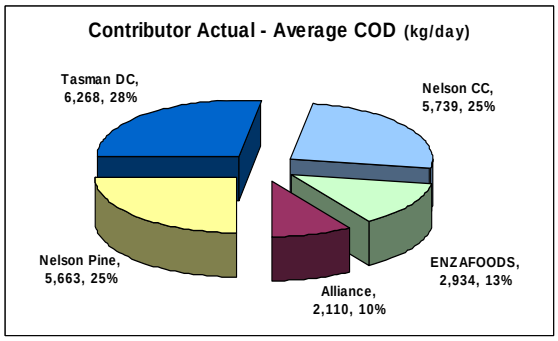
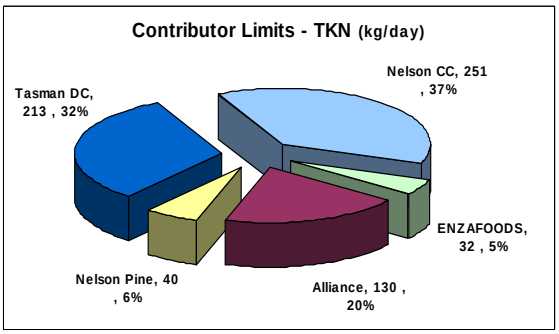
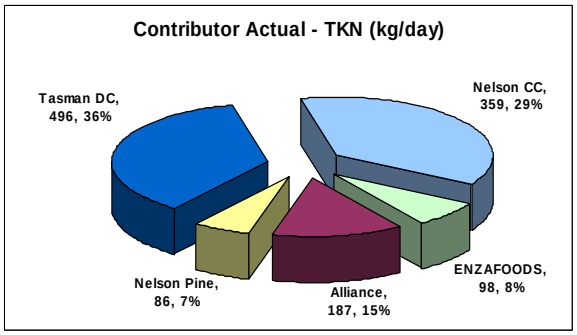
[3] Bells Island inlet flows and loads

[4] Based on certain assumptions about distribution within the treatment system.

3.2.1 Contributor Demand

Contributors are charged on average peak flow, BOD, COD and SS calculated annually. As can be seen there is significant disparity between parameters and contributors. The Contributor Actual figures are 95% of the two day average as detailed in Capacity Trend Analysis 2005-2006.XLS

Contributor - Limits	Contributor - Actual
Reticulation Demand Parameters	
	
	
Treatment Demand Parameters	
	

Contributor - Limits	Contributor - Actual
	
	
	

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Demand therefore requires careful management to achieve consent compliance, cost efficiency and meet contributor's expectations. This is managed through excellent communication with the contributor's user group.

The above graphs clearly indicate that:

- The major demand on the reticulation which includes pump stations and trunk mains comes from the two Local Authorities
- Major demands on the Treatment Plant (setting aside the peak flow issues) are four contributors (the two Local Authorities and Nelson Pine Industries for BOD and the two Local Authorities and Alliance for TKN)

It is therefore important to project the individual contributor's reticulation and treatment needs.

3.2.2 Inflow and Infiltration (I/I)

The Local Authority (LA) demand is the most influential on the overall system. Both LA's accept domestic, commercial and Industrial wastewater. They control commercial and industry discharges through their respective trade waste agreements and domestic waste by imposed standards.

Monitoring of flows during rain events has shown peak flows from both LA's exceeding agreed peak discharge levels; as a result overflows due to wet weather have occurred as identified in Figure 3-1.

The ingress of stormwater into the sewer system through direct inflow and infiltration known as I/I requires proactive intervention to control, it is extremely hard to control and has significant operational impacts, consent compliance and major negative effects on NCC and TDC customers (ratepayers). While the NRSBU can constrain flows at the point of discharge from its contributors as per individual agreement this is neither constructive nor helpful. This issue will be discussed and addressed in the current contributors review. **(IP 3 – 1)**

Controlling I/I is a long term commitment and reductions that would reduce wet weather flows are itself likely to be gradual and can't be relied upon to form part of a non asset solution for the NRSBU with the pending upgrade timelines. There is a need to control I/I as ingress of stormwater can well exceed system capacity very quickly and the "do nothing" option is not appropriate. Commitment to I/I reduction can be inferred through financial commitment reflected in:

- Stormwater Upgrades within existing reticulation
- Sewer Renewal programmes (dependant on age profile)
- Specific I/I reduction programme

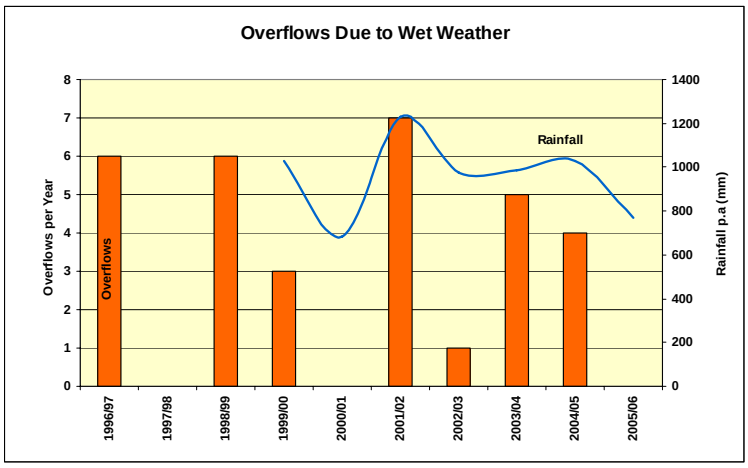
Table 3-3: I/I Reduction Strategies Status

Reduction Strategies	Nelson City Council	Tasman District Council
Inflow/Infiltration Programme	2	5
I/I Monitoring Programme	3	4
Water Reduction Programme	Domestic water metering complete	Domestic water metering complete
Stormwater Upgrades	2	2
Sewer Renewals (on Target)	2	2
Trade Waste Bylaw	Yes	Yes
Population (Regional)	45,372	48,306
Residential Dwellings (Regional)	16,920	16,803

Level	Description
1	Investigations substantially complete, implementing a structured work plan and has supporting budget
2	Staged Investigations, implementing staged work plan with supporting budget
3	Investigations started with supporting budget

Level	Description
4	Known problems not yet implemented programme or budget
5	Don't believe problem exists
U	Unknown

Figure 3-1: Overflows Due to Wet Weather



3.3 Growth Demand Forecast

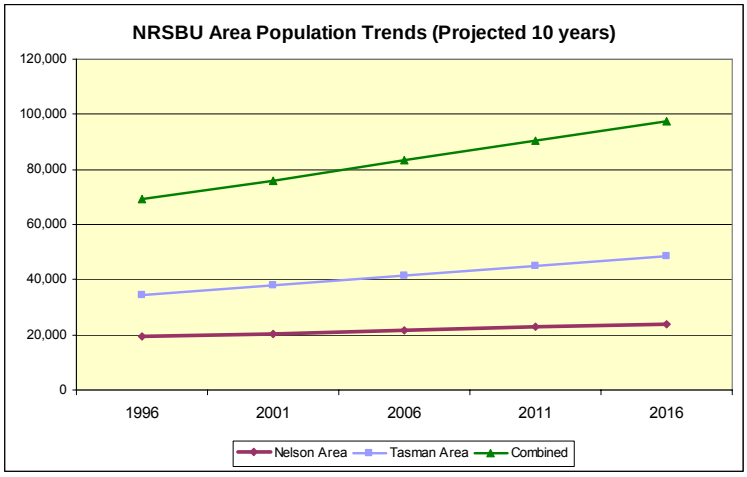
Nelson Urban Growth Strategy (NUGS) that covers all the Nelson City but excludes Richmond (within Tasman District) has indicated that Nelson is expected to be one of the fastest growing regions in New Zealand over the next few decades. The study has identified a need for 8000 residential dwellings in Nelson in the next 50 years.

Currently all contributors are reviewing their individual needs for future quota and this will be combined with information in the NUGS. The NRSBU board may then require (within the requirements of the memorandum of understanding) seek resolution of the two Councils to proceed with further expansions if required or agree on alternative demand management strategies. **(AP 3.5)**

3.3.1 Population Trends

Populations for the areas that the NRSBU serves from 1998 and projected to 2016 are detailed in Figure 3-2 below. The projections is not statistically based as it does not consider current age profile and other related issues but does support the need to plan for growth. Future revisions of this plan will include detailed analysis of population trends.

Figure 3-2: Population Trend (Projected 10 years)



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3.3.2 Nelson City Council

Table 3-4: Nelson City Council Wastewater Profile

2005/06	Avge Flow m^3/day	ADWF l/s	Peak Flow l/s	BOD kg/day (g/m^3)	COD kg/day (g/m^3)	SS kg/day (g/m^3)	TKN kg/day (g/m^3)	TP kg/day (g/m^3)
Actual (concentration)	11,527		514	1,522 (209)	3,807 (523)	1,792 (246)	359 (49)	55 (8)
Limit/Design (Aug 04)	4,970		500	3,368 (678)	6,463 (1300)	3,105 (625)	251 (51)	40 (8)
Limit/Design 07 (concentration)	4,970		495	3,368 (678)	6,463 (1300)	3,105 (625)	251 (51)	39 (8)
Population Equivalent[5]				25,367				

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Table 3-4 reflects a normal predominantly based domestic wastewater system. The major impact is on the reticulation, NCC requires a 132% increase over current limit or 15% increase into the plant, from the population projections a further 15-20% increase is likely over the next 20 years.

From a treatment perspective the additional flows are providing a dilution effect for other contributors except for TKN and TP. The treatment limits requested are generally well below actual demand and are likely to meet future requirements in the 20 year window except for TKN and TP. The additional loading requirements from septage disposal (from non reticulated rural areas septic tanks) will be resolved in the design process.

[5] Based on 60g/person/day

Alternative Solutions

Possible alternative solutions to NRSBU providing all capacity or treatment upgrades, requires discussion as part of any contract variation discussions.

Table 3-5: NCC Alternative solutions

	Description	How
AS1	Continue/increase stormwater inflow and Infiltration removal programme	Project
AS2	Reduce trade waste limits in rewrite of bylaw	Bylaw
AS3	Provide flow buffering to reduce peak flows and overflows	Project

3.3.3 Tasman District Council

The additional loading requirements from septage disposal (from non reticulated rural areas septic tanks) will be resolved in the design process.

Table 3-6: TDC Wastewater Profile

2005/06	Avge Flow m^3/day	ADWF l/s	Peak Flow l/s	BOD kg/day (g/m^3)	COD kg/day (g/m^3)	SS kg/day (g/m^3)	TKN kg/day (g/m^3)	TP kg/day (g/m^3)
Actual	8,327		293	2,145 (258)	6,268 (753)	4,959 (596)	496 (60)	76 (9)
Limit/Design (Aug 04)	11,380		335	2,265 (199)	4,600 (404)	3,857 (339)	212 (19)	33 (3)
Limit/Design (April 07)	11,150		820	3,310	7,275	3,820	560	102
Population Equivalent				35,750				

Table 3-6 suggests the major impact is not on the reticulation but treatment, from the population projections an increase in population of 15-20% increase is likely over the next 20 years. COD, SS, TKN, TP all exceed agreed limits, COD, SS, TKN suggest industry discharges which well exceed normal domestic sewerage composition.

Table 3-7: TDC Trade Waste Limits

	BOD g/m^3	COD g/m^3	SS g/m^3	TKN g/m^3	TP g/m^3
Normal Domestic Waste	200-300	400-600	260-400	30-80	10-20
Trade Waste	1000 (600)	n/a	1000	150	50

Existing Trade Waste Bylaw was updated in 2005 and it sets maximum standards for compliance. These maximums exceed agreed contract limits with NRSBU, hence TDC are relying on dilution of industrial discharges with the domestic waste stream to meet contract limits.

The actual discharge results suggests there is either inadequate monitoring, no enforcement of breaches, a high tolerance level for non-compliance, an over allocation of industry discharges without reducing discharge limits to achieve adequate dilution or a combination of

the above. The bylaw should have some correlation of limits with NRSBU contract with a factor of safety dependant on level of tolerance with compliance. Without alternative solutions TDC will need to increase their treatment requirements with NRSBU. **(IP 3 – 2 & IP 3 – 3)**

3.3.4 Alternative Solutions

Possible alternative solutions to NRSBU providing all capacity or treatment upgrades, requires discussion as part of any contract variation discussions.

Table 3-8: TDC Alternative Solutions

	Description	How
AS8	Continue/increase stormwater inflow and Infiltration removal programme	Project
AS9	Reduce trade waste limits	Bylaw
AS10	Provide flow buffering to reduce peak flows and overflows	Project

3.3.5 Nelson Pines Industries (NPI)

The Nelson Pine Industries Golden Edge medium density fibre board factory, near Richmond, opened in October 1986, for manufacturing products comprising of specially engineered wood fibre bonded with synthetic resin adhesive under heat and pressure. The plant capacity was doubled in 1991, and using the Kusters continuous press technology, with the addition of a third line, the plant now has a total capacity of 400,000 cubic metres annually, making it the largest single site MDF producer in the world. In March 2002 a new LVL (laminated veneer lumber) plant where veneers are laminated by hot pressing into a beam form was commissioned.

Nelson Pine Industries is a wholly owned subsidiary of the Sumitomo Forestry Company Ltd of Tokyo, Japan.

NPI uses approximately 350,000 m3/year of water with significant water loss as a result of steam produced. Water used for washing chips and other process wash water is treated to remove solids before it leaves the site. A flotation clarifier uses tiny dispersed air bubbles to float coagulated solids to the surface of the clarifier where they are skimmed off. The solids are then thickened up in a big screw press. These solids are then burned with other wood waste in the furnaces. This minimises requirements for land fill disposal. The treated water is then pumped to the Bells Island treatment plant for further biological treatment prior to discharge.

16% of the productive land area in the Nelson and Marlborough area is planted in production forests. Harvest predictions were for 2.5 million cubic metres per year by 2005, of which Nelson Pine would use about 1 million cubic metres.

Nelson Pines demands on Bells Island WWTP can be affected by:

- Importing additional logs into the district (make up shortfall or increase production)
- Harvesting peaks due to planting sequences (fluctuating production)
- No further land available for planting (can not increase production)
- Competing land use (reduction in land for forestry unless owned by NPI)
- Securing logs for processing into MDF (unable to buy logs for processing)
- World prices (influence demand)

- NPI Plant capacity and room for further expansion (influence demand)
- Undertake their own onsite treatment

The above factors will be considered to validate the future requirements requested or not requested by NPI as part of the current discussions with all contributors as to their future requirements.

Table 3-9: NPI Wastewater Profile

2005/06	Average Flow m^3/day	Peak Flow l/s	BOD kg/day (g/m^3)	COD kg/day (g/m^3)	SS kg/day (g/m^3)	TKN kg/day (g/m^3)	TP kg/day (g/m^3)
Actual	1,066	22	2,687 (2520)	5,663 (5312)	929 (871)	86 (81)	13.5 (13)
Limit/Design (April 07)	1,140	23	3,300 (2895)	7,387 (6480)	1,500 (1316)	40 (35)	11 (10)
NRSBU Limit	1,073	23	660 (615)	1,477 (1377)	300 (280)	40 (37)	11 (10)
Population Equivalent			44,783	(Actual)			

NPI exceeds current limits, their current needs are being reviewed along with a commitment to a supply contract. Table 3-9 suggests their operation does not present any reticulation capacity issues unless the current review identifies further plant expansion but is presenting treatment issues for NRSBU with approximately 1/3rd of the total BOD loading coming from NPI. Their future requirements are yet to be established.

3.3.6 Alliance

The Alliance Group Ltd's Nelson plant replaced the 1909 plant with a new plant on the 30th October 2000, the comparatively small and efficient, single chain sheep and lamb operation which also processes bobby calves in the spring.

A farmer owned co-operative with head offices in Invercargill, the Alliance Group Ltd has a turnover of around $1billion, and six plants spread throughout the South Island. The Nelson plant services the northern part of the South Island.

The plant operates on a shift basis, employing a staff of about 160 over two shifts, one starting in August operating almost all year round with the second shift commencing early November going through to May., The plant is able to add value to a lamb carcass, hence securing chilled markets in Europe and the United States with fresh product. The pelts are taken to Timaru, and the rendering material down to Kokiri north of Greymouth.

Table 3-10: Alliance Wastewater Profile

2005/06	Average Flow m^3/day	Peak Flow l/s	BOD kg/day (g/m^3)	COD kg/day (g/m^3)	SS kg/day (g/m^3)	TKN kg/day (g/m^3)	TP kg/day (g/m^3)	Oil & Grease
Actual	1,124	34	933 (830)	2,110 (1877)	632 (562)	187 (166)	26.5 (24)	
Limit/Design (April 07)	1,450	35	1,100 (759)	2,400 (1655)	700 (483)	140 (97)	30 (21)	

2005/06	Average Flow m^3/day	Peak Flow l/s	BOD kg/day (g/m^3)	COD kg/day (g/m^3)	SS kg/day (g/m^3)	TKN kg/day (g/m^3)	TP kg/day (g/m^3)	Oil & Grease
Limit	1,350	35	1,000 (741)	2,200 (1630)	650 (481)	130 (96)	20 (15)	
Population Equivalent			15,550					

Table 3-10 indicates general compliance with waste discharges to Bells Island except for TKN which represents about 10% of the total contribution. Alliance does not present a major risk for Bells Island given the total flow contribution.

3.3.7 ENZAFOODS

ENZAFOODS was established in 1962, with the first processing plant built in Nelson.

What was then the New Zealand Apple and Pear Marketing Board, sought to add value to that part of the New Zealand apple crop which did not meet the very stringent fresh fruit export standards then in place, and recognised processing and consumer beverages as the principal opportunity to achieve this goal.

ENZAFOODS New Zealand Limited manufactures and exports fruit and vegetable juice concentrates, and additionally a range of variant applications for fruit and vegetable products factory is located in Nayland Rd, Stoke, and Nelson.

ENZA factories are strategically located close to international ports in the two key pipfruit growing regions of Hawke's Bay and Nelson.

The Nelson Fruit Ingredients Factory had a major face-lift prior to the 2002 season that included the lining of the processing areas with food grade walls and ceilings and provision of a filtered, positive pressure air ventilation system. This has greatly enhanced the processing environment, enabling exclusion of pests, control of background microbial levels, and restricting access to authorised personnel only.

The Nelson Juice Concentrates Factory commenced a staged refurbishment which included the upgrade of wall linings, replacement of 40 years worth of tankage and pipe work systems that had reached their use by date, and expansion of the Berryfruit processing line.

Table 3-11: ENZA FOODS Wastewater Profile

2005/06	Avge Flow m^3/day	ADWF l/s	Peak Flow l/s	BOD kg/day (g/m^3)	COD kg/day (g/m^3)	SS kg/day (g/m^3)	TKN kg/day (g/m^3)	TP kg/day (g/m^3)
Actual	1,056		41	1,021 (966)	2,934 (2,777)	2,103 (1,991)	98 (93)	5 (3)
Limit/Design (April 07)	1,450		30	700 (483)	2,200 (1517)	2,000 (1379)	50 (34)	10 (7)
Limit/Design	1,450		22	700 (483)	2,000 (1,379)	1,000 (960)	32 (22)	5 (3)
Population Equivalent				17,016	(Actual)			

Most compliance requirements are exceeded and by a large margin however this presents less of an issue for Bells Island given the total flow contribution. There is a compliance issue that needs to be addressed as part of their future contributor agreement.

3.4 Proposed Upgrades

The proposed upgrades detailed in the Capacity Testing report identify the need for urgent response to ensure adequate performance and consent compliance. The timeframe to deliver these upgrades constrains the ability to look at detailed non-asset solutions. Detailed plant upgrade options have been considered and cost effective solutions promoted. **(AP 3.7)**

3.5 Capital Costs

Capital costs of upgrading the plant as detailed in the report Nelson Regional Sewerage Business Unit Bells Island Wastewater Treatment Plant Treatment Capacity Testing Report, by Waste Solutions Ltd, 14 November 2006 is detailed in Table 3-12 below.

As a result of the proposed upgrades there will be additional operational costs which are detailed in Table 3-13 below.

Table 3-12: Capital Costs

Proposed Timeline for Implementation of the Capital Works		
Date	**Description of Work**	**Estimated Cost ($,000)**
	Pump Stations & Rising Mains	
2007/08	Rising Main Study and Strategy	500
2008/09 to 2011/12	New R/M and P/S Richmond to Bells Is	19,500
2007/08	Liquid waste receiving facility	500
	Bells Island Treatment Plant	
2008/09	Outfall Capacity Upgrade	400
2007/08	Inlet Load Reduction (primary clarifier)	3,750
2007/08	Thickening system	550
2010/11	Expand Biosolids Treatment Facilities	1,000
2013/14 to 2014/15	Anaerobic Digestion and Co-generation	7,150
2015/16	Nitrogen Removal	3,500
2015/16	Phosphorus Removal	500
2015/16	Pond Desludging	1,000
2007/08	Boat	8
	Biosolids Facility	
2011/12	Forest Planting (Bells)	15
	TOTAL	38,373

Table 3-13: Additional Operational Costs due to Proposed Upgrades

	From Year	Estimated Cost per year($,000)
Pipeline (30% additional)	2010/11	70
Liquid Waste facility	2007/08	15
Additional Screening		Nil
Primary Clarifier	2007/08	40
	2008/09	85
Thickening	2007/08	25
	2008/09	50
ATAD tank addition	2010/11	65
Anaerobic Digestion and Co-generation	2014/15	350
Nitrogen Removal	2015/16	450
Phosphorus Removal	2015/16	540

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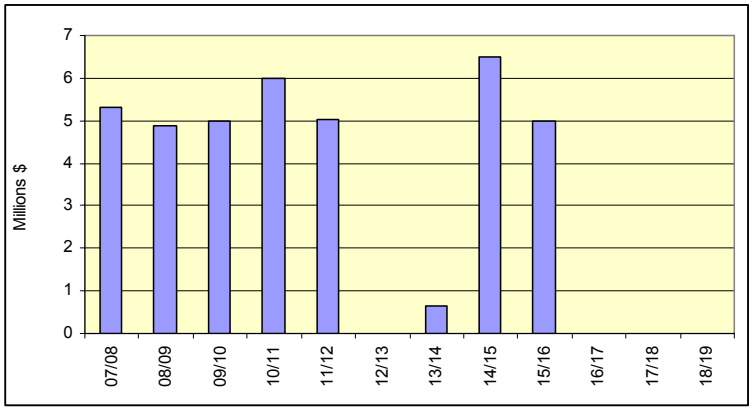
Figure 3-3 Annual Capital Works 2007/08 to 2018/19



3.6 Improvement Plan

ID	Action	Completion Date
IP 3 - 1	Discuss and agree Inflow & Infiltration programme with NCC and TDC	June 2007
IP 3 - 2	Identify reason for TDC non compliance with current limits which appear to be Industry based and discuss relationship of TW Bylaw limits with NRSBU discharge limits	June 2007
IP3 - 3	Review Contract agreements to address: - Enforcement of limits - Tolerance levels for compliance - QA/QC of onsite processes to ensure compliance - Contingencies plan to manage non-compliances	June 2007
IP3 - 4	Discuss and review non asset solutions with Contributor User Group. This to include considering reducing Trade Waste limits further (i.e. increasing onsite management requirements)	June 2007

4.0 EMERGENCY AND RISK MANAGEMENT

4.1 Risk Management

4.1.1 Background

Risk management is the systematic application of management policies procedures and practices to the tasks of:

- Identifying
- Analysing
- Evaluating
- Treating
- Monitoring

It is important to note that risk management is not simply about the downside of events such as financial loss or legal proceedings. It also refers to the upside and opportunities that exist for the NRSBU to do things more innovatively, sustainably and effectively.

4.1.2 Potential Risks

Risks can be seen to arise from many areas of the NRSBU, both in the physical aspect for assets and business risks. Table 4-3 identifies all risks associated with the ongoing management, funding, planning, development and operation of the NRSBU and Table 4-4 identifies all risks associated with natural causes and operational aspects of all assets owned by NRSBU.

The mitigation strategies are detailed and the residual risk is then ascertained. The Business and Asset Risk Control Schedules will be updated on a regular basis, to ensure that all risks are relevant and understood. **(IP 4.1)** Where required, the mitigation strategies have been noted in the improvement programme.

4.1.3 Analysis of Risks

The risk management framework is consistent with the joint Australian New Zealand Standard AS/NZIS4360:2004 Risk Management and the associated Risk Management Guidelines (SAA/SNZ HB 436:2004), to ensure risks are managed on a consistent basis.

Risk, likelihood and consequence are:

- Risk is the combination of the likelihood and consequence of an event occurring
- Likelihood is a description of the probability or frequency of an event occurring
- The consequence is the outcome of an event being a loss, injury, disadvantage or gain

For each event the likelihood score is multiplied by the consequence score for each area of impact (there will be only one likelihood but several consequences for each event) – See Table 4-1 below. These multiples are then totalled to produce the risk score for the event. The likelihood and consequence tables are shown in the Supplementary Section.

The risk priority ratings and the risk response of the mitigation strategies are detailed in Table 4-2 below.

Table 4-1 Semi-Quantitative Measures of Consequence and Areas of Impact

Areas of Impact		Descriptor				
		Negligible	Minor	Moderate	Major	Catastrophic
Area of impact	Health and Safety	10	30	50	70	100
	Public Health	10	30	50	70	100
	Asset Performance	10	30	50	70	100
	Environment and Legal Compliance	10	30	50	70	100
	Historical or Cultural	10	30	50	70	100
	Financial	10	30	50	70	100
	Public Perception	10	30	50	70	100

Table 4-2: Risk Priority Rating

Risk Score	Level of Risk	Risk Response
>200	Extreme	Awareness of the event to be highlighted to the board
150 - 200	High	Risk treatment required. Risk to be eliminated or mitigated by 30 June 2009
100 - 150	Moderate	Risk treatment required
0 - 100	Low	Managed by routine procedures

Table 4-3: Business Risk Schedule

No.	Issue	Consequence or Outcome	Mitigation Strategies	Gross Risk	Improvement Plan (IP) Ref	Improvement Plan	Residual Risk
1	**Higher Level Policies, Procedures and Controls**						
1.1	Board does not have clearly defined documented strategy to guide long-term delivery of activity	Ad-hoc decision making, waste and unnecessary financial cost	Development of long term Strategy Document to be completed by November 2006	Low			Low
1.2	Operations Manuals not up-to-date	Failure to supply service or cause adverse health effects or environmental damage due to poor operation of assets.	Operating Manuals substantially complete and reporting requirements in place to ensure contractors comply with requirements.	Low	**IP 4.2**	The existing maintenance schedules and procedures, quality/procedure, decision making process, contingency and operation and maintenance manuals are to be formalised, updated where required	Low
1.3	NRSBU do not have a complete Business Continuity Plan	Business unable to recover quickly following extreme event	Operative Business Continuity Plan	Mod	**IP 4.3**	Business Continuity Plan to be completed **(AP 6.3)**	Low
1.4	No clear direction on public consultation	Contributing Councils in breech of LGA2002 with respect to Public Consultation.	High level of public consultation through the five contributors	Low			Low
1.5	NRSBU does not have an acceptable position on the impact of climate change on service delivery	Financial loss due to liability for property damage, loss of asset. Not able to provide service.	NRSBU has and implements relevant design parameters on Climate Change.	Mod			Mod
1.6	The Asset management plan is not fully implemented.	The operational, tactical and strategic objectives of the activity are not integrated into the annual/LTCCP planning cycle and are not aligned to staff work programmes resulting in delays and poor decision making.	High level of commitment from NRSBU	Low			Low
1.7	Inaccurate growth information or growth not considered	Inappropriate decisions made about development.	Development of long term Strategy Document to be completed by October 2006	Low			Low

No.	Issue	Consequence or Outcome	Mitigation Strategies	Gross Risk	Improvement Plan (IP) Ref	Residual Risk
2	**Financial**					
2.1	Lack of long-term financial planning	Higher than necessary financial costs	Development of long term Strategy Document to be completed by October 2006	Low		Low
2.2	Service levels vs funding and works not clear	Service levels not being met due to lack of funding as decision makers not aware of implications for Service Levels.	Performance targets are defined and monitored/report on	Low		Low
2.3	True costs and "whole of life" costs of activity not recorded appropriately	Financial cost for providing both operations and capital works not reflecting true costs. Decision making not based on true costs.	Financial cost for providing both operations and capital works reflects true costs.	Low		Low
2.4	Assumptions for financial forecasting not always understood	Additional costs incurred because assumption/uncertainties not accounted for i.e.: asset valuations, depreciation	Manager is aware of assumptions and uncertainties behind financial forecasting information and noted in AMP and other relevant documents	Low		Low
2.5	Unforeseen Additional Costs	Reputation of NRSBU detrimentally affected	Ensure AMPs and asset information up to date	Low		Low
2.6	Valuations not accurate for asset facilities	Fixed Asset Register not reconciling with existing assets causing incorrect valuations and affecting true financial requirements	Hansen and FAR reconciled and revaluation occurring in 2007	Low		Low
2.7	All potential sources of Government and other external funding (Third Party funding) not appreciated or obtained	Higher cost to NRSBU than should have been	Identify potential availability of third party funding and apply / take advantage of it.	Low		Low
2.8	Consultant Fees for design works	Cost exceed expectations due to spiraling fees and re-work.	Insure robust professional services contracts and ensure good communications between staff and consultants	Low		Low

No.	Issue	Consequence or Outcome	Mitigation Strategies	Gross Risk	Improvement Plan (IP) Ref	Improvement Plan	Residual Risk
2.9	Insurance cover needs review	Insurance not adequate and unnecessary costs may be incurred in the future	Review of insurance cover to ensure adequate cover.	Mod	IP 4.4	Review adequacy of the NRSBU insurance cover for the wastewater activity.	Low
3	**Organisational Management**						
3.1	Lack of Strategic Thinking/ Long-Term planning	Inefficient use of time and money.	Development of long term Strategy	Low		Strategy completed in late 2006	Low
3.2	Failure to act on identified risk	Possible legal action against NRSBU if event occurs which NRSBU l knew about. Public Health adverse affected.	Risk schedules updated on a regular basis and improvements carried out as required	low			Low
3.3	Lifelines Plan not up to date or implemented	Large scale asset failure due to a naturally occurring event resulting in prolonged and substantial loss of service to contributors	Ensure Lifelines Plan recommendations implemented that includes having a high level of risk reduction, readiness, response and recovery during and following Civil Defence Emergency.	Ext	IP 4.5	Ensure Lifelines up to date and identified risks and mitigation works are programmed into capital works programme	Mod
3.4	NRSBU does not have internal audit policy	Financial loss due to lack of robust internal audit process and/or legislative requirements not being met.	Use of Audit NZ auditors	Low			Low
3.5	Low standard provision of professional and physical services	Poor quality or delayed projects. Unnecessary financial cost.	Appropriate penalty or exit clauses in contracts.	Low			Low
3.6	Improvement plan from AMP not undertaken.	Future forecasting not accurate. Decision making not optimised.	Reporting on implement improvement plan required on a 6 monthly basis	Low			Low
3.7	Opportunity for corruption of data/operational systems.	Interruption to supply of service. Decision making not robust as data missing/damaged.	Security and administration system implemented	low			Low
3.8	Legislative requirements not understood	NRSBU faces legal action because legal requirements are not met	High level of understanding by Manager of legislative requirements	Low			Low

No.	Issue	Consequence or Outcome	Mitigation Strategies	Gross Risk	Improvement Plan (IP) Ref	Improvement Plan	Residual Risk
4	**Human Resources**						
4.1	Accountabilities not clear	Staff not accountable for actions allowing apparent problems to continue	Performance reporting on a regular basis to NRSBU Board	Low			Low
4.2	Information in peoples heads or inappropriate recording of information	Organisational knowledge lost with staff leaving	Ensure Managers and Contractors document and appropriately file everything that is relevant. The areas of Risk Demand, Asset Management, Renewals, Capital expenditure, Environmental and Operations are well documented	High	**IP 4.6**	Formalise and update maintenance schedules and procedures, contingency and operation and maintenance manuals. **(AP4.3)** Consider benefits of succession planning and how it might be implemented.	Mod
4.3	Inadequate attention to staff succession	Organisational knowledge lost with staff leaving	Implement good staff/management succession plan and document procedures	High	**IP 4.7**	Consider benefits of succession planning and how it might be implemented.	Mod
5	**Health and Safety**						
5.1	Do not have a good health and safety culture	High accident rate	Ensure NRSBU health and safety procedures being implemented	Low			Low
5.2	Health and Safety Risks not identified or managed appropriately	NRSBU faces legal claims for not meeting health and safety obligations	Health and Safety manuals up to date and be effectively managed.	Low			Low
6	**Wastewater Asset Management**						
6.1	Deferred renewal and maintenance not recorded	Deferred maintenance not recorded causing unexpected, additional costs from asset failure	Record all deferred maintenance and renewals when this occurs	Low			Low
6.2	Not all easements recorded or obtained	NRSBU faces legal action or cannot carry out its activities because it does not have legal right to cross a property	Keep up-to-date record of easements. Establish clear policy for processes to be followed when easements are required.	Low			Low

No.	Issue	Consequence or Outcome	Mitigation Strategies	Improvement Plan			
				Gross Risk	(IP) Ref		Residual Risk
6.3	Wastewater not treated to an acceptable standards	Dissatisfaction of customers from odours and not being able to swim at local beaches	Development of long term Strategy Document. High level of acceptance for long term strategy by Board	Mod	IP 4.8	High level of acceptance for long term strategy by Board	Low
6.4	Performance monitoring of service levels not completed	Target Service levels not met resulting in customer dissatisfaction.	Monitoring programme established and reviewed regularly	Low			Low
6.5	Security of assets not adequate	Wastewater assets damaged causing widespread sickness or environmental damage	Ensure security systems in place	Mod	IP 4.9	Review of security required at all facilities	Low
6.6	Poor standards of constructed assets due to design and/or construction of infrastructure	Substandard physical works resulting in poor asset performance	Ensure NRSBU Code of practice code is updated regularly and Contractors & Consultants are familiar with this. Ensure contractors/Consultants take responsibility for work done.	Low			Low
6.7	Excess discharge from contributors exceeds the capacity of treatment plant	Discharge from treatment plant exceeds consent conditions	Excess discharge penalty cost as detailed in the in the individual agreements for disposal are set at a rate that actively discourages excess discharge from contributors. Treatment plant to be upgraded in 2007-08	Mod	IP 4.10	Instigate procedure to ensure individual contributors are invoiced for exceeding their allowed flows /capacity	Low
6.8	Long term viability (20 - 30 years) of the existing plant at the existing site	Dissatisfaction of customers from odours Biosolids disposal not sustainable High costs of treatment	Investigate alternative sites and beneficial reuse of treated wastewater	High		Investigate alternative sites and beneficial reuse of treated wastewater (AP 3.2)	Low
7	**Asset Management**						
7.1	Network modelling and condition assessments not undertaken.	Capital Works programme not optimised. Renewal works not completed due to lack of knowledge causing failure of assets. Future forecasting not accurate.	Hansen database is maintained, up-to-date and accurate. Continue condition assessments of network. Continue to develop robust Renewals programme based on sound knowledge.	Low			Low

No.	Issue	Consequence or Outcome	Mitigation Strategies	Gross Risk	Improvement Plan (IP) Ref	Improvement Plan	Residual Risk
7.2	As-built information can be slow or incorrect coming from Contractors, Consultants	Inability to repair assets within reasonable time	As-builts are kept up to-date and on recorded promptly.	Low			Low
7.3	Criticality assessment not undertaken	Failure of critical assets resulting environmental damage or not meeting service levels	Criticality assessment of assets carried out and implementation strategy for managing critical assets required	Low			Low
7.4	Asset Risk Register and Asset Risk Plan not implemented	NRSBU faces legal action because of asset failure or unnecessary costs incurred due to asset failure	Maintain Asset Risk Schedules with reviewing and reporting on an six monthly basis Instigate risk assessment at component level	Low		Maintain Asset Risk Schedules with reviewing and reporting on an six monthly basis Instigate risk assessment at component level	Low
7.5	Asset management systems not up-to-date or completed	Failure to of wastewater systems because maintenance work not completed or management system not operational.	Asset Management System in place and updated as required	Low			Low
8	**Resource Consents and Designations**						
8.1	Review of Designations required	NCC or TDC faces legal action because wastewater assets have not been designated in the District plan	Review of designations to ensure these are appropriate.	Low			Low
8.2	Resource Consents	Council faces legal action because resource consents not applied for or conditions not met. Public dissatisfaction with environmental damage being caused.	Consents that are required are well documented and effects understood Consents continuously monitored and reporting undertaken	Low			Low
8.3	Application for resource consents	Failure to obtain resource consents associated with biosolids disposal	Bring foreword Ammonia Stripping at treatment plant from 2015/16 at a cost of $1.98m	Low			Low

Files in AMP\Business RISK SCHEDULE 29-09-06.xls

Table 4-4: Asset Risk Schedule

Item	Risk Location	Risk Event	Consequence or Outcome	Mitigation Strategy	Gross Risk	Action Plan Description	(IP) Ref	Residual Risk
1	Rising Mains - Concrete	Estuarine environment deterioration and acid attack	Deterioration and failure of asset resulting in loss of service, health and safety issues and wastewater discharges to the environment having an impact on environmental and cultural issues.	Rising main strategy report to be instigated. A programme of regular pipe inspections of risk areas will be developed once duplicate main in use. Use of pipe line for pumping clean effluent back to golf-course will assist to extend life of concrete pipe and to be used as duplication in emergency **(AP 3.6)**	Ext	A programme of regular pipe inspections of risk areas to be developed. Introduce long-term replacement strategy of affected rising mains and duplication of rising mains to ensure redundancy in the event of a failure.	**IP 4.11**	Mod
2	Aeration Basin /Clarifier	Overloading of Components Treatment Capacity	Failure to comply with resource consent conditions. Customer complaints	The STP is operated and maintained in a manner that employs best practicable options to comply with the resource consents that includes: - High level of training - Calibration of equipment carried out on regular basis - Performance based Design Build and operations contract is in place and the risk for achieving consent conditions are the contractors Updating and integration of O & M manuals to contain the major elements of Risk Plans, Demand requirements, Renewals, Standards & Policies, Health and Safety, Environmental and Operational Plans	Ext	Currently the STP is operated and maintained in a manner that employs best practicable options to comply with the resource consents. Upgrading of treatment plant occurring in 2007-08	**IP - 4.2**	Mod
3	Aeration Basin/Clarifier	Failure to achieve consent conditions: Air	Customer complaints and failure to comply with Discharge of Contaminants to Air resource consent conditions.	STP operated and maintained in a manner that employs best practicable options	Ext	Currently the STP is operated and maintained in a manner that employs best practicable options. Upgrading of treatment plant occurring in 2007-08		Low

Item	Risk Location	Risk Event	Consequence or Outcome	Mitigation Strategy	Gross Risk	Action Plan Description	(IP) Ref	Residual Risk
4	Treatment Plant	Toxic Discharge to Plant	Failure of biological process resulting in the treatment plants discharges failing to meet consent conditions.	Current trade waste by-laws for NCC & TDC prohibit certain toxic discharges to the plant. Trade waste sampling and monitoring programme implemented. Contributor contracts to fix characteristics of discharge from contributors are now in place for the majority of contributors	Mod	Current trade waste by-laws for NCC & TDC prohibit certain toxic discharges to the plant. Trade waste sampling and monitoring programme has been implemented. Contributor contracts to fix characteristics of discharge from contributors are now in place for the majority of contributors.		Mod
5	Pump Stations	Equipment/component Failure	Wastewater discharges to the environment having an impact on environmental, cultural and health issues. Customer complaints	Processes within pump station to have contingencies for failure (duplication of pumps) or alarm systems (SCADA) installed The 2005 performance based Design Build and operations contract that has placed the risk for achieving no failures due to equipment failure onto the contractor	Low	Processes within pump station that have contingencies for failure (duplication of pumps) or alarm systems (SCADA) installed The 2005 performance based Design Build and operations contract that has placed the risk for achieving no failures due to equipment failure onto the contractor		Low
6	Treatment Plant	Equipment/component Failure	Failure to meet consent conditions.	Processes within treatment plant to have contingencies for failure (duplication of pumps) and alarm systems (SCADA) The 2005 performance based Design Build and operations contract that has placed the risk for achieving consent conditions onto the contractor	Low	Processes within treatment plant that have contingencies for failure (duplication of pumps) and alarm systems (SCADA) The 2005 performance based Design Build and operations contract that has placed the risk for achieving consent conditions onto the contractor		Low

Item	Risk Location	Risk Event	Consequence or Outcome	Mitigation Strategy	Gross Risk	Action Plan Description	(IP) Ref	Residual Risk
7	Ponds	Failure to achieve consent conditions: Air	Failure to comply with resource consents. Customer complaints.	Currently the pond is operated and maintained in a manner that employs best practicable options that includes: - Pond loadings are adjusted for different seasons and conditions - Loading profile of the ponds are known and operated to these limits - A regular pond monitoring and sampling programme is in place - Performance based Design Build and operations contract is in place and the risk for achieving consent conditions are the contractors	Low	Currently the pond is operated and maintained in a manner that employs best practicable options		Low
8	Ponds	Overloading of Components Treatment Capacity	Failure to comply with resource consents. Customer complaints.	Currently the pond is operated and maintained in a manner that employs best practicable options that includes: - Pond loadings are adjusted for different seasons and conditions - A regular pond monitoring and sampling programme is in place Contributors are limited to maximum fixed volumes	Low	Currently the pond is operated and maintained in a manner that employs best practicable options		Low
9	Rising Mains	Capacity	Wastewater discharged to the environment at pump stations having an impact on environmental and cultural issues.	Pump stations are designed for the capacity of the rising mains. All pump stations have high level and overflow alarms for advance warning of an overflow event. Contributors are limited to maximum fixed volumes and overflows above these volumes become the responsibility of the contributor.	Low	Pump stations are designed for the capacity of the rising mains. All pump stations have high level and overflow alarms for advance warning of an overflow event. Contributors are limited to maximum fixed volumes and overflows above these volumes become the responsibility of the contributor.		Low

Item	Risk Location	Risk Event	Consequence or Outcome	Mitigation Strategy	Gross Risk	Action Plan Description	(IP) Ref	Residual Risk
10	Pump Stations	Insufficient Wet Weather Storage Capacity	Insufficient storage or capacity resulting in wastewater discharges to the environment having an impact on environmental and cultural issues	All pump stations have high level and overflow alarms for advance warning of an overflow event and high capacity pumps for peak flow conditions. Contributors are limited to maximum fixed volumes/flows/loadings and are subject to excess discharge costs plus other punitive actions by the NRSBU The wet weather overflows due to volumes greater than the agreed limit are the responsibility of the contributor and contributors need to consider the amount of wet weather storage	Mod			Mod
11	ATAD	Corrosion and sulphur attack	Discharge of Biosolids to environment. Failure to comply with resource consents. Customer complaints.	ATAD's have recently been inspected and modelling has been carried out to predict failure. Fiberglass roof installed. Performance based Design Build and operations contract is in place and the risk for achieving consent conditions are the contractors.	Mod			Mod
12	Pump Stations	Power failure		Standby generators will be made available from NCC in an event of power failure	Mod			Mod
13	Biosolids Facility	Odours'		Currently the Biosolid facility is operated and maintained in a manner that employs best practicable options to comply with the resource consents that includes: - High level of training Updating and integration of O & M manuals to contain the major elements of Risk Plans, Demand requirements, Renewals, Standards & Policies, Health and Safety, Environmental and Operational Plans	Mod			Mod
14	Treatment Plant	Power Failure		Standby generators can be made available from NCC in an event of power failure Ability of ponds to take increased loadings for short periods when STP not operating	Mod			Mod
15	Treatment Plant	Asset register not linked to design standard	Replacement by lower level of asset there by increasing risk of not performing to peak requirements	Asset replacement procedure has reviewing incorporated	Mod			Mod

Item	Risk Location	Risk Event	Consequence or Outcome	Mitigation Strategy	Gross Risk	Action Plan Description	(IP) Ref	Residual Risk
16	Facilities building	Fire	Failure to comply with resource consent conditions. Customer complaints	Fire & smoke alarms in buildings that is linked to the SCADA system	Low			Low
17	ATAD	Overloading of Components Treatment Capacity	Discharge of Biosolids to environment. Failure to comply with resource consents. Customer complaints.	Currently the ATD is operated and maintained in a manner that employs best practicable options to comply with the resource consents that includes: - High level of training - Up to date O & M manuals - Calibration of equipment carried out on regular basis - A regular monitoring and sampling programme in place - Contributors are limited to maximum fixed volumes and overflows above these volumes become the responsibility of the contributor	Mod			Mod
18	Treatment Plant	Operator Error	Failure to achieve consent conditions	All operators are presently suitably qualified. The new performance based Design, Build and operations contract has ensured that training regimes are put in place so all staff are adequately trained.	Mod			Mod
19	Biosolids Facility	Forest Fire	Significantly reduced areas for biosolids disposal	Extensive fire breaks exists (roads) Easy assess to site for fire fighting equipment Other areas outside the Rabbit Island area available for biosolds disposal	Low			Low
20	Treatment Plant	SCADA Failure		Backup systems in place	Mod			Mod
21	Treatment Plant delegation process	Insufficient documentation of escalating process decision making	Failure to meet consent conditions.	Currently the STP is operated and maintained in a manner that employs best practicable options that includes: - Operating parameters for all major items facilities - Performance based Design Build and Operations contract is in place and the risk for achieving consent conditions are the contractors responsibility	Low			Low

Item	Risk Location	Risk Event	Consequence or Outcome	Mitigation Strategy	Gross Risk	Action Plan Description	(IP) Ref	Residual Risk
22	ATAD	Failure to achieve consent conditions: Air		High level of operating and testing practiced Performance based Design Build and operations contract is in place and the risk for achieving consent conditions are the contractors	Low			Low
23	Ponds	Failure to achieve consent conditions: Estuary		High level of operating and testing practiced Performance based Design Build and operations contract is in place and the risk for achieving consent conditions are the contractors	Low			Low
24	Pump Stations	Corrosion and sulphur attack of electrical/control equipment		Testing of effluent on regular basis to ascertain sulphur content	Low			Low
25	Pump Stations	Insufficient Operational Pump Station Capacity		See item 12	Low			Low
26	Pump Stations	Vandalism		Intrusion alarms are installed	Low			Low
27	Rising Mains	Inaccurate and/or Unknown Location of pressure line		As built plans of high quality and all asset locations known	Low			Low
28	Rising Mains - PE	Estuarine environment deterioration and acid attack		High level of resistance to acid and sulphide attack	Low			Low
29	Biosolids Facility	High Nutrient Levels in Biosolids		High level of testing carried out	Low			Low
30	Biosolids Facility	Failure to meet consent conditions		High level of testing carried out	Low			Low
31	Biosolids Facility	Excessive Heavy Metals		High level of testing carried out	Low			Low
32	Pump Stations	Odours from pump Stations		All pump stations have biological filters	Low			Low
33	Rising Mains - PE	Land based deterioration and acid attack		High level of resistance to acid and sulphide attack	Low			Low

Item	Risk Location	Risk Event	Consequence or Outcome	Mitigation Strategy	Gross Risk	Action Plan Description	(IP) Ref	Residual Risk
34	Treatment Plant	Vandalism		Intrusion alarms are installed	Low			Low
35	Biosolids Facility	Land Ownership / Land Use Change			Low			Low
36	Biosolids Facility	Vandalism		Intrusion alarms are installed	Low			Low
37	Pump Stations	Designs of infrastructure: No innovation and no demand management		High level of innovation and demand management incorporated into all design	Low			Low
38	Rising Mains	Movement failure caused by, Earthquake, landslide or settlement.		Civil Defence Emergency Management Plan Emergency procedures manual and exercises Wastewater Mutual Aid Plan	Low			Low
39	Pump Stations	Movement failure caused by, Earthquake, landslide or settlement.		Civil Defence Emergency Management Plan Emergency procedures manual and exercises Wastewater Mutual Aid Plan	Low			Low
40	Pump Stations	Tsunami inundation		Civil Defence Emergency Management Plan Emergency procedures manual and exercises Wastewater Mutual Aid Plan	Low			Low
41	Treatment Plant	Movement failure caused by, Earthquake, landslide or settlement.		Civil Defence Emergency Management Plan Emergency procedures manual and exercises Wastewater Mutual Aid Plan	Low			Low
42	Treatment Plant	Tsunami		Civil Defence Emergency Management Plan Emergency procedures manual and exercises Wastewater Mutual Aid Plan	Low			Low

Item	Risk Location	Risk Event	Consequence or Outcome	Mitigation Strategy	Gross Risk	Action Plan Description	(IP) Ref	Residual Risk
43	Biosolids Facility	Movement failure caused by, Earthquake, landslide or settlement.		Civil Defence Emergency Management Plan Emergency procedures manual and exercises Wastewater Mutual Aid Plan	Low			Low
44	Biosolids Facility	Tsunami		Civil Defence Emergency Management Plan Emergency procedures manual and exercises Wastewater Mutual Aid Plan	Low			Low

Files in AMP\Asset Risk Analysis V1.1.xls

4.2 Risk Summary

The extreme and high risks are associated with the following:

- Ability of the treatment facilities to treat existing and future contributor requirements
- Duplication of the concrete rising main servicing the treatment plant
- Equipment and/or component failure
- Succession planning for management of NRSBU
- Wastewater overflows at pump stations due to contributors exceeding agreed limits

It is considered that the Asset Risk Schedule be further developed to a component level i.e. pumps, electrical, controls etc**. (AP 4.2)** This being necessary as different assets lends themselves to different treatment options. These treatment options may include:

- Duplication
- Increased maintenance
- Early replacement i.e. the concrete rising main under the estuary has previously been allocated a reduced service life (now 34 years) that decreases the risk associated with that individual rising main
- High level of procedures, decision making process, contingency plans and operation and maintenance manuals
- Quicker response times and/or increased storage
- Accepting risk i.e. do nothing, monitor

These treatment options may increase operating and depreciation costs but offsets the high level of risks associated with NRSBU assets.

It is considered that if the improvements or actions indicated in the improvement and action plans are implemented that the level of risk is considered to be at an acceptable level for the ongoing operation of the NRSBU.

4.3 Insurance

NRSBU has only material damage insurance (with an excess of $50,000). The NRSBU Board has previously agreed not to have any other insurance i.e. they are not part of the Local Authority Protection Programme Disaster Fund (LAPP) nor do they self insure.

The contributing Councils do not hold any additional insurance for the NRSBU operations.

4.4 Emergency Management

4.4.1 Civil Defence and Emergency Response Plans

The following documents are available for guidance in the Civil Defence and Emergency Management:

- Civil Defence Emergency Management Plan
- NCC emergency procedures manual - exercises are carried out on a six monthly basis to ensure all staff are familiar with the procedures. The NRSBU are a party to the procedures manual and any exercises carried out

4.4.2 Local CDEM Arrangements

Nelson-Tasman Civil Defence Emergency Management Group (CDEM) is a joint committee of both NCC and TDC.

The Nelson Tasman Civil Defence Emergency Management Group Plan provides for an 'all hazards' approach to emergency management planning and activity within the CDEM Group area for Nelson City and Tasman District. The CDEM Group Plan states the civil defence emergency management structure and systems necessary to manage those hazards, including the arrangements for declaring a state of emergency in the Group's area. The Group Plan is the primary instrument whereby the community identifies and assesses its hazards and risks, and decides on the acceptable level of risk to be managed and how it is to be managed.

4.4.3 Lifelines Responsibility

The Civil Defence Emergency Management (CDEM) Act 2002 requires Local Authorities to coordinate Plans, Programmes and Activities related to CDEM across the areas of Risk Reduction, Readiness, Response and Recovery. It also encourages cooperation and joint action within regional groups.

NCC and TDC participated in the Nelson-Tasman Engineering Lifelines project.

The following indicates the status of the wastewater schemes in the areas of Risk Reduction, Readiness, Response and Recovery.

Table 4-5: Risk Reduction, Readiness, Response and Recovery Status

Activities required	Description	Wastewater Status
Risk Reduction	Identifying hazards, describing risks, and taking actions to reduce the probability or consequences of potential events	AMP Risk Treatment Schedule and Plan
Readiness	Planning and preparation required to equip agencies and communities to respond and recover	Wastewater Mutual Aid Plan Emergency procedures manual and exercises
Response	Addressing immediate problems after an emergency	Wastewater Mutual Aid Plan
Recovery	Addressing the long-term rehabilitation of the community	Nelson-Tasman Civil Defence Emergency Management Group

4.4.4 NRSBU Mutual Aid Plan

The Nelson City Council (and therefore the NRSBU) is a signatory to the Wastewater Mutual Aid Plan administered by the Water and Drainage Managers Group of the New Zealand Water and Waste Association (NZWWA).

4.4.5 Electricity Supply

The electricity lines supplier is via Network Tasman Ltd (NTL) and the electricity network is detailed in Table 4-6 below.

Table 4-6: Electricity Network Supply to Facilities

Facility	Supply
Saxton	Ring fed network with 90m cable and dedicated transformers
Whakatu	Ring fed single transformer
Airport	Ring fed network with 1400m cable and dedicated transformers
Richmond	Ring network with dedicated 20m cable spur and transformers
Bells Island	Ring network with 1500m overhead and 1500m cable spur to multiple dedicated transformers

Electricity Supply Summary

- All the facilities are supplied by a single transformer, NTL monitor demand on these units and none are overloaded
- NTL 11kV network is operated as a series of radial supplies with a number of switchable ring feeds between these radials
- The transformers supplying the Whakatu site is the most secure being located within one of these switchable rings
- The Saxton, Airport and Richmond transformers are all similar in that they are connected via a single 11kV cable to the switchable ring network
- The Bells Island transformers are connected via a section of underground cable and an overhead line to the switchable ring network
- Failure rates of transformers, cables and overhead lines are all low but typical emergency replacement times can be between 3-12 hrs depending on the asset

Energy supply is via a contract with Meridian Energy that was signed in February 2006 for a three year term. The energy contract is based on 85% fixed price and 15% on the spot market.

The NCC owns a mobile generator which is available to the NRSBU in an emergency, with a 300kVA capacity that is used in the event of a power failure and would provide power to operate one pump station at a time. It is unlikely that all four main pump stations would be without power at the same time, unless there was a major electricity network failure.

4.4.6 Interconnectivity Effects

Interconnectivity or interdependence between different utilities during and after a disaster is of utmost importance. In the event of failure, access is necessary to visit a site and provide power for recovery or removal of debris. To enable effective and efficient recovery of lifelines from an event which disrupts their service, dependencies on other lifelines must be understood and where necessary, mitigated against.

Table 4-7 details the interdependence between NRSBU and other utility providers following a disaster.

Table 4-7: Interdependency – NRSBU and other Utility Providers following a Disaster

Wastewater System Components	Electricity	Communications	Roading	Railways	Water	Stormwater	Fire Fighting
Treatment Plant	2	2	2	-	1	-	1
Bio-Solids Facility	0	1	3	-	-	-	-
Pump Stations	3	2	3	-	-	-	1
SCADA	2	3	1	-	-	-	-
Rising Mains	1	1	3	-	-	-	-
Total	**8**	**8**	**12**	**-**	**1**	**-**	**2**

Note: 3 = High dependence 2 = Moderate dependence 1 = Low dependence - = No dependence

The above table shows a high dependence for NRSBU on roading, electricity and communications following a disaster.

4.4.7 Business Continuity

Succession Planning

Succession planning within any business is considered necessary to reduce the risk associated with staff leaving the organisation. Succession planning allows institutional knowledge to be passed on, and assists in ensuring continuity of organisational culture.

Succession planning has been carried out in a number of areas but to ensure greater effectiveness there is a need to improve planning and implementation (see IP 4.7).

4.4.8 Climate Change

There has been considerable work undertaken at a national level on the possible effects of climate change and sea level rise. NCC is aware that increases in average sea level that could have significant effects on the foreshore areas. This may lead to the need for:

- The development of policies to take into account climate change/sea level rise
- Additional infrastructure requirements

The NCC design standards take into consideration the effects of climate change in the designs for rising mains, pump stations, treatment plant and biosolids disposal.

4.5 Health and Safety

Health and Safety has a very high profile and procedures within NRSBU relating to Health and Safety are:

- Monthly meeting with the two main contractors (Total Construction and Astro Environmental) to discuss any safety concerns
- Six monthly audits are carried out by NCC

4.6 Significant Negative Effects

The following identifies any significant negative effects for the NRSBU wastewater scheme that the activity may have on the social, economic, environmental or cultural well-being of the community, and states how the effects will be measured and reported against these in future.

Table 4-8: Negative Effects – The Wastewater Activity

Effect	Status of Effect		Type of Effect (existing situation)		Impact on Well-Being (existing situation)				Existing Approach or Proposed Action to Address
	Existing	Potential	Negative	Significantly Negative	Social	Economic	Environmental	Cultural	
Wastewater Treatment Plants									
Discharge of treated wastewater to ocean	Static	Static	√		Moderate	Minor	Minor	Moderate	Compliance with resource consent
Biosolids disposed to land	Static	Static	√		Minor	Moderate	Minor	Minor	
Discharge of odour	Static	Reducing	√		Minor	Nil	Minor	Minor	High degree of odour control with additional odour mitigation programmed for upgraded treatment plant
Pump stations									
Discharge of odour	Static	Static	√		Minor	Nil	Minor	Minor	Reported and resolved within a short space of time
Overflows	Static	Static		√	Moderate	Nil	Minor	Moderate	Pump station overflows are generally reported and resolved within a short space of time Rising main strategy will incorporate investigation of flows and storage requirements of the contributors
Noise	Static	Static	√		Minor	Nil	Minor	Nil	High degree of noise mitigation in residential areas
Rising Mains									
Overflows	Static	Static		√	Moderate	Nil	Minor	Moderate	High level of inspections carried out
Discharge of odour	Static	Static	√		Minor	Nil	Minor	Minor	Reported and resolved within a short space of time

5.0 LIFECYCLE MANAGEMENT

5.1 Overview

Lifecycle management has a direct impact on the provision of wastewater services to the contributors. Section 2 identifies the Levels of Service that NRSBU are committed to delivering for the contributors. This section identifies the measures that need to be implemented to achieve these levels of service. Lifecycle Management will allow NRSBU to clearly identify both the short and long term requirements of the wastewater system ensuring that a cost effective service is delivered to the contributors.

5.1.1 Asset Lifecycle

Assets have a lifecycle as they move through from the initial concept to the final disposal. Depending on the type of asset, its lifecycle may vary from 10 years to over 100 years. Key stages in the asset lifecycle are:

Asset planning	When the new asset is designed - decisions made at this time influence the cost of operating the asset and the lifespan of the asset. Alternative, non-asset solutions, must also be considered
Asset creation or acquisition	When the asset is purchased - constructed or vested in the NRSBU. Capital cost, design and construction standards, commissioning the asset, and guarantees by suppliers influence the cost of operating the asset and the lifespan of the asset
Asset operations and maintenance	When the asset is operated and maintained - operation relates to a number of elements including efficiency, power costs and throughput. Maintenance relates to preventative maintenance where minor work is carried out to prevent more expensive work in the future and reactive maintenance where a failure is fixed
Asset condition and performance monitoring	When the asset is examined and checked to ascertain the remaining life of the asset - what corrective action is required including maintenance, rehabilitation or renewal and within what timescale
Asset rehabilitation and renewal	When the asset is restored or replaced to ensure that the required level of service can continue to be delivered
Asset disposal and rationalisation	Where a failed or redundant asset is sold off, put to another use, or abandoned

5.1.2 Asset Failure Modes

Generally it is assumed that physical failure is the critical failure mode for many assets. However the asset management process recognises that other modes of failure exist. The range of failure modes includes:

Structural	Where the physical condition of the asset is the measure of deterioration, service potential and remaining life
Capacity	Where the level of under or over capacity of the asset is measured against the required level of service to establish the remaining life
Level of Service Failure	Where reliability of the asset or performance targets are not achieved

Obsolescence	Where technical change or lack of replacement parts can render assets uneconomic to operate or maintain
Cost or Economic Impact	Where the cost to maintain or operate an asset is greater than the economic return
Operator Error	Where the available skill level to operate an asset could impact on asset performance and service delivery

5.2 Summary of Assets

5.2.1 General

NRSBU is responsible for 15.5km of rising mains, 4 pump stations, Sewage Treatment Plant (STP) and biosolids application facility. An indicative replacement costs as in 2006 is shown in Table 5-1 below.

Table 5-1: NRSBU Summary Asset Replacement Costs

Item	Indicative 2006 Replacement Cost $
Land	20,000
Pump Stations	4,487,878
Pipeline	6,164,304
Aeration Basin Equipment	2,858,492
Clarifier	2,360,107
ATAD Plant	6,974,002
Biosolids Facility	1,121,857
Oxidation Ponds	8,259,574
Outfall	1,222,603
Buildings	515,964
Roads	375,651
Resource Consents	625,096
Forestry	-
	34,985,528

5.2.2 Rising Mains

The rising main component varies from 510mm to 800mm diameter rising mains that link the four pump stations, and the treatment plant plus the outfall main and the biosolids pipeline.

Main Type	Length - km	Base Service Life (years)	Residual Life (years) at 2006
PE	11.08	80	75 - 80
Concrete	4.41	34	10
Steel	.04	80	79
	15.53		

5.2.3 Pump Stations

The NRSBU operates four pump stations, three of these being very large and Wakatu being small (in comparison to the other three). There are linkages between pump stations ie Wakatu pumps into the Richmond to Saxton rising main, the Saxton acts as a booster for the Richmond/Wakatu pump stations and the Saxton and Airport have a common rising main across the estuary to Bells Island. All pump stations have SCADA and flow monitoring installed.

Table 5-2: Pump Station Details

Name	Location	Residual Life (years) at 2007	Storage Capacity ADWF As at 2004	Pump Capacity - Lts/sec *	
				Duty Pumps	Pump 3
Richmond	Beach Rd	1 - 55	1.8hrs	176 l/s	389/s
Saxton	Saxton Rd	1 - 55	1hr	192 l/s	312/s
Airport	Stoke	1 - 55	1.2hrs	183 l/s	458/s
Wakatu	Wakatu Industrial estate	7 - 76	4hrs	40 l/s	-

* Approximate maximum values

5.2.4 Treatment Plant

History

The Bells Island Sewage Treatment Plant (BISTP) was commissioned in 1983.The original design population for the (BISTP) was 33,000 and the plant consisted of a fully mixed aeration basin, three facultative oxidation ponds (in parallel), two maturation ponds (in series), and a tidal discharge. The original concept allowed for expansion by the addition of one extra aeration basin (alongside the existing aeration basin), and extra facultative ponds as required.

The (BISTP) operated successfully until overloading of the facultative oxidation ponds (FOPs) was noticed in the late 1980's. A major result of overloading was the generation of malodour. Investigations were undertaken and it was concluded that the cause of the overloading was a combination of stratification and organic load build-up in the ponds considerably in excess of treatment capacities. As a consequence of the high organic load all oxidation pond oxygen was quickly assimilated, causing anaerobic and putrefactive conditions and noticeable malodour production.

A review of the (BISTP) in 1992 confirmed that sludge build-up was a primary factor causing the overloading and it was recommended that desludging of the oxidation ponds should be commenced. This was undertaken over the period 1993-1995. Other recommendations from the 1992 review that were implemented were:

- Install mechanical aeration mixing on the three facultative oxidation ponds
- Install a clarifier and sludge processing plant (Autothermal Thermophilic Aerobic Digestion - ATAD) to remove the sludge, thereby significantly reducing the build-up of waste aerobic sludge

These upgrades were completed in 1996. Following commissioning of the 1996 upgrade, several operational issues became apparent:

- Overloading of the aeration basin caused malodours
- A fungal parasite had infected the ponds, reducing the algal population for short periods with consequential generation of malodours
- Improved solids capture through recycling of sludge was desirable in the clarifiers to reduce solids loadings on the FOPs
- High nitrogen levels in the biosolids processed by the ATAD plant led to a requirement for additional land to maintain biosolids application rates within consent limits for nitrogen
- The operation of the ATAD and sludge processing plant needed improvements to the aeration and mixing equipment
- There were reported high hydrogen sulphide levels around the inlet basin which needed to be addressed

In 2003 NSRBU tendered the design, construction and operation of a retrofit at the Bells Island Waste Water Treatment Plant that included the installation of a Dissolved Air Flotation System (DAF). This upgrade was implemented during 2004 and 2005.

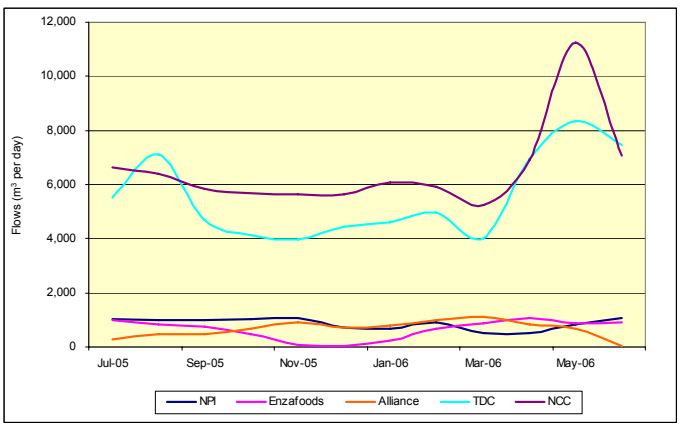
After the acceptance of the tender, but prior to the construction, it became apparent that the influent parameters to the Bells Island Facility could, at times, exceed the design parameters used for the upgrade. However, NRSBU decided to continue with the tender and to review the situation after the installation of the 2004-2005 upgrade.

Background

The treatment plant treats sewage equivalent to that generated by a domestic population of around 133,000 people. Peak flows and loads are highly variable due to the combined effects of stormwater infiltration and the seasonal nature of industrial food processing activities.

The NCC and TDC municipal wastewater discharges have relatively dilute concentrations of BOD and SS but the total loads contributed to the NRSS are not dissimilar to the sum of the major industrial contributors because of the higher and more consistent average flows. The municipal inputs particularly that of Richmond are characterised by high wet weather flows. These peak wet weather flows govern the sizing of the pump stations and rising mains of the NRSBU. An indication of flows received from the five contributors is detailed in Figure 5-1 below.

Figure 5-1: 2005- 06 Flows



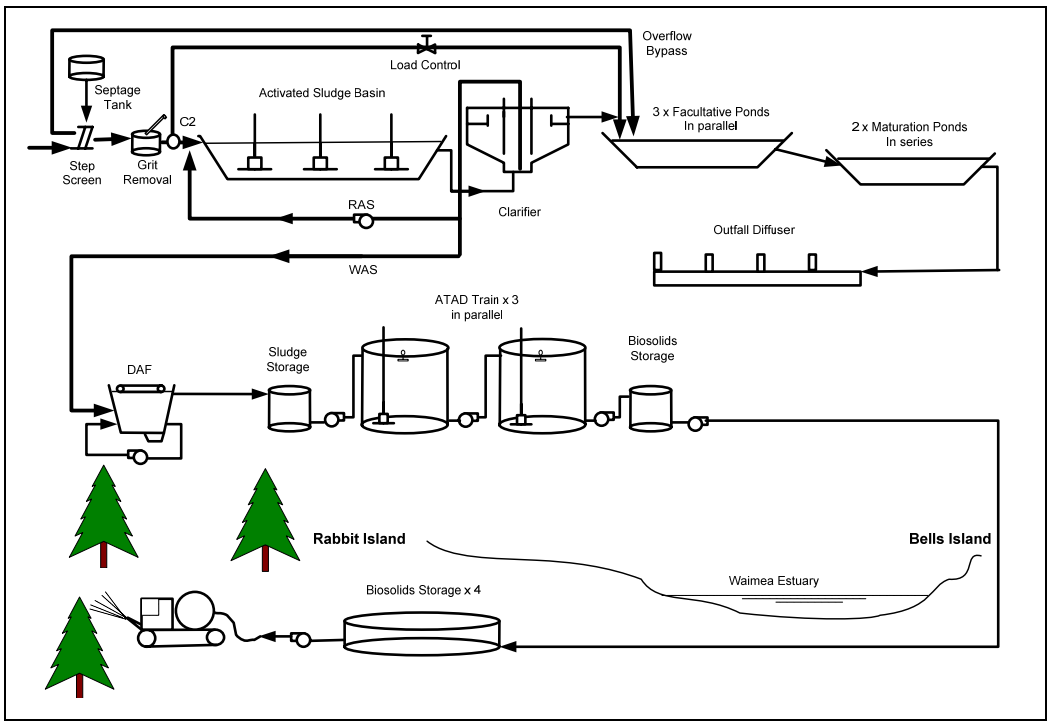
The treatment plant process is shown schematically in Figure 5-2 with the essential treatment plant components detailed below:

Table 5-3: Treatment Plant Details

Essential Components	Install Date	Residual Life (years) at 2007	Capacity* (Indication only)
Step screen	1996	4	950Lts/sec
Aeration basin	1982 - 2005	5 - 55	9,600kg BOD_5/day
Clarifier	1996 - 2004	0 - 39	425Lts/sec
Dissolved Air Flotation System (DAF)	2005	0 - 47	551kg/hr or 13230kg/day
Autothermal Thermophilic Aerobic Digester (ATAD)	1996 - 2006	0 - 40	8,200kg TSS/Day
Three 10ha facultative oxidation ponds	1982 - 2005	6 - 79	50 – 60Kg.BOD_5/ha.d in winter 120Kg.BOD_5/ha.d in summer
Two 10ha maturation ponds	1982 - 2005	6 - 79	
Outfall to the Waimea Inlet	1982 - 2001	0 - 51	16,000m^3 per day
Total			

*Details of individual asset capacity is detailed in the Bells Island WWTP Treatment Capacity Report dated November 2006

Figure 5-2: NRSBU Wastewater Treatment Process- Schematic



Clarifier

The clarifier was added to the process in 1996 with the aim of reducing the solids and BOD load on the oxidation ponds.

The clarifier removes the settleable solids from the wastewater. The resultant sludge is pumped from the base of the clarifier to gas plant before being pumped to the digesters. Effluent from the top of the clarifier is decanted into the facultative ponds.

Dissolved Air Flotation System (DAF)

In 2005 the DAF process was added as a gravity separation system that uses air bubbles in the wastewater holding tank to help float insoluble materials to the surface so they can be removed. Those materials that are heavier than water are removed by dosing with polyelectrolytes. The resulting flocculants cause these materials to join together in clusters that are lighter than water and therefore float.

Autothermal Thermophilic Aerobic Digestion (ATAD)

The two stage ATAD process, also added in 1996, uses heat released by microbial activity to achieve and sustain minimum operating temperatures of 35°C and 55°C respectively. Thermophilic bacteria have a very high oxygen demand. The ATAD plant was refurbished in 2004-05 that included replacement of the roofs.

The resultant “biosolids” are transferred to a storage tank before being pumped across the Waimea Inlet to holding tanks on Rabbit Island. Tankers transport them to the forest where they are sprayed under the trees as fertiliser.

Facultative Oxidation Ponds (FOPs)

Effluent from the clarifier is split between the three 10ha FOPs. Bacteria and nutrient in the waste promote vigorous growth of algae. During the day, near the surface, the algae generate oxygen by photosynthesis, further stabilising the wastes. The remaining solids settle to the bottom of the ponds and are treated by anaerobic processes.

Maturation Ponds

The two 10ha maturation ponds, in series, complete the stabilisation process and reduce bacteria numbers. They also provide storage capacity for intermittent release of the effluent.

Outfall to Waimea Inlet

After an average retention time of about 30 days, the treated wastewater is discharged through a gravity driven outfall, into the waters of the Waimea Inlet, on the first three hours of each outgoing tide.

5.2.5 Biosolids Application Facility

Disposal of biosolids is via application every three years (maximum of 40mm per application – 100 Kg/ha TKN per year) within the forested area of Rabbit and Bells Islands. Total afforested area available for biosolids disposal is approximately 750ha. The land is owned by TDC and a licence to dispose of biosolids is held by NRSBU. Resource consents for additional disposal areas on Rough Island will be applied for in early 2007.

The resultant “biosolids” from the ATAD are transferred to a storage tank before being pumped across the Waimea Inlet to holding tanks on Rabbit Island. Tankers transport them to the forest where they are sprayed under the trees as fertiliser. Resource consent details are contained in the supplementary section.

5.3 Plant Upgrades

The Bells Island Sewage Treatment Plant has been substantially upgraded since March 1995. The upgrades, the reasons for them, and their approximate costs are summarised below in Table 5-4 below.

Table 5-4: NRSBU Treatment Plant Recent Upgrades

STP Upgrade	Date	Reason	Approximate Capital Cost
Installation of Clarifier	1996	To reduce loading on oxidation ponds and hence potential for odours	Total of $5.8million
Installation of ATAD	1996	To treat solids from clarifier to a standard appropriate for beneficial disposal of biosolids	
Additional ATAD aeration	1998	Reduction in biosolids odour by better mixing and increased oxygen	$500,000
Installation of biofilters	1998	Reduction in odours from ATAD	$120,000
Installation of additional basin aerators	2001	To reduce/eliminate potential for odours from aeration basin and to improve treatment capacity to ensure better capture of solids in clarifier	$100,000
Installation of flow meters and pond monitoring equipment	2001	Better information and management control	$100,000
Cleaning of outfall pipeline and diffuser ports; installation of "red valves"	2001	Increase capacity of outfall	$56,000
Treatment plant inlet	2005	Upgrade to install grit removal , installation of biofilter for odour control and bypass pipe to Pond F1 for peak flows	$ 422,000
Aeration basin equipment - Electromechanical Services and 11 aerators	2005	Increased aeration to reduce risk of odours	$ 1,586,000
Aeration basin - Civil works and recirculation Pipe	2005	Increased aeration and to improve treatment capacity with an appropriate level of aeration and recycling of activated sludge.	$ 697,000
Clarifier - Mechanical Services	2005	To pump sludge from clarifier to DAF	$132,000
Dissolved Air Flotation Plant	2005	To thicken sludge to the required level for ATAD treatment	$1,122,000
Sludge Storage Tank- Electromechanical Services	2005	Replace tanks walls which had corroded and mixer	$85,000
ATAD Plant - Structures and electromechanical Services	2005	C Train tank roof replacement - extreme corrosion of beam and roof panels	$432,000
	2005	B train	$430,000
Rabbit Island Facility - Biosolids Storage Tank (1&2)	2005	Tanks walls corroded and required replacement	$44,000

5.4 Critical Assets

Criticality is determined by considering if an asset is in a situation where:

- The likelihood of failure is high
- The consequences of the asset failing is very high

Due to the nature of the NRSBU, all assets are considered critical and the consequence of failure in any asset is high. Risk Management Section 4.1 and 4.2 details the risk assessment at a high level for facilities. This will allow the General Manager of the NRSBU to:

- Compare assets for business criticality
- Focus capital expenditure on those assets whose failure have the greatest impact on the NRSBU
- Give robust conclusions that are based on a risk approach that will aid the prioritisation of the renewal and capital programme

5.5 Asset Condition and Performance Assessments

5.5.1 Background

Summarised sections from the October 2006 Bells Island WWTP Treatment Capacity Report have been used extensively in the following asset and condition assessment as this is the most comprehensive and up to-date report on NRSBU.

5.5.2 Rising Mains

Condition

An investigation of the condition of all the pipelines was conducted in 1997 following several failures. Due to the lack of storage or bypass facilities it is not possible to conduct a CCTV inspection or remove sections of pipe for detailed inspection without risking an overflow of effluent into the estuary. The inspection was therefore limited to a core sampling exercise. This inspection resulted in the replacement of all AC mains with PE mains, a process that was completed in 2005.

The concrete pumping main that services the Bells Island Treatment Plant has had two core samples taken. While these samples indicated that the pipeline was in good condition the samples were located at air valves and the overall condition of the main is unknown. This main has a risk classification of extreme and duplication is being considered. This duplication will then allow the true condition to be ascertained and give additional security for pumping effluent to the treatment plant. The duplication will allow the use of pipe line for other purposes (pumping treated effluent back to golf-course) which will assist to extend the life of the concrete pipe.

A rising main strategy review that will encompass the risks associated the individual rising mains and the peak flows from the individual contributors will be instigated in 2007. The strategy will include consideration for increased storage capacity and standby generators for power outages.

A programme of regular pipe inspections of risk areas will be developed once the duplicate main is in use.

The PE mains have a high level of resistance to acid and sulphide attack and a base service life of 80 years.

Performance

The regional pipeline has undergone a significant amount of upgrading over the last few years, and it is now at the point where the pipe material is considered structurally sound and the storm pumping system can be used. This allows the capacity to accept all but the worst storm flows reaching the system. Specific capacity information is difficult to ascertain with the pipe, with estimates ranging from 720 to 840ℓ/s at different times.

In terms of the operation of the rising main there are a number of areas where improvements could be made to ease the operation, although none are sufficiently serious that the system capacity is constrained.

5.5.3 Pump Stations

Condition

The Wakatu pump station was installed in 2003 and in very good condition. All duty pumps and SCADA have been replaced in the other three pump stations over the last three years. Part of the strategy review will consider the need of three pumps at each pump station.

All pump stations are maintained to a high level as required by the Design Build and Operations contract with renewals occurring in a timely fashion.

Performance

There is a small amount of buffering available in the pump stations generally, but this small amount of buffering is not being used at present due to the current set up of the control system within the pump stations. Currently the pumps are on set-point control, and the control system will need to be modified to allow an integrated control arrangement that minimises the fluctuation of flow at Bells Island.

Additional buffer storage for the Nelson Regional Sewerage System would be very useful and would greatly assist in resolving a number of the operational issues, and risks within the existing facility.

Rag has been an issue at the Saxtons Rd pump station, and the pumps that have been installed have been modified to reduce this issue. Similarly the operation of the pump station has been changed to reduce the Rag / Blockage issues. The rag issue in the pump station and the remedial actions in the pump station have caused consequential effects both in the pump stations and at Bells Island.

In the pump stations the effects of the rag issues are; reduced control range on the sewage pumps; increased pump downs in the pump sumps and increased clean downs of the pump stations.

Table 5-5: Suggested Storage Requirements for Contributors

Catchment / Contributor	ADWF (m^3/hr)	Storage Required for 4 x ADWF (m^3)
Saxton (NCC)	29.7	118
Airport (NCC)	122.7	491
Richmond (TDC)	194.3	777
ENZA Foods	81.0	324
Alliance	49.0	196
NPI	45.8	183
Mapua (TDC)	12.7	50

5.5.4 Treatment and Disposal Facilities – Condition and Performance

Aeration Basin/Clarifier

As a summary, the aeration appears to operate effectively, but does experience overloading on occasion based on Dissolved Oxygen Measurements. Considerable work has been done to try to identify the actual load and the mass balance around the aeration basin. At this time there are still questions that need to be answered and further work is planned to try to identify why the one estimation method appears to suggest the a reduced oxygen demand compared to the other methods. At present it is considered that additional capacity will be required within the Aeration Basin, or load reduction will be required in order to ensure ongoing performance of the system as the average load to the facility increases. The proposed primary clarifier upgrade will achieve the load reduction necessary to remove the overloading from the aeration basin.

ATAD

At some point in time, estimated to be approximately 2015, the load to the ATADS will exceed the current capacity. At approximately this time the ATAD tanks reach the end of their (extended) design life. This would be an appropriate time to consider switching to anaerobic digestion rather than replace the existing tanks and add a fourth train. The capital costs of either option would be similar but the operating cost of anaerobic digestion are considerably less than ATADs particularly if the biogas is used for co-generation of electricity and heat for pasteurisation in a Temperature Phased Anaerobic Digestion (TPAD) system. At the average loads expected in 2025 co-generation form the produced biogas would be sufficient to produce approximately 400kW electricity and 610kW of useful heat on a continuous basis. An additional electrical cost saving of approximately $95,000 (at $0.06/kWhr) would result because the mixing energy required for TPAD is much less than the aeration energy required in the ATADS. A study for co-generation for Bells Island has been commissioned and due in June 2007.

Ponds

The algal and other pond parameter monitoring has shown that, at times, the ponds are in a fragile state. The management systems have prevented that fragile state from deteriorating to the extent of malodour generation or other consent compliance violation. What is unknown is how conservative the approach has been compared to the actual capacity of the ponds i.e. how much more load could have been applied without compromising pond operation. Examination of pond health parameters in the broard view and particularly looking at “fragile state events” suggests that the operation has not been overly conservative.

Outfall

It is considered that the current outfall has a maximum daily capacity with the end plates on of around 16,000m^3 per day on a normal day. As a result additional work will be required to the outfall to accommodate the full 20,250m^3 per day flow projected to occur in 20 years, and either longer discharge times are required or the end caps need to be removed to allow the current consent peak daily volume discharge of 25,000m^3 per day.

Diver inspections have been undertaken on a number of occasions and oysters are often found growing on the diffuser legs and in the discharge end of the diffuser. These growths cause significant friction losses, and need to be cleared from the system reasonably regularly (estimated at annually). However, even with the oysters removed and the end plates removed the expected sustained wet weather effluent flow of 25,000m^3 per day discharge is not currently possible.

5.5.5 Biosolids Pipeline and Facility

The biosolids pipeline has historically been one of the capacity constraints on the Bells Island WWTP, however this situation changed in early 2006 with the installation of a new pipe across the estuary, to replace the damaged/blocked old section.

The new pipe appears to have sufficient capacity to pump 21m3/hr, or 500m3/day over 24 hours, which is significantly more flow than would ever be required on a daily basis. Current estimates are that up to around 150 -180m3 per day might be needed in the event of an emergency type scenario. The pipe has capacity to transfer this amount over a period of around 12 hours at maximum flow rate.

In reality the pipeline from Bells Island to Rabbit Island will be constrained not by its capacity, but by the maintenance (pigging frequency) and by the disposal capacity of the Rabbit Island Contractor and the acceptance capacity of the land onto which the biosolids are disposed.

The biosolids pipeline does not appear to be influenced significantly by rag material, however the biosolids irrigation Contractor is heavily influenced by rag material, and frequent issues occur with the irrigation operation due to rag blocking the pumps and nozzles.

The nitrogen content of the biosolids has increased to the extent that there is no longer enough land to allow the permitted application cycle to occur. The mass balance for the existing plant shows that the nitrogen is typically discharged in roughly equal amounts in the two liquid discharges to the estuary and to Rabbit Island. It appears that the recent upgrade has shifted the nitrogen partitioning away from the pond discharge to the biosolids discharge and this is causing problems with the land requirement on Rabbit Island[6].

Bells Island WWTP Treatment Capacity Report has indicated that Nitrogen will quickly become the limiting constraint for the BIWWTP, and nitrogen is already a contaminant of significant concern due to insufficient land availability on Rabbit Island.

Treatment and Disposal Facilities Summary

There are three major constraints within the facility that influence the system significantly, these being:

[6] Bells Island WWTP Treatment Capacity Report : October 2006

- The rag level within the system and the damage and operational difficulties that causes throughout the system
- The flow profiles occurring as a result of the poor control of the pump stations and the poor integration and buffering associated with the existing pump stations
- The high average and peak loads which overload parts of the plant and place the plant as a whole at or near capacity

There are a number of smaller issues associated with the facility that influence the day to day operation, and raise or lower the risk of compliance issues occurring, these relate to:

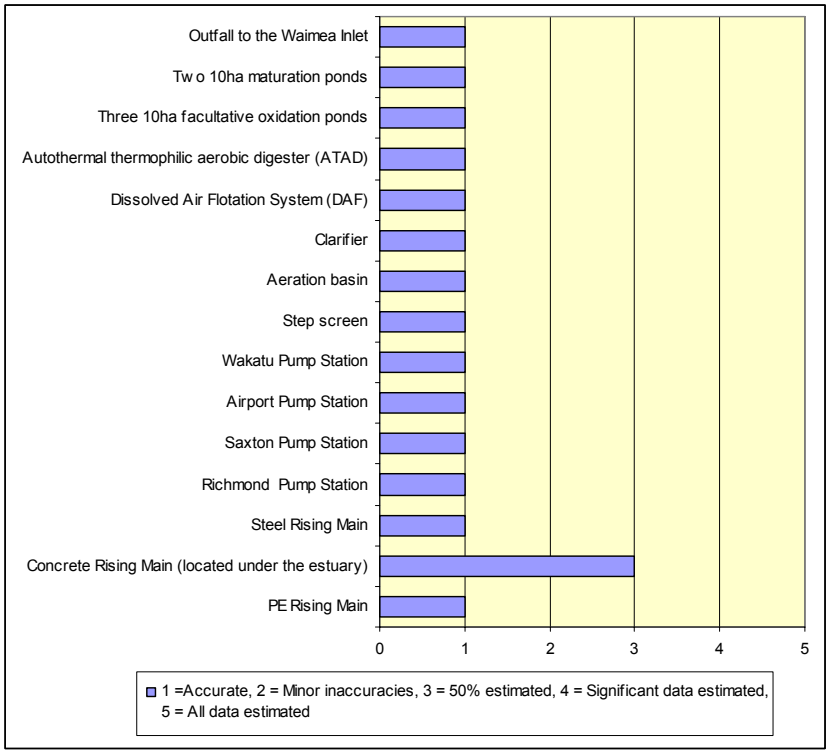
- Potential odour release issues at the biofilter and ATADs and from Chamber C3
- The backing up of Chamber C3 during high flow events
- The discharge rate achievable with the outfall is below the consent limit and reduces the plants ability to handle sustained storm inflows

Nitrogen will quickly become the limiting constraint for the BIWWTP, and Nitrogen is already a contaminant of significant concern due to insufficient land availability on Rabbit Island.

5.6 Knowledge of Assets – Data Confidence

The confidence in the data for rising mains, pump stations and treatment plant is detailed in Table 5-6. This confidence rating is from NRSBU Manager's knowledge, data from the Hansen asset register and is based on the "New Zealand Infrastructure Assets Grading Guidelines" 1999.

Table 5-6 Data Confidence



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6.0 FINANCIAL

6.1 Background

The works proposed in the previous sections on Levels of Service, Future Demand, Emergency and Risk Management and Lifecycle Management all impact on expenditure. There are cost implications that affect the Operations and Maintenance Renewal and Capital Plans that include:

- Meeting levels of service
- Meeting future demand
- Managing risk
- Maintaining and improving asset condition
- Maintaining and improving asset performance
- Operating assets

6.2 Asset Valuation and Depreciation

6.2.1 Definition

The basic value of an asset reduces in accordance with the wearing out over the asset's life arising from use, the passage of time, or obsolescence. This reduced value is called the depreciated replacement cost. It is accounted for by the allocation of the cost (replacement cost) of the asset less its residual value over its useful life.

6.2.2 Valuation Method

All pipelines, pump stations, oxidation ponds and outfall have been previously valued based on optimised replacement costs assuming the use of modern techniques and pipe materials. The prices are based on a Beca Steven evaluation in 1994 adjusted to present day costs using the Cost Construction index (CCI) and were re-evaluated in October 1998 by Duffill, Watts and Tse Ltd. Nelson City Council using the new method in the NZ Infrastructural Asset Manual carried out a further re-evaluation in 2001 - 2003.

The treatment plant valuations are based on construction costs. The valuations were then adjusted to present day costs using the CCI. Table 6-1 shows the replacement value of the NRSS to be $32 million as at June 2004 (not including land and buildings).

6.2.3 Depreciation

The value of the assets has been depreciated on a straight line basis over their nominal working life.

Table 6-2 details the life span of the pipelines and pump stations used for the valuation.

Pump station motors, pumps and valves/control equipment have been assigned a life as set out in Table 6-2. This is based on the NAMS manual and experience. Experience with sewer pumps has shown that pump seals and bearings are replaced at intervals of between three to five years depending on use and general ongoing maintenance. With the rotation of duty pumps at pump stations, a life cycle of 15 years can be achieved.

The Asset Management System records the number of pump hours with the maintenance history to enable predictive modelling techniques to be used for maintenance and renewal strategies and determine more accurate life cycles. The assumed asset life of pumping station components are detailed in Table 6-2.

The assumed working life used for the pipelines in Table 6-2 is based on the latest NCC valuations.

6.2.4 Future Valuations

The next full valuation is not required until June 2007 but a full valuation may occur earlier depending on the CCI movement and ability to carry out optimisation using the known update strategy. **(AP 6.2)**

The NRSBU risk strategy presently used makes allowance for the high level of risk associated with the concrete rising main under the estuary by having a reduced replacement age. This strategy may be used for other assets following further development of the risk schedule to a component level indicated in Section 4.2.

Table 6-1 details the 2004 valuations and the associated additions that occurred in 2004/05 and 2005/06 to give an indicative replacement cost for 2006.

Table 6-1: NRSBU Asset Valuation 2004 and Indicative 2006 Replacement Cost

Facility	Item	Replacement Cost 2004	Additions 2004/05	Additions 2005/06	Indicative 2006 Replacement Cost
1	Beach Rd P/S Total	1,305,375	8,000	13,120	1,326,495
2	Saxton P/S Total	1,438,836	8,000	13,120	1,459,956
3	Airport P/S Total	1,414,060	8,000	13,120	1,435,180
4	Wakatu P/S Total	278,248	8,000	-	286,248
5	Rising Mains Total	4,659,217	1,349,587	8,369	6,017,173
6	Valves Total	112,626	34,505	-	147,130
7	Inlet Total	590,676	423,162	-	602,966
8	Aeration Equipment Total	222,743	1,608,486	13,426	1,844,655
9	Aeration Basin Civil Works Total	-	564,672	13,426	578,098
10	Pipes and Ponds Total	7,169,663	135,521	13,426	7,318,610
11	Facultative Equipment Total	332,866	30,000	-	362,866
12	Outfall Total	1,222,603	-	-	1,222,603
13	Washwater Total	5,852	8,260	-	14,112
14	Clarifier Total	2,122,353	237,754	-	2,360,107
15	Supernatent Sump Pumps Total	60,110	-	-	60,110
16	Dissolved Air Floation Plant Total	23,887	1,126,535	-	1,150,422
17	Sludge Storage Tank Total	98,550	144,701	-	243,251
18	Buildings Total	384,449	-	-	384,449
19	Equipment Total	121,747	3,310	6,458	131,515
20	ATAD Plant Total	3,819,446	969,969	535,528	4,918,792
21	Biofilter - ATAD Total	141,170	39,994	-	181,164
22	Biosolids Storage Tank Total	68,951	36,250	-	105,201
23	Biosolids Transfer Pumps Total	99,405	-	-	99,405

Facility	Item	Replacement Cost 2004	Additions 2004/05	Additions 2005/06	Indicative 2006 Replacement Cost
24	Biosolids Pipeline Total	347,730	10,000	4,795	362,525
25	Rabbit Island Facility Total	505,752	48,973	-	554,725
26	Road Total	375,651	-	-	375,651
27	Bells Island Land	-			-
28	Bells Island Forest	-			-
29	Resource Consents Total	620,188	-	4,909	625,096
		27,542,153	6,803,678	639,698	34,985,528

Table 6-2: Asset Lives – Pump Stations and Pipe Lines

	Element	Life (years)
Pump Station	Structure	80
	Steelwork	50
	Pump/Motor	15
	Electrical	15
	Valves	25
	Telemetry	10
	VSD	10
	Mixers	10
	Aerator	15
	Flow meters	10
Pipe Lines	High Density Polyethylene (HDPE)	80
	RCRRJ	34

6.3 Loans

A $17m multi-option facility exists that is secured over rates revenue of the Tasman District and Nelson City which expires 30th April 2011. Details of the balance at 30 June 06 is as following (The $600k has since been repaid).

Table 6-3: NRSBU Loans

Date Due	Loan Number	Amount $	Term %	Annual interest $
31/07/2006	548080.94	600,000	7.775	46,650
10/04/2007	548080.95 & 86482.95	1,000,000	7.685	76,850
26/10/2007	612353-94 & 326036.91	1,000,000	6.95	69,500
11/05/2008	86482-92 & 548080-92	2,000,000	7	140,000
26/10/2008	612353-95 & 326036.92	2,000,000	6.95	139,000
9/08/2009	86482-91 & 548080-91	2,000,000	7	140,000
21/02/2010	612353-91 & 326036-93	2,000,000	7.1	142,000
11/04/2010	548080.93 & 86482.93	2,000,000	7.325	146,500
Total		12,600,000		900,500

6.4 Routine Maintenance Plan

6.4.1 Definition

Routine maintenance is the regular ongoing day-to-day work necessary to keep assets operating including instances where portions of the asset fail and need immediate repair to make the asset operational again. This includes:

- Regular and ongoing annual expenditure necessary to keep the assets at their required service potential
- Day-to-day and/or general upkeep works designed to keep the assets operating at required levels of service
- Works which provide for the normal care and attention of the asset including repairs and minor replacements
- Unplanned (corrective) maintenance, i.e. isolated failures requiring immediate repair to make the asset operational again

6.4.2 Maintenance Contract

Prior to 2005 the operations of NRSBU assets were via Councils treatment plant staff or maintenance contractors. A Performance based Design, Build and Operations contract that includes the operation and maintenance of the pump stations, rising mains and treatment plant was instigated in 2003. The maintenance portion of this contract commenced in April 2006 with a six year period (three plus three) with the maintenance contractor being Total Construction Ltd.

The Performance based Design, Build and Operations contract has transferred the risk of complying with the resource consent conditions to the Contractor. The NRSBU however will still carry the risk of the influent exceeding the quantities or characteristics prescribed in the contributor's agreements.

A separate contract for the operation of the biosolids disposal had previously been awarded to ASTRO Environmental in 1996 and will be re-tended in 2008.

The memorandum of understanding between TDC and NCC terminates in 2010 and therefore it is considered that any contract entered into by NRSBU that exceeds this date will require ratification by the two Councils unless the Memorandum of Understanding is extended prior to contracts being entered into.

6.4.3 Maintenance Standards

The work performed and material used complies with the NCC Engineering Standards 2003 (and subsequent amendments) and all relevant New Zealand Standards, in particular those listed in the Maintenance Contract.

6.4.4 Operations and Maintenance Funding

No maintenance funding provision is carried over to the following year. Financial estimates are submitted to the Board and the contributors each year following inspections of the assets and the recorded maintenance history during the previous year. The contributor's agreement details the methodology of charging and the terms of trade.

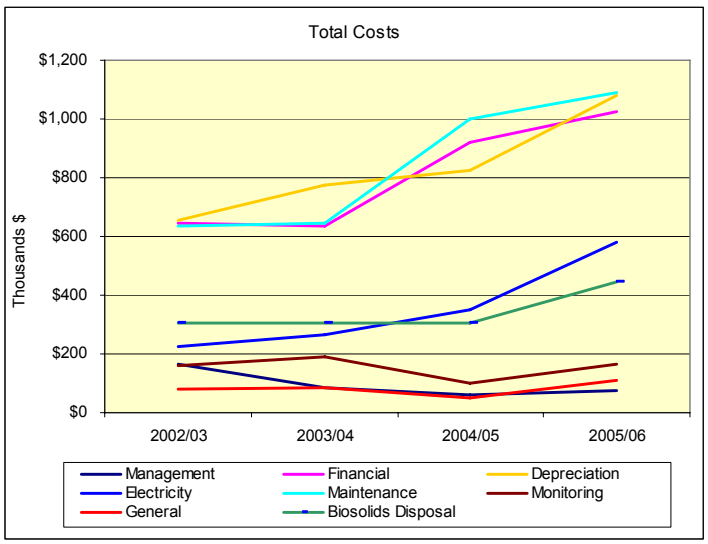
In July each year the NRSBU supplies to the contributors the operating costs of the previous year. The differences between the charges assessed at the commencement of the year and the final actual costs are either reimbursed to the contributors if in credit or paid by the contributors if in debit.

Excess Maximum Discharges Levels

Any user who discharges the trade waste and/or sewerage to the sewerage scheme in excess of the contributors agreement are required to pay additional charges that are detailed in clause 8.3 of the agreement. To-date clause 8.3 has not been invoked.

Analysing Total Expenses 2002/03 to 2005/06

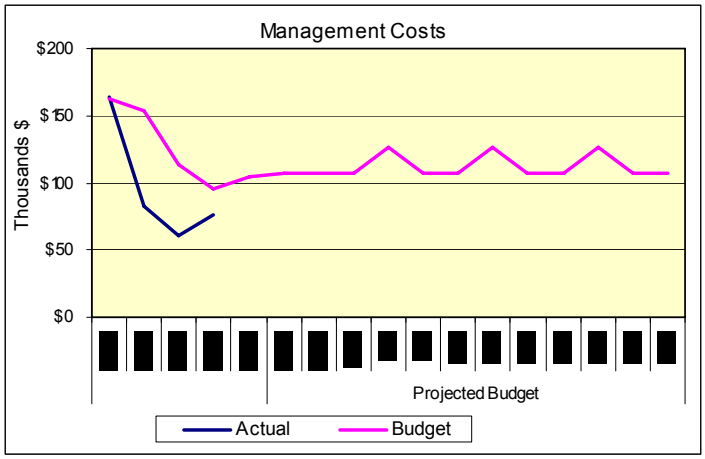
The following section is an analysis of the total expenses associated with the NRSBU over the previous four years and the future costs. This allows long term trends to be indicated. Actual and budgeted costs for 2002/03 to 05/06 are shown for the seven financial areas of: Management, Financial, Depreciation, Electricity, Maintenance, Monitoring, Biosolids Disposal and General.



Total Costs 2002/03 to 2005/06

Total costs for period 2002/03 to 2005/06 have increased by 59.4% or on an annual basis:

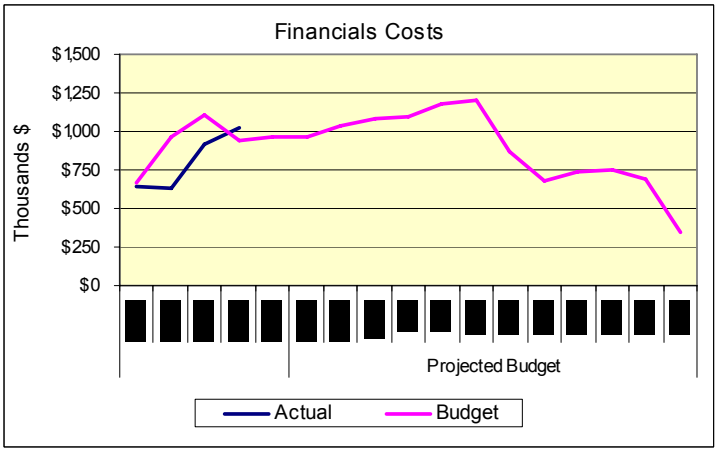
- 02/03 - 03/04 = 3.9%
- 03/04 - 04/05 = 21.2%
- 04/05 - 05/06 = 26.6%



Management Costs:

- Actuals 2002/03 to 2005/06

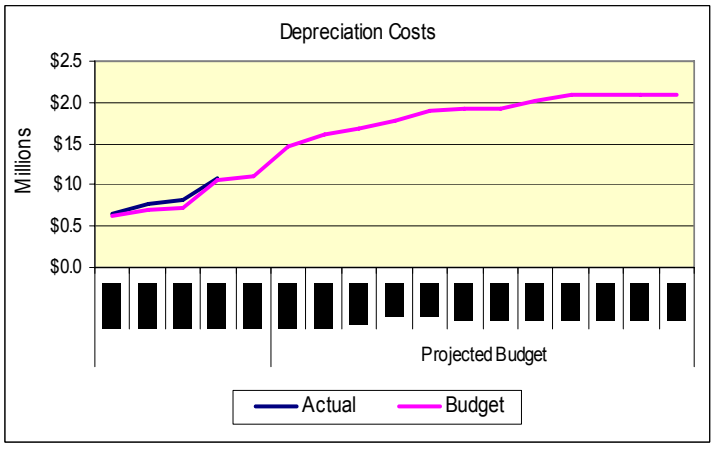
- Budgets 2002/03 to 2018/19



Financial Costs

- Actuals 2002/03 to 2005/06

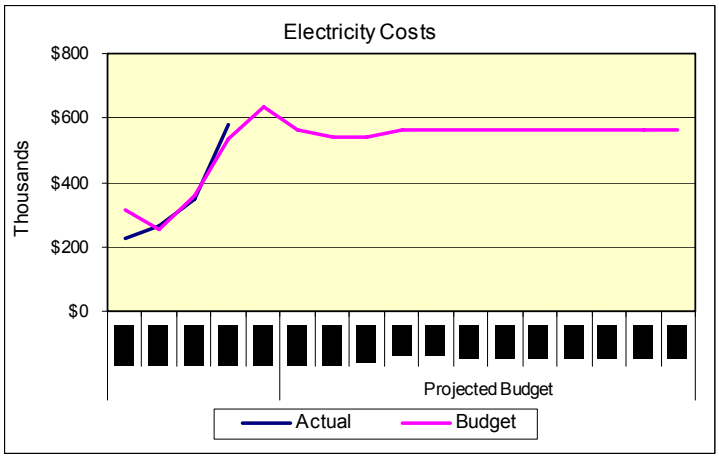
- Budgets 2002/03 to 2018/19



Depreciation Costs

- Actuals 2002/03 to 2005/06

- Budgets 2002/03 to 2018/19

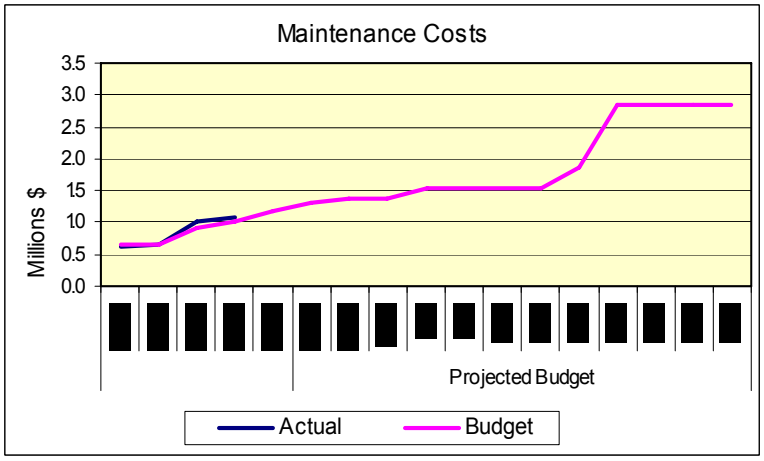


Electricity Costs

- Actuals 2002/03 to 2005/06

- Budgets 2002/03 to 2018/19

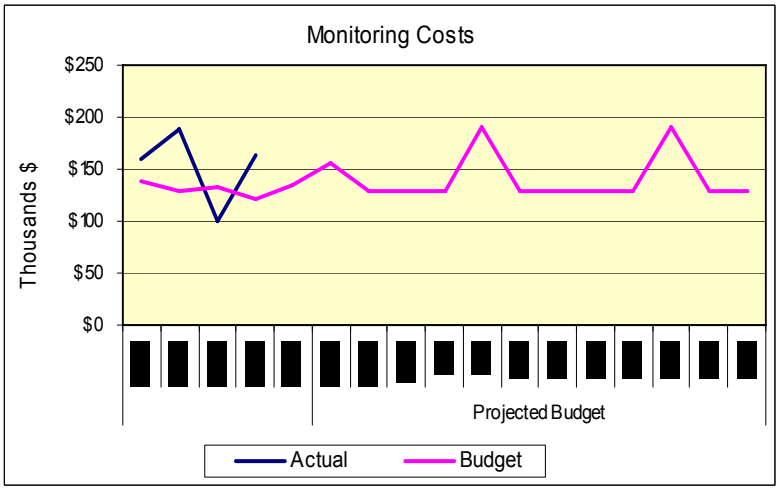
Over the last four years there has been a 158% increase in electricity costs, this increase due to the commissioning of additional 11 aerators in the aeration basin in 2004/05.



Maintenance

- Actuals 2002/03 to 2005/06

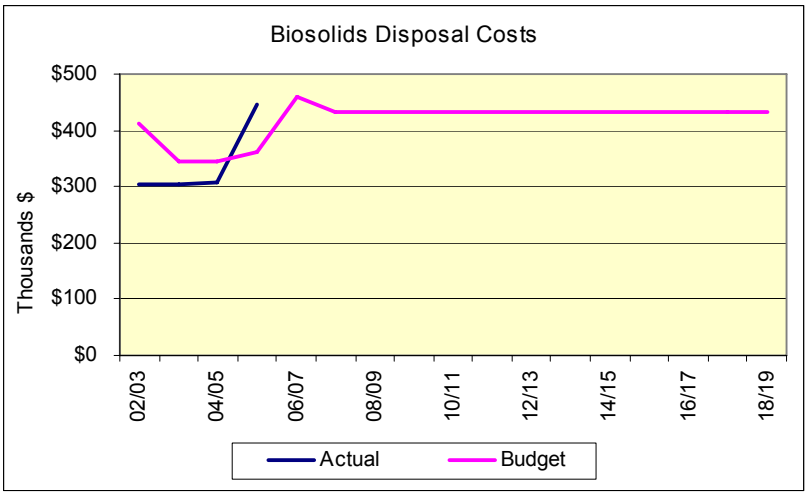
- Budgets 2002/03 to 2018/19



Monitoring Costs

- Actuals 2002/03 to 2005/06

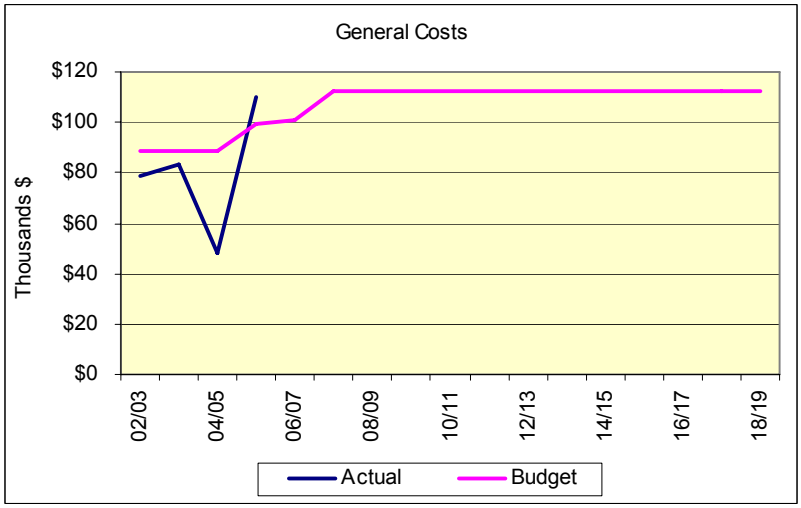
- Budgets 2002/03 to 2018/19



Biosolids Disposal Costs

- Actuals 2002/03 to 2005/06

- Budgets 2002/03 to 2018/19



General Costs – Consisting of Consultancy, Rates, Water Charges, Forestry and Telephone/Computers

- Actuals 2002/03 to 2005/06

- Budgets 2002/03 to 2018/19

Files in AMP\AMP graphs and $ costs.xls

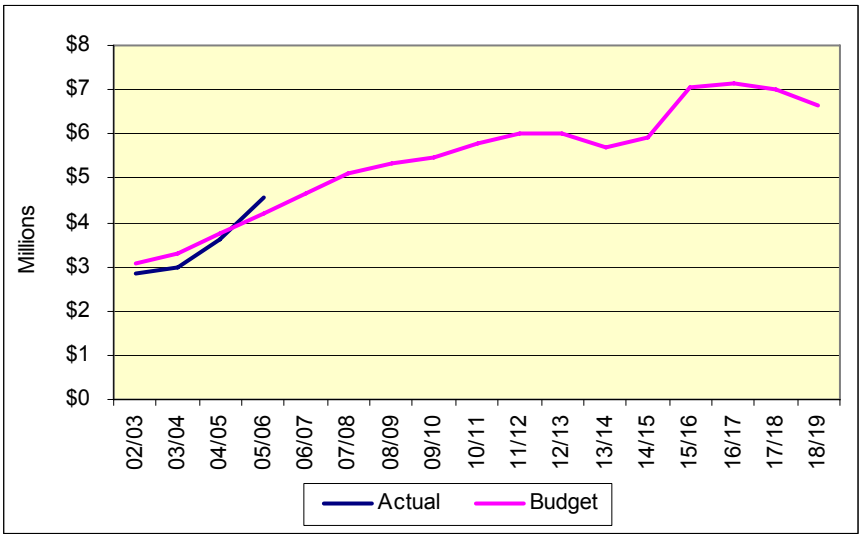
6.4.5 Total Cost Projections

The projected benchmark costs based on the recommended levels of service of operating the NRSS over the next twelve years are shown in Table 6-4 below.

Table 6-4: Wastewater 12 Year Operations and Maintenance Projections ($,000)

	1	2	3	4	5	6	7	8	9	10	11	12
	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19
Total Management	107	107	107	127	107	107	127	107	107	127	107	107
Total Financial	921	991	1,038	1,053	1,133	1,159	831	635	702	712	654	309
Depreciation	1,468	1,600	1,678	1,783	1,888	1,926	1,926	2,011	2,097	2,097	2,097	2,097
Total Electricity	566	541	541	566	566	566	566	566	566	566	566	566
TP Maintenance	990	1,060	1,060	1,125	1,125	1,125	1,125	1,475	2,465	2,465	2,465	2,465
PS & RM Maintenance	326	326	326	396	396	396	396	396	396	396	396	396
Total Monitoring	155	129	129	129	190	129	129	129	129	190	129	129
Consultancy	50	50	50	50	50	50	50	50	50	50	50	50
Insurance	40	40	40	40	40	40	40	40	40	40	40	40
Rates	26	26	26	26	26	26	26	26	26	26	26	26
Water Charges	15	15	15	15	15	15	15	15	15	15	15	15
Forestry	1	1	1	1	1	1	1	1	1	1	1	1
Biosolids Disposal	434	434	434	434	434	434	434	434	434	434	434	434
Telephone/Computers	20	20	20	20	20	20	20	20	20	20	20	20
Total Expenses	5,119	5,340	5,465	5,765	5,991	5,994	5,686	5,905	7,048	7,139	7,000	6,655

Figure 6-1: Wastewater Operations and Maintenance – Actuals and Projections



Notes on projections

- Electricity costs have exceeded budget due to the power demand of the aeration basin and ATAD use due to improved solids capture rates
- Treatment plant maintenance exceeded the budget due to ATAD biofilter repairs and contract cost fluctuations
- Biosolids costs exceeded budget due to repairs to the pipeline across the estuary from Bells Island and contract cost fluctuations

6.5 Renewal Strategy

6.5.1 Definition

Renewal expenditure is major work that does not increase the asset's design capacity but restores, rehabilitates, replaces or renews an existing asset to its original capacity. Work over and above restoring an asset to original capacity is deemed to be new capital. Work displaying one or more of the following attributes is classified as rehabilitation or renewal expenditure:

- Works which do not increase the capacity of the asset, i.e. works which upgrade and enhance the assets restoring them to their original size, condition, capacity etc
- The replacement component of augmentation works which increase the capacity of the asset, i.e. that portion of the work that restores the asset to their original size, condition, capacity etc
- Reconstruction or rehabilitation works involving improvements and realignment
- Renewal and/or renovation of existing assets, i.e. restore the assets to a new or fresh condition

6.5.2 Renewals Strategy

NRSBU renewal strategy is in a stage of transition from renewal, based on condition and age, to the strategy based on a combination of the following (PACC):

- Performance
- Asset criticality (using the business and extended asset risk schedules)
- Capacity
- Condition (age data used to estimate condition when condition data not held)

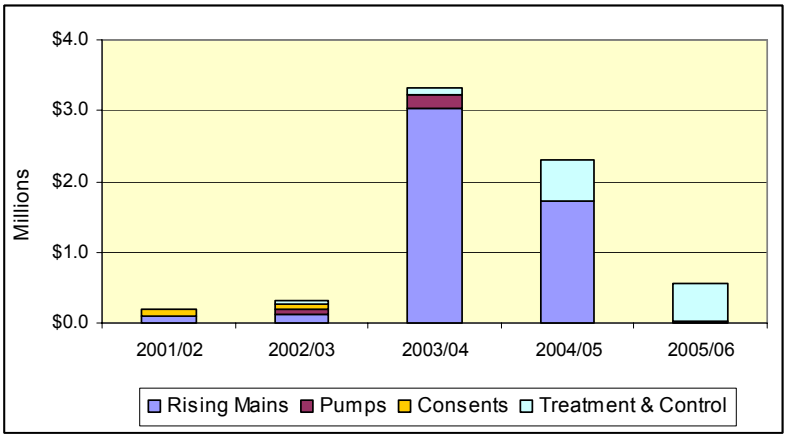
The transition to the PACC strategy will take up to two years to implement **(IP 6 – 1)** as supporting analysis of the above obtained. These will include:

- Field maintenance condition feedback
- Asset failure records
- Pipe sampling programmes
- Specific inspections and condition rating of assets

6.5.3 Actual Renewal Expenditure

The actual renewal expenditure for the period 2001/02 to 2005/06 is detailed below.

Figure 6-2: Renewal Expenditure 2001/02 to 2005/06



6.5.4 Deferred Renewals

This plan indicates no deferred renewals.

6.5.5 12 Year Renewal Plan

The renewal program for 2007/08 to 2018/19 is detailed in Table 6-5 below.

(IP 6.1)

Table 6-5: 12 Year Renewal Plan

	1	2	3	4	5	6	7	8	9	10	11	12
	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19
Miscellaneous	20	20	20	20	20	20	20	20	20	20	20	20
Pump Stations and Rising Mains	173		40	134	109	16	562	11	20	1,105	20	482
Inlet, Aeration Basin, Clarifier and Ponds				12	341	155		9		335	192	0
Solids Handling		390	21		20	80	104	17	232	2,648		261
Rabbit Island					16		10		7	180		
Roads		19										
Consents												300
Total	193	429	81	167	506	271	697	57	279	4,288	233	1,064

6.5.6 Sensitivity on Renewal Plan

The renewals programme is based on a transitional stage as detailed in section 6.5.2 and as this renewal strategy is developed the renewal programme will be reviewed.

6.6 Capital Programme

6.6.1 Definition

New works are those works that create a new asset that did not previously exist or works which upgrade or improve the capacity of pipelines through infill development. They may result from growth, social or environmental needs. Capital expenditure projects display one or more of the following characteristics:

- Construction works which create a new asset that did not previously exist in any shape or form
- Expenditure which purchases or creates a new asset (not a replacement) or in any way improves an asset beyond its original design capacity
- Upgrading works which increase the capacity of the asset
- Construction works designed to produce an improvement in the standard and operation of the asset beyond its present capacity

6.6.2 Capital works Programme 2007/08 to 2016/17

The capital works programme for the 12 year period as outlined in Table 6-6, is based on the following:

- Rising main strategy and duplication/replacement
- Upgrading treatment plant for capacity and treatment
- Biosolids disposal
- Alternative disposal options

Table 6-6: NRSBU 12 Year Capital Upgrade Plan ($,000)

	Total For 12 Years	Notes	Carry 05/06	Budget 06/07	Proj 06/07	1 07/08	2 08/09	3 09/10	4 10/11	5 11/12	6 12/13	7 13/14	8 14/15	9 15/16	10 16/17	11 17/18	12 18/19	Variation +/- %
Pump Stations & Rising Mains																		
Rising Main Study and Strategy	500	1				500												25
New R/M and P/S Richmond to Bells Is	19,500						4,500	5,000	5,000	5,000								25
Liquid waste receiving facility	500	2				500												10 to 25
Bells Island Treatment Plant																		
Clarifier scum removal				30	30													10 to 25
Additional Screening		3		500	500													10 to 25
Outfall Capacity Upgrade	400	4					400											10 to 25
Inlet Load Reduction (primary clarifier)	3,750	5	350		350	3,750												10 to 25
Thickening system	550	6				550												10 to 25
Expand Biosolids Treatment Facilities	1,000	7							1,000									10 to 25
Anaerobic Digestion and Co-generation	7,150	8										650	6,500					25
Nitrogen Removal	3,500	9												3,500				25
Phosphorus Removal	500													500				25
Pond Desludging	1,000													1,000				10 to 25
Boat	8	10				8												10 to 25

	Total For 12 Years	Notes	Carry 05/06	Budget 06/07	Proj 06/07	1 07/08	2 08/09	3 09/10	4 10/11	5 11/12	6 12/13	7 13/14	8 14/15	9 15/16	10 16/17	11 17/18	12 18/19	Variation +/- %
Biosolids Facility																		
Forest Planting (Bells)	15									15								10 to 25
Resource Consent		11	70		70													5
Mixers		12	25		25													5
Power Supply		13		140	140													5
TOTAL	38,373		445	670	1,115	5,308	4,900	5,000	6,000	5,015	0	650	6,500	5,000	0			

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6.6.3 Notes as detailed Table 6-6

Refer to Section 6.5.6 for sensitivity of Capital Upgrade Plan
This scenario above is based on achieving the variation to the biosolids consent, if not, the nutrient removal plant installation will need to be brought forward, with associated O&M costs.

1 The pipeline across the estuary has been assessed as an extreme risk and there are potential capacity issues in the near future.

2 Recent monitoring of Liquid Waste discharged at Bells Island has revealed that this source is significantly higher in load and volume than anticipated, overwhelming the recently constructed septage receiving facility and resulting in load spikes which are adversely affecting the treatment plant. It is now recommended that an off site facility be constructed. Will require telemetry, smart card recording, automated screening and composite sampler.

3 Additional screening, to existing step screen, to improve capture of fibres

4 The outfall is not capable of discharging design flows and in storm events it takes several days, at time weeks, to reduce pond levels to normal, which creates a risk of overflows. As discharges to the plant increase the issue becomes more critical and already in the recent past a retrospective consent has been required for pond overflows and an emergency discharge consent to allow extended discharges to provide buffer storage in the ponds for rainfall events.

5 The treatment plant us currently at or very close to BOD capacity and requires additional infrastructure to ensure odour control and compliance with conditions of consent. Will include design of screening and thickening facilities.

6 This is subject to obtaining a resource consent to increase biosolids application rates on Rabbit Island at year 6 and 9 and to apply biosolids to Rough Island. It is an interim measure to delay the need to install a BNR plant

7 Additional ATAD tank required to accommodate growth. At this stage the Board are discussing converting the solids treatment facility to an anaerobic system when the rest of the ATAD tanks reach the end of their economic life. This project may be brought forward instead of adding an additional tank.

8 Once ATAD tanks have reached the end of their economic lives the opportunity exists to investigate other options which may be more sustainable.

9 Removal of nitrogen to ensure compliance with coastal permit and to ensure adequate land available for biosolids application. The timing of this is yet to be confirmed and is subject to successfully obtaining the biosloilds resource consent and evaluating the effect of the final consent obtained.

10 Motor boat required to service equipment on ponds, service air valves on Saxton Island and access Bells Island on high tides, currently sharing a boat with NCC but with increased use by Parks and Reserves often not available when required and with NNWWTP coming on line this year the situation will get worse.

11 Resource consent to double application of biosolids and apply biosolids after harvesting with grass seed planting - Not Budgeted

12 Mixers required to stop biosolids settling out and blocking pipes and pumps, delayed due to issues with current mixers.

13 Power supply to replace generator and allow continuous mixing and aeration of biosolids, needed to reduce risk of odour generation from biosolids, yet to be confirmed following an economic analysis

6.6.4 Sensitivity on Capital Plan

The capital plan has varying sensitivity as the programme is been derived from different areas with greater design requirements and information available for projects with low sensitivity. The sensitivity is only for budget items from 2007/08 onwards and the sensitivity is as follows:

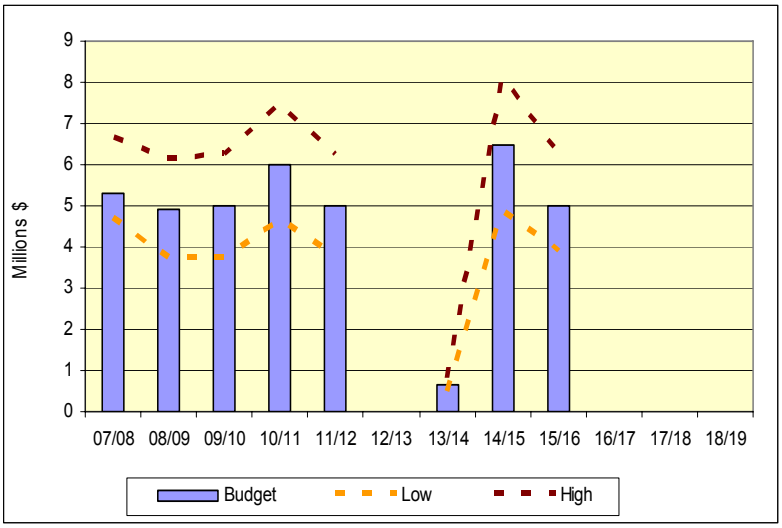
- Concept +/- 25%
- Initial & Planning +/-10 to +/- 25%
- Execution +/- 5%

Sensitivity	Capital Project Area	Reasons
Low Sensitivity	Treatment Plant Upgrades	Treatment upgrades that are detailed in the Treatment Capacity Report dated November 2006 Known flow & loading requirements of the five contributors
	Nitrogen removal	Medium level of confidence in obtaining resource consents
Medium	Rising main duplication	No design yet carried out
	Pump station storage	No design yet carried out
High	Reuse of treated effluent	Strategy consideration

Table 6-7 Sensitivity on Capital Plan ($,000)

	Capital Requirement	+/- % Variation	Low Sensitivity	High Sensitivity
Pump Stations & Rising Mains				
Rising Main Study and Strategy	500	25	375	625
New R/M and P/S Richmond to Bells Is	19,500	25	14,625	24,375
Liquid waste receiving facility	500	10 to 25	450	625
Bells Island Treatment Plant				
Outfall Capacity Upgrade	400	10 to 25	360	500
Inlet Load Reduction (primary clarifier)	3,750	10 to 25	3,375	4,688
Thickening system	550	10 to 25	495	688
Expand Biosolids Treatment Facilities	1,000	10 to 25	900	1,250
Anaerobic Digestion and Co-generation	7,150	25	5,363	8,938
Nitrogen Removal	3,500	25	2,625	4,375
Phosphorus Removal	500	25	375	625
Pond Desludging	1,000	10 to 25	900	1,250
Boat	8	10 to 25	7	10
Biosolids Facility				
Forest Planting (Bells)	15	25	11	19
TOTAL	38,373		29,861	47,966

Figure 6-3: Overall Capital Cost Variations



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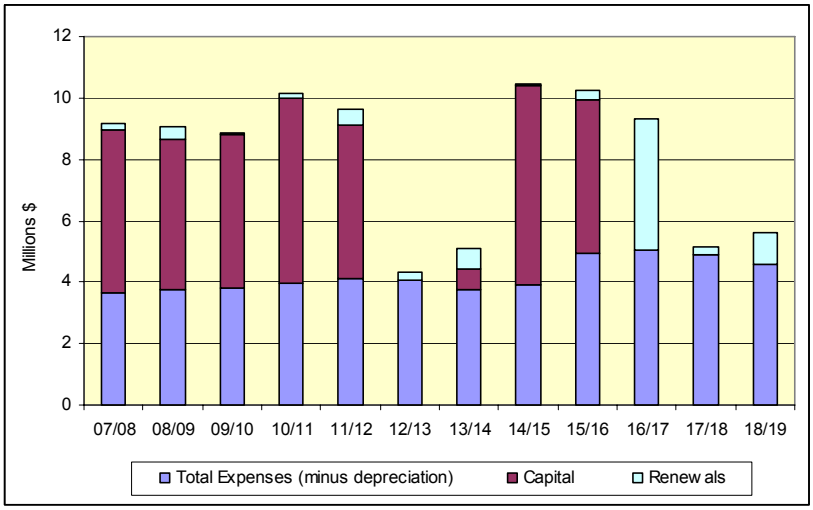
6.7 Financial Summary

The following is as 12 year summary of the total costs associated with the operation and management of NRSBU.

Table 6-8 Financial Summary



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6.8 Assumptions and Uncertainties

Table 6-9 details possible and actual significant forecasting assumptions and uncertainties relating to the NRSBU wastewater system.

Table 6-9 Significant Forecasting Assumptions and Uncertainties

No.	Assumption	Degree of Risk or Uncertainty	Likely Impact if the Assumption is (or is Not) Realised or is Not Acceptable
1	Interest rates for new loans raised, or existing debt refinanced during the years are forecasted as about 7.1%	Low	Level of debt is moderate. Interest costs are not expected to vary significantly
2	Growth is based on figures provided by the individual contributors	Low	Any significant increase in the growth may require upgrading of treatment plants to occur at an earlier stage than presently proposed
3	The actual remaining lives of assets will not deviate significantly from those contained in the asset valuation	Medium	Changes in estimated asset lives could lead to significant changes in asset renewal projections, depreciation and renewal budgets
4	The replacement values are a realistic cost and have taken into consideration engineering fees, resource consents etc	Low	Replacement values have gone through a review process
5	Upgrade/capital estimates are as follows: • Concept +/- 25% • Initial & Planning +/-10 to +/- 25% • Execution +/- 5%	Medium	Costs of upgrades are estimated only without detailed project planning
6	Maintenance cost of service for Reticulation and Treatment will be within -5% and +10% of budget	Low	Historically maintenance costs % variations for treatment have been low
7	Depreciation based on estimated useful lives not on condition of pipework	Medium	If proposed condition assessments indicate that Councils mains have decreased useful lives, depreciation presently taken will be less than that required for replacement
8	At the time of finalising this AMP a major error in the Airport pump station flow meter was discovered, which is likely to impact on load and flow projections for this site and possibly even some of the upgrade design assumptions such as timing of upgrades and sizing of the components. This issue is unlikely to be resolved until all Contributor Contracts are finalised	Medium	Likely to impact on load and flow projections for this site and possibly even some of the upgrade design assumptions such as timing of upgrades and sizing of the components

6.9 Asset Disposal Plan

If pipes are left in the ground, they are usually sealed at the connections and backfilled with cement grout apart for those located within the estuary.

Mechanical equipment that has been replaced will be reused for parts or sold as scrap metal unless it is considered to have genuine resale value. In this case, the piece of surplus equipment will be sold with income directed to the NRSBU account.

Consideration will be required in the long term on the restoration of the existing treatment plant and pond system if the treatment and disposal system is relocated to a land based system.

7.0 ASSET MANAGEMENT PRACTICES

7.1 Advanced Asset Management

Asset Management Gap Analysis is carried out every three years by the NCC Infrastructural Assets Business Unit. The January 2006 assessment indicated that the NRSBU asset management was about 90% of the "advanced" criteria. The intention to achieve an increased level of advanced asset management (the gap) by July 2009 but there is no requirement to achieve advanced asset management in all areas.

NCC will instigate a programme detailing the resource requirements to achieve required level of asset management by 2009. **(IP 7 – 1)**

Table 7-1: NRSBU Advanced Asset Management Gap Analysis

	Practice	Gap	Comment
1	- A reliable *physical* inventory of assets at both an individual asset level and at a network level. This would include:		
	-physical attributes such as location, material, age etc.	No	All such data should be in GIS, asset register or Hansen
	-systematic monitoring and analysis of physical condition for critical assets.	Yes	There is no formalised system of monitoring condition, left to Contractors to report on issues.
	-systematic measurement of asset performance (including utilisation/capability) for critical assets	Yes	In the process of identifying asset load and flow limits to set benchmarks for performance. Performance of Contributors is monitored and reported on to the Board
2	The assumptions underpinning financial forecasts should be disclosed in the organisations strategic plans and AM plans	Yes	Intend to include significant assumptions in AMP such that consequences of change can be identified and reported on
3	Have degrees of confidence on the reliability of data as follows: - Physical Inventory data: Grade 1 - Condition data: Grades 2 - Performance data: Grades 2	Yes	All critical assets to be identified and then these confidence levels to be identified for critical assets
4	AM planning will state what needs to be done to improve AM processes and techniques. Improvement programmes will outline: - the weak areas and how these will be addressed - the timeframe over which the improvements will take place - the resources (human and financial) needed, and - key performance indicators (KPIs) for monitoring AM improvement	Yes	NRSBU will instigate a programme detailing the resource requirements to achieve required level of asset management by 2009

	Practice	Gap	Comment
5	Risk management for critical assets will encompass: - identification of strategies - failure mode and effects analysis - integration to disaster recovery plans (eg lifelines) and business continuity plans - the link to optimised decision making on maintenance and replacement strategies	Yes	 Done, but will be updated Done Need integration with lifelines, etc Addressed in AMP
6	Identify all critical assets and then apply optimised decision making techniques only to these critical assets	Yes	Risk assessment done but need to identify critical assets.
7	The ability to predict, by applying models and past data, robust and defensible options for asset treatments that assist in achieving optimal costs over the entire life cycle of the asset or network, including: - Applying appropriate economic evaluation tools (or other Council-endorsed prioritisation systems) in developing short-term project lists - Using predictive modelling techniques to provide defensible long-term financial forecasts	Yes	 Discounted Cash Flows (or NPV) evaluations done on some capital expenditure decisions, very few other economic tools used Wastewater network model is now available to run reticulation upgrade scenarios but need to improve growth prediction models. Alternatively, could rely on projections from Contributors Need to identify what predictive models (economic and capacity) are available and will meet NRSBU requirements

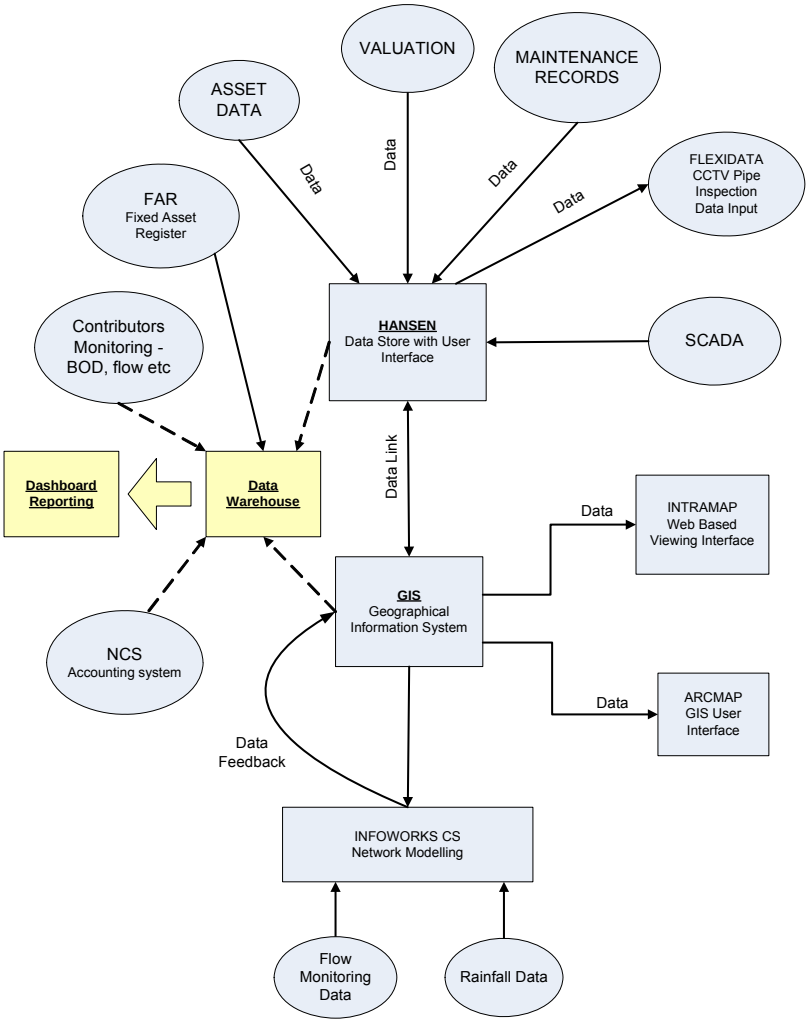
7.2 Information Systems

All asset information is stored on Arcinfo, a computer based geographical information system (GIS), and Hansen Asset Management System (Hansen). The accounting system used is integrated computer software supplied by Napier Computer Systems (NCS). An overview of the asset information system in its existing state and future state is depicted in Figure 7-1 below.

The warehousing of specific data and the instigating of dashboard reporting in the future will have the benefits of:

- Enhanced management reporting
- Assist in the mitigation associated with succession planning

Figure 7-1: Asset Information Systems



7.3 Accounting and Financial Systems

7.3.1 Background

Accounting is currently carried out to Generally Accepted Accounting Principles (GAAP) to comply with the Local Government Act 2002. The Nelson City Council uses integrated computer software supplied by Napier Computer Systems (NCS). The General Ledger is linked to packages that run Debtors, Creditors, Banking, Rates, Fixed Assets, Invoicing, Water Billing, Job Costing, and Payroll. Internal monthly financial reports are generated by Council significant activity and sub-activity categories. External financial reports by significant activity are published in the annual report.

7.3.2 Definition of Expenditure Categories

Expenditure for the wastewater system can be divided into two broad categories:

- Day to day operations and maintenance works, and
- Programmed works that upgrade or renew the asset to maintain a level of service

All expenditure on infrastructure assets falls into one of three categories:

- Operations and Maintenance Expenditure
- Capital Expenditure – renewals
- Capital Expenditure – new or upgraded assets

7.3.3 Maintenance Expenditure

Maintenance may be planned or unplanned and is the regular day to day work necessary to keep assets operating, including instances where parts of the asset fail and need immediate repair to make the asset operational again. This includes:

- Regular and ongoing annual expenditure necessary to keep the assets at their required service potential
- Day to day and/or general upkeep works designed to keep the assets operating at required levels of service
- Works which provide for the normal care and attention of the asset including programmed repairs and minor replacements of sub-components (ie asset components not individually listed in asset register)
- Unplanned (reactive) maintenance, i.e. isolated failures requiring immediate repair to make the asset operational again

7.3.4 Capital Renewal/Replacement Expenditure

Renewal expenditure is major work that does not increase the asset's design capacity but restores, rehabilitates, replaces or renews an existing component to its original capacity. This includes:

- Works that do not increase the capacity of the asset but restores them to their original size, condition capacity, etc
- Reconstruction or rehabilitation works involving improvements and realignment
- Renewal and/or renovation of existing assets, restoring the assets to a new or fresh condition consistent with the original asset

7.3.5 Capital Creation/Upgrading Expenditure

Capital works create a new asset that previously did not exist, or upgrade or improve an existing asset. They may result from growth, social or environmental needs. This includes:

- Expenditure which purchases or creates a new asset (not a replacement) or in any way improves an asset beyond its original design capacity
- Upgrading works which increase the capacity of the asset
- Construction works designed to produce an improvement in the standard and operation of the asset beyond its present capacity

7.3.6 Depreciation and loss of Service Potential

Depreciation and Loss of Service Potential are calculated via the fixed asset register (FAR) using a spreadsheet. Due to the limited number of assets owned by NRSBU a spreadsheet system is considered the most appropriate and cost effective solution.

7.4 GIS

7.4.1 Background

When the decision was made to implement the GIS in 1993, NCC recognised that the existing asset information was not of a suitable standard to be entered directly into the system. A contract was let for the capture and delivery of data in digital format suitable for entry into the GIS system.

The data capture included contours, building outlines, road markings, kerb and channel, manholes, sumps, valves etc. To ensure that underground services were captured as accurately as possible, a field survey team was employed to identify and mark every surface access point (e.g. manholes, valves).

The data was captured using photogrammetry in March 1994 and progressively delivered over the following three years. Nelson City Council staff carried out accuracy checks on the geographical co-ordinate data supplied, searched all the engineering plans and field books for information on pipe alignment, material and age and entered this information into the GIS.

7.4.2 Accuracy Limitations

The data captured by photogrammetry was required to be accurate to within a tolerance of +/- 0.3m. In streets where surface openings could not be seen from the air (e.g. under verandas or trees) the points were picked up by the contractor's field survey team.

In other less accessible areas, it was not considered economic to search for buried fittings. Instead, the best estimated position was entered and the accuracy limitation flagged. Similarly, only limited fieldwork has been done to confirm the pipe material and sizes. The accuracy of this information will be verified through time with the introduction of asset data collection procedures.

7.4.3 Maintenance of GIS Data

Procedures are in place to update new data into the GIS system on a monthly basis via NCC engineering staff.

Council's Engineering Standards require that any work on a Council sewer must be proposed to Council by means of an engineering plan for approval and an "As-built" record submitted at the completion of works.

The design/build/operate contract required implementation of the Hansen AM system. The contractor employs a part time administrator on Bells Island who has implemented and operates the Hansen AM system for all data associated with maintenance contract.

Data on assets associated with renewal and upgrade capital are now updated into the asset register by NCC Engineering and Finance staff. This ensures a high level of reliability.

7.5 Modelling

Modelling has been carried out for all four components of the system (pumping, rising mains, treatment and disposal) and normally been associated with planned upgrades.

The simplicity of the pumping and rising mains associated with the NRSBU means that this modelling can be carried out without sophisticated proprietary systems.

The existing treatment plant has been modelled in association with the Bells Island WWTP Treatment Plant Capacity report that used actual flow and loadings to understand the limiting capabilities of each unit operation.

The modelling for disposal of biosolids to the afforested land on Rabbit Island is based on evidence presented for the resource consent in 1994 and the varying of the consent in 2003.

7.6 Information Flow Requirements and Processes

7.6.1 Existing Information Flow and Business Processes

In June 2000, Opus International Consultants Ltd completed a report entitled "The Development of Business Process Mapping for Asset Management Systems" preparatory to Nelson City Council purchasing and implementing a computer-based Asset Management System. The report details the existing business processes used by the Nelson City Council in its asset management planning.

The report identified a preferred process for the management of Council assets and identified gaps in the current process for each asset group and recommended actions required to correct the gaps and implement the transition to the preferred management process. The report concluded that the majority of data required for asset management is already collected and stored. However, the data is stored in a myriad of systems and files and is therefore not extensively used to support the asset management planning decision making processes. This has now been partially remedied by the implementation of the Hansen Asset Management System. The use of dashboard reporting and associated data warehousing will help to resolve this issue.

7.7 Asset Management System

7.7.1 Background

In 2000 the Hansen Asset Management System was selected as best suited to meet the future asset management planning requirements of Council.

The Hansen system provides the following key features that have enabled:

- Customer enquiries being logged directly and sent immediately to the contractor for action
- Contractor directly enters resolution confirmation at completion of job
- Tracking of expenditure on assets to allow assets that have a disproportionately high maintenance cost to be identified - upgrade or renewal can then be prioritised

The use of Hansen for reporting on performance to ensure levels of service are met will be incorporated into 2007.

7.8 Criticality in Asset Management

Criticality can be readily aligned with the 4 well beings under the LGA 2002 and by using these categories an assessment process can be promoted. Once the criticality of an asset has been determined the ranking (criticality) can then determine the intervention points for assets. Potential intervention points are:

- Operation and maintenance planning
- Priorities for collecting and determining the required level of reliability of data for AM systems

- Priorities for undertaking condition assessments
- Adjusting economic lives with respect to renewal profiles
- Prioritising/Deferring renewals
- Prioritising expenditure
- Prioritising levels of service reviews
- Assessment of risk

A criticality assessment of all assets will be instigated in 2007 and a review of the priorities for collecting and determining the required level of reliability of data for AM systems will be carried out consecutively.

7.9 Dashboard Reporting

Dashboard reporting is a methodology to allow continuous monitoring of performance. The dashboard is software that looks just like what it's called: a graphic display that can be structured like an automobile speedometer or to individual's requirements and provides an ongoing display of operating and financial data. A dashboard reporting process can provide an overview of NRSBU status, overall direction and trends. **(IP 7- 2)**

The objectives for dashboard reporting are:

- Better management - By being better informed
- Compliance – Ensuring that legislative and KPI requirements are being met
- Risk management – Through knowing what is occurring or trending indicates and succession planning
- Economics – Through timely intervention
- Accountability - Ensuring that maintenance contractors, Council staff and management are shown to be responsible
- Accomplishment – By indicating that Council, staff and maintenance contractors are achieving their goals and objectives

7.10 Asset Management Processes

The table below sets out the current state of Council's Asset Management existing business processes and the desired business processes that Management intend to develop in the next three years.

Table 7-2: Level of Current Business Process

Current Business Process	key	Attention Required by	Response Required
Requires attention		NRSBU Board	Action plans and management responsibility specified
Basic		NRSBU General manager	Management responsibility specified
Appropriate best practice		Specific monitoring or response procedures	Management responsibility specified
Comprehensive		Routine procedures	unlikely to need specific application of resources

Table 7-3: Management Business Practices

Process	Desired Business Processes	Current Business Processes	Competence	IP Item	3 Year Target
Level of Service	Contributor consultation results incorporated into levels of service	A stated level of service	Comprehensive		
	High level performance measures with associated technical KPI to enable compliance reporting	High level KPI's defined and processes developed to measure and report on these	Comprehensive		
	Customer feedback surveys	Customer feedback survey for ascertaining performance levels	Comprehensive		
Organisation issues	Corporate sponsorship and commitment through out senior management	High level of corporate sponsorship	Appropriate Practice		
	High level of staff skills and on going training programmes	High level of skills	Appropriate Practice		
Knowledge of Assets	Comprehensive data collection system for consultants and contractors	Data capture programme for validation of GIS network database in place	Appropriate Practice		
		Process in place for new as-builts,vested assets to be entered into GIS and IMS database			
Condition Assessment	Inspection programme cycles based on criticality and condition	Inspection programme cycles based on criticality and condition	Appropriate Practice		

Process	Desired Business Processes	Current Business Processes	Competence	IP Item	3 Year Target
	Use of industry documents (condition rating manual)	Condition rating manual used in condition assessments			
Risk Management	Critical assets monitored and failure modes understood	Risk management is practised informally, based on the knowledge of General manager	Basic	IP 4 – 1 & 4 - 10	Best Practice
Accounting / Economics	Level of deferred maintenance identified through condition rating	No deferred maintenance identified	Appropriate Practice		
	Valuation optimised by criticality, capacity and system redundancy	Valuation based on optimised replacement costs assuming the use of modern techniques and pipe materials	Appropriate Practice		
Maintenance	Measurement of actual performance against level of service indicators	Measurement of actual performance against level of service indicators	Appropriate Practice		
	Performance outcomes included in maintenance agreement	Performance outcomes included in maintenance agreement	Appropriate Practice		
Performance Monitoring	Range of performance standards developed for service delivery contracts	Range of performance standards developed for service delivery contracts	Appropriate Practice		
Optimised Life Cycle Strategy	10 year renewal programme with budgets based on predicting failure for critical assets, replacement on failure of non-critical assets	10 year renewal programme with budgets based on asset age and knowledge of plant operators and general manager	Basic	IP 6-1	Appropriate Practice
	Life cycle and risk costs considered in optimisation process	Life cycle and risk costs informally considered in optimisation process	Basic	IP 6-1	Appropriate Practice
Design, Project Management	Document design and project management procedures.	High level of contract management procedures defined	Appropriate Practice		
	Improved contract management with quality assurance programmes	High level of contract management with quality assurance procedures	Appropriate Practice		
QA / Continuous Improvement	System of quality checks on work activity and data collection in place	Some inspection of work undertaken but no formal process for quality assurance	Basic	IP 4-2	Appropriate Practice

8.0 AMP PLAN IMPROVEMENT AND MONITORING

8.1 General

An important component of this Asset Management Plan is the recognition that it is a "live" document in need of monitoring, change and improvement over time.

NRSBU AMP is a regularly revised and evolving document and will be reviewed annually and updated at least every three years. The AMP will be developed throughout its life cycle as further information about the wastewater system assets are collected in terms of condition, performance and service delivery. NRSBU is committed to advanced data collection and management systems that will allow for a greater appreciation of the performance and condition of the NRSBU assets.

The effectiveness of the Wastewater Asset Management Plan will be monitored in various ways and the results used in the updating and revision of the Plan as described below.

8.2 Performance Monitoring and Management

The effectiveness of the Asset Management plan will be monitored by the following procedures that will in the future use the dashboard reporting system:

- Levels of Service performance reporting to the NRSBU Board on a quarterly basis
- Quarterly reporting on the improvement plan and action plan to the NRSBU Board
- Operations reports on a daily, weekly and monthly basis
- Environmental reporting on a monthly basis

The continued monitoring of these performance measures and ongoing analysis of results will result in:

- Optimisation of expenditure through the asset lifecycle
- Service levels actively monitored and reported on
- Management of risk and control of failures

8.3 Improvement Programme

The NRSBU Improvement Plan **(AP 8.1)** as detailed in Table 8-1 is focused on the following key areas:

- Scheme knowledge update
- Renewals
- Enhanced Maintenance
- Asset Management

Table 8-1: Improvement Programme

IP Number	Description	Completion Date
2 - 1	The annual survey will be revised sent out in March, allowing contributors to base their replies on three-quarters of the year's performance	March 2008
3 - 1	The ingress of stormwater into the sewer system through direct inflow and infiltration known as I/I will be discussed with NCC and TDC and addressed in the current contributors review	Ongoing
3 - 2	Identify reason for TDC non compliance with current limits which appear to be Industry based and discuss relationship of TW Bylaw limits with NRSBU discharge limits	December 2007
3 - 3	Review Contract agreements to address: - Enforcement of limits - Tolerance levels for compliance - QA/QC of onsite processes to ensure compliance - Contingencies plan to manage non-compliances	June 2007
3 - 4	Discuss and review non asset solutions with Contributor User Group to consider reducing Trade Waste limits further (increasing onsite management requirements)	June 2007
4 - 1	The Business and Asset Risk Control Schedules will be updated on a regular basis, to ensure that all risks are relevant and understood	Ongoing
4 - 2	The existing maintenance schedules and procedures, quality/procedure, decision making process, contingency and operation and maintenance manuals are to be formalised, updated where required	September 2007
4 - 3	Business Continuity Plan to be completed	December 2007
4 - 4	Review adequacy of the NRSBU insurance cover for activity	June 2007
4 - 5	Ensure Lifelines Plan up to date and identified risks and mitigation works are programmed into capital works programme	June 2008
4 - 6	Consider benefits of succession planning and how it might be implemented	June 2008
4 - 7	High level of acceptance for long term strategy by Board	June 2007
4 - 8	Review of security required at all facilities	December 2007
4 - 9	Instigate procedure to ensure individual contributors are invoiced for exceeding their allowed flows /capacity	June 2008
4 - 10	Instigate risk assessment at component level and maintain Asset Risk Schedules with reviewing and reporting on an six monthly basis	December 2007
4 - 11	Introduce long-term replacement strategy for rising mains	June 2007
4 - 12	A programme of regular pipe inspections of risk areas to be developed	June 2008
6 - 1	Renewal strategy will be based the strategy based on a combination of the following (PACC): • Performance • Asset criticality (using the business and extended asset risk	June 2009

IP Number	Description	Completion Date
	schedules) • Capacity • Condition The transition to the PACC strategy will take up to two years to implement as supporting analysis of the above obtained	
7 - 1	NRSBU will instigate a programme to achieve required level of asset management by 2009	June 2009
7 - 2	A dashboard reporting process to be instigated to provide an overview of NRSBU status, overall direction and trends	September 2007

8.4 Monitoring and Review Procedures

8.4.1 Asset Management plan Review

The plan will be reviewed annually and revised every three years to incorporate improved decision making techniques, updated asset information, and NRSBU policy changes that may impact on the levels of service.

8.4.2 Statutory Audit

The Local Government Act requires that an independent, annual, financial audit of the operations of the NRSBU be carried out.

8.4.3 Internal Audit

Annual internal audits will be taken to assess the effectiveness of the plan in achieving its objectives. The internal audit will also assess the adequacy of the asset management processes, systems and data.

8.4.4 Benchmarking

Bench Marking (trending) of the Activity is to be instigated to give the Manager increased understanding of:

- The efficiency and efficiency variations of individual activities
- Effects of any programmes instigated by the Asset Management Plan
- Operating costs over range of individual activities

Examples of types of benchmarking that are to be considered include:

- Tracking progress
- Responsiveness to service calls
- Operation costs i.e. $/m/year
- Energy costs

As trending is obtained and implications understood the benchmarking can be used for additional or revised Levels of Service and can be incorporate into the dashboard reporting.

The Aim of NRSBU is to be ranked in the top 80% of Local Authorities for benchmarking when system becomes operative (presently being instigated by NZWWA with run out date of early 2007). **(AP 7.1)**

9.0 ACTION PLAN

9.1 Explanation

Throughout this Wastewater Asset Management Plan, objectives, targets, capital works, maintenance and improvements to general business processes are referred to. Table 9-1 details the 2003 AMP Action Plan and Table 9-2 brings all of these initiatives together to clearly identify the actions required for the successful implementation of the Asset Management Plan.

The AMP will be reviewed in late 2008 to align with the NCC and TDC LTCCP. The review will include Levels of Service, Emergency Management, Lifecycle Management and Asset Management Practices. **(AP 7.2)** The review will also include consideration of the following:

- Reticulation strategy
- Anaerobic treatment and co-generation
- Recent treatment plant design and progress in construction
- General consent compliance
- Contributor contracts
- 2007 valuation

Table 9-1: Previous Action Plans

ID	Action	Completion Date	Completed	Comments
1.0	Levels of Service			
1.1	Implementation of system to measure the NRSBU's performance against the recommended levels of service as identified under Section 3 of the asset management plan	July 2004	Partially	Little historical data to date
1.2	Finalise the Bells Island WWTP Upgrade and NRSS Operation and Maintenance Contract	July 2004	Yes	
1.3	Finalise contributor contracts that will set defined quantities and characteristics of effluent accepted from contributors	Dec 2003	Partially	Four of the five contributors are signed off
1.4	Development of Hansen for recording of maintenance histories, asset data, and other asset management information	Operational July 2004	Yes	
2.0	Demand Management			
2.1	Continue to analyse future population trends and growth and determine the impact on the capacity of all rising mains, pump stations and treatment plant. Especially monitor the likelihood of the proposed change to the zoning of the area west of Richmond to Rural 3 zone and other residential and industrial zone changes within NCC and TDC likely to impact on growth scenarios. This analysis will be used to recommend the planning and programming of future upgrade requirements	Yearly	Yes	Agreements with individual contributors that defines their future requirements
3.0	Risk Management			
3.1	Review risk profiles of identified events to take cognisance of any changes to	Yearly	No	

ID	Action	Completion Date	Completed	Comments
	operational procedures or the implementation of new capital projects			
3.2	Replacement of all remaining sections of AC pipe	July 2004	Yes	
3.3	Introduce long-term replacement strategy of affected rising mains and duplication of rising mains to ensure redundancy in the event of a failure, including the options of the Richmond to Bells Island alternative pipeline	July 2006	Yes	Long term strategy report received in October 2006
4.0	Life Cycle Management			
4.1	Record the ongoing maintenance history of the NRSS network to assist with identifying problematic areas to enable planning and programming of upgrade requirements	Ongoing	Yes	All data going into Hansen
4.2	On completion of the wastewater treatment plant upgrades update the operational limits and analyse the reliability and capacity trends to assist with programming future works	July 2005	Yes	Long term strategy report received in October 2006
5.0	Asset Management Plan Review	July 2006	No	To be completed by December 2006, delay due to delay in obtaining long term strategy report

Table 9-2: 2006 – 2017 Action Plan

Section	AP	Action	Completion Date	Comments
2	Levels of Service			
	2.1	Annual survey	March each year	
3	Demand Management			
	3.1	Determine factors affecting treatment plant location and implications of those factors	June 2007	
	3.2	Identify possible future treatment plant sites	December 2007	
	3.3	Designate a site for a future treatment plant	June 2013	
	3.4	Upgrade strategy for treatment plant over the next 10 years is implemented as approved by the owners (NCC and TDC)	Ongoing	
	3.5	Extending/renewing the Memorandum of Understanding that expires in 2010	2008/09	
	3.6	Rising main strategy that will encompass the risks associated with peak flows from the individual contributors	Dec 2008	
	3.7	Implement Treatment plant upgrades		
		- Install thickening system	2007	
		- Install the Primary Clarifier system	2007	
		- Septic tank reception upgrades	2007/08	
		- Outfall upgrade	2008/09	
		- Replace ATADS with Temperature Phased	2014/15	

Section	AP	Action	Completion Date	Comments
		Anaerobic Digestion system		
		- Additional TKN removal device	2015/16	
	3.8	Confirm future demand requirements from 5 contributors (10 and 20 yr)		
	3.9	Review Improvement Plan, consider and if appropriate prioritise and move to action.		
4	Risk Management		March 2008	
	4.1	Risk assessment	December 2007	
	4.2	Asset Risk Schedule be further developed to a component level i.e. pumps, electrical, controls etc	March 2008	
	4.3	Emergency spillage contingency plans and alarms procedures reviewed	December 2008	
6	Financial			
	6.1	Renewals	Ongoing	
	6.2	Valuation	June 2007	
	6.3	Business Continuity Plan updated	Dec 2008	
7	Asset Management			
	7.1	Instigate benchmarking	December 2007	Dependent on NZWWA
	7.2	AMP updated	May 2007 Late 2008	
8	AMP Improvement and Monitoring			
	8.1	AMP improvement items	As detailed in Improvement Plan	

9.2 Action Plan Implementation

The following table indicates the possible time lines for the individual improvement items over the following 3 years.

	2007												2008												2009				
Project Description	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M
2009-2019 Community Plan																													
Install thickening system																													
Additional Screening																													
Install the Primary Clarifier system																													
Septic tank reception upgrades																													
Outfall upgrade																													
Replace ATADS with Temperature Phased Anaerobic Digestion system																													
Additional ammonia removal device from AD system																													
Renewals programme																													
2007 valuation																													
Annual survey																													
Extending/renewing the Memorandum of Understanding that expires in 2010																													
Rising main strategy																													
Rising main duplication																													
Determine factors affecting treatment plant location and implications of those factors																													
Identify possible future treatment plant sites																													
Designate a site for a future treatment plant																													
AMP updated																													

Key	Design	Construction and implementation	To be instigated after 2009

SECTION 3

10.0 APPENDIX A - GLOSSARY OF TERMS

Term	Definition
Activity	The work undertaken on an asset or group of assets to achieve a desired outcome
Advanced Asset Management	Asset management which employs predictive modelling, risk management and optimised renewal decision making techniques to establish asset lifecycle treatment options and related long term cashflow predictions. (See Basic Asset Management)
Annual Plan	The Annual Plan provides a statement of the direction of Council and ensures consistency and co-ordination in both making policies and decisions concerning the use of Council resources. It is a reference document for monitoring and measuring performance for the community as well as the Council itself
Annual Report	The audited report published annually (by 30 November) which provides information on how the Local Authority has performed with respect to its policies, objectives, activities, targets, budgets and funding proposals
Asset	A physical facility of value which enables services to be provided and has an economic life greater than 12 months
Asset Management (AM)	The combination of management, financial, economic, engineering and other practices applied to physical assets with the objective of providing the required level of service in the most cost effective manner
Asset Management Plan	A plan developed for the management of one or more infrastructure assets that combines multi-disciplinary management techniques (including technical and financial) over the lifecycle of the asset in the most cost effective manner to provide a specified level of service. A significant component of the plan is a long term cashflow projection for the activities
Asset Management Strategy	A strategy for asset management covering, the development and implementation of plans and programmes for asset creation, operation, maintenance, renewal, disposal and performance monitoring to ensure that the desired levels of service and other operational objectives are achieved at optimum cost
Asset Management System (AMS)	A system (usually computerised) for collecting analysing and reporting data on the utilisation, performance, lifecycle management and funding of existing assets
Asset Management Team	The team appointed by an organisation to review and monitor the corporate asset management improvement programme and ensure the development of integrated asset management systems and plans consistent with organisational goals and objectives
Asset Register	A record of asset information considered worthy of separate identification including inventory, historical, financial, condition, construction, technical and financial information about each
Asset	A physical component of a facility which has value, enables services to be provided and has an economic life of greater than 12 months
Benefit Cost Ratio (B/C)	The sum of the present values of all benefits (including residual value, if any) over a specified period, or the life cycle of the asset or facility, divided by the sum of the present value of all costs
Business Plan	A plan produced by an organisation (or business units within it) which translate the objectives contained in an Annual Plan into detailed work plans for a particular, or range of, business activities. Activities may include marketing, development, operations, management, personnel, technology and financial planning
Cash Flow	The stream of costs and/or benefits over time resulting from a project investment or ownership of an asset
Components	Specific parts of an asset having independent physical or functional identity and having specific attributes such as different life expectancy, maintenance regimes, risk or criticality
Condition Monitoring	Continuous or periodic inspection, assessment, measurement and interpretation of resulting data, to indicate the condition of a specific component so as to determine the need for some preventive or remedial action
Consequence	The outcome of an event expressed qualitatively or quantitatively, being a loss, injury, disadvantage or gain. There may be a range of possible outcomes associated with an event

Term	Definition
Critical Assets	An asset where failure would have significant consequences, either in the ability of the system to provide service to customers or the effect on the environment
Current Replacement Cost	The cost of replacing the service potential of an existing asset, by reference to some measure of capacity, with an appropriate modern equivalent asset
Deferred Maintenance	The shortfall in rehabilitation work required to maintain the service potential of an asset
Demand Management	The active intervention in the market to influence demand for services and assets with forecast consequences, usually to avoid or defer CAPEX expenditure. Demand management is based on the notion that as needs are satisfied expectations rise automatically and almost every action taken to satisfy demand will stimulate further demand
Depreciated Replacement Cost (DRC)	The replacement cost of an existing asset after deducting an allowance for wear or consumption to reflect the remaining economic life of the existing asset
Depreciation	The wearing out, consumption or other loss of value of an asset whether arising from use, passing of time or obsolescence through technological and market changes. It is accounted for by the allocation of the historical cost (or revalued amount) of the asset less its residual value over its useful life
Economic life	The period from the acquisition of the asset to the time when the asset, while physically able to provide a service, ceases to be the lowest cost alternative to satisfy a particular level of service. The economic life is at the maximum when equal to the physical life however obsolescence will often ensure that the economic life is less than the physical life
Facility	A complex comprising many assets (e.g. a water treatment plant, recreation complex, etc.) which represents a single management unit for financial, operational, maintenance or other purposes
Frequency	A measure of the rate of occurrence of an event expressed as the number of occurrences of an event in a given time
Geographic Information System (GIS)	Software which provides a means of spatially viewing, searching, manipulating, and analysing an electronic data-base
GUI	Graphical User Interface is a particular case of user interface for interacting with a computer which employs graphical images in addition to text to represent the information and actions available to the user
IMS	Hansen IMS software - Asset Management software product purchased as result of PAMS project
InTouch	The brand of Graphical User Interface (GUI)
Infrastructure Assets	Stationary systems forming a network and serving whole communities, where the system as a whole is intended to be maintained indefinitely at a particular level of service potential by the continuing replacement and refurbishment of its components. The network may include normally recognised 'ordinary' assets as components
Level of service	The defined service quality for a particular activity (i.e. sewerage) or service area (i.e. sewage disposal) against which service performance may be measured. Service levels usually relate to quality, quantity, reliability, responsiveness, environmental acceptability and cost
Life	A measure of the anticipated life of an asset or component; such as time, number of cycles, distance intervals etc
Life Cycle Cost	The total cost of an asset throughout its life including planning, design, construction, acquisition, operation, maintenance, rehabilitation and disposal costs
Maintenance Plan	Collated information, policies and procedures for the optimum maintenance of an asset, or group of assets
Maintenance Standards	The standards set for the maintenance service, usually contained in preventive maintenance schedules, operation and maintenance manuals, codes of practice, estimating criteria, statutory regulations and mandatory requirements, in accordance with maintenance quality objectives
Maintenance	All actions necessary for retaining an asset as near as practicable to its original condition, but excluding rehabilitation or renewal

Term	Definition
NZPIM	New Zealand Pipe Inspection Manual - National manual for inspecting and scoring wastewater pipes. Published by NZWWA - Second Edition March 1999
NZWWA	New Zealand Water and Wastes Association - National industry association formed for the advancement and application of fundamental and practical knowledge to natural water resources, water use and wastes
O&M - Operations & Maintenance Expenditure	The cost of operating and maintaining assets. O&M expenditure does not alter the value of an asset and is not included in the asset valuation
Objective	An objective is a general statement of intention relating to a specific output or activity. They are generally longer term aims and are not necessarily outcomes that managers can control
ODRC - Optimised Depreciated Replacement Cost	The ORC after deducting an allowance for usage to reflect the remaining life of the asset
Operation	The active process of utilising an asset which will consume resources such as manpower, energy, chemicals and materials. Operation costs are part of the life cycle costs of an asset
Optimised Renewal Decision Making (ORDM)	An optimisation process for considering and prioritising all options to rectify performance failures of assets. The process encompasses NPV analysis and risk assessment
ORC - Optimised Replacement Cost	The minimum cost of replacing an existing asset by another asset offering the same utility most efficiently. The optimisation process adjusts the value for technical and functional obsolescence, surplus assets or over-design
Outcome	The end result for the community which Council hopes to achieve
Output	Services, actives or goods produced by Council which contribute to achieving an outcome
Performance Measure	A qualitative or quantitative measure of a service or activity used to compare actual performance against a standard or other target. Performance indicators commonly relate to statutory limits, safety, responsiveness, cost, comfort, asset performance, reliability, efficiency, environmental protection and customer satisfaction
Performance Monitoring	Continuous or periodic quantitative and qualitative assessments of the actual performance compared with specific objectives, targets or standards
Rehabilitation	Works to rebuild or replace parts or components of an asset, to restore it to a required functional condition and extend its life, which may incorporate some modification. Generally involves repairing the asset using available techniques and standards to deliver its original level of service (i.e. heavy patching of roads, slip-lining of sewer mains, etc.) without resorting to significant upgrading or replacement
Renewal	Works to upgrade, refurbish, rehabilitate or replace existing facilities with facilities of equivalent capacity or performance capability
Renewal Accounting	A method of infrastructure asset accounting which recognises that infrastructure assets are maintained at an agreed service level through regular planned maintenance, rehabilitation and renewal programmes contained in an asset management plan. The system as a whole is maintained in perpetuity and therefore does not need to be depreciated. The relevant rehabilitation and renewal costs are treated as operational rather than capital expenditure and any loss in service potential is recognised as deferred maintenance
Repair	Action to restore an item to its previous condition after failure or damage
Replacement	The complete replacement of an asset that has reached the end of its life, so as to provide a similar, or agreed alternative, level of service
Risk	The chance of something happening that will have an impact upon objectives. It is measured in terms of consequences and the likelihood of a particular risk
Risk Assessment	The overall process of risk analysis and risk evaluation
Risk Management	Risk Management is the systematic application of management policies, procedures and practices to the tasks of identifying, analysing, evaluating and monitoring those risks that could prevent a Local Authority from achieving its strategic or operational objectives or Plans or from complying with its legal obligations

Term	Definition
Routine Maintenance	Day to day operational activities to keep the asset operating (replacement of light bulbs, cleaning of drains, repairing leaks, etc.) and which form part of the annual operating budget, including preventative maintenance
Service Potential	The total future service capacity of an asset. It is normally determined by reference to the operating capacity and economic life of an asset
Strategic Plan	Strategic planning involves making decisions about the long term goals and strategies of an organisation. Strategic plans have a strong external focus, cover major portions of the organisation and identify major targets, actions and resource allocations relating to the long term survival, value and growth of the organisation
TKN	Total Kjehldahl Nitrogen. TKN is the combination of organically bound Nitrogen and Ammonia. The combination of the organic nitrogen and the inorganic nitrogen (NH4 Ammonia, NO3 Nitrate, NO2 Nitrite) make up the total nitrogen
Unplanned Maintenance	Corrective work required in the short term to restore an asset to working condition so it can continue to deliver the required service or to maintain its level of security and integrity
Upgrading	The replacement of an asset or addition/ replacement of an asset component which materially improves the original service potential of the asset
Valuation	Estimated asset value which may depend on the purpose for which the valuation is required, i.e. replacement value for determining maintenance levels or market value for life cycle costing

10.1 ACRONYMS

Term	Definition
AC	Asbestos cement pipe
ADWF	Average dry weather flow
ATAD	Autothermal thermophilic aerobic digestion plant
AV	Average flow
BNR	Biological nutrient removal
BOD	Biochemical oxygen demand
BTWWTP	Bells island waste water treatment plant
CCTV	Close circuit television
CDEM	Civil Defence Emergency Management
COD	Chemical oxygen demand
DAF	Dissolved air floatation
FAR	Fixed asset register
FOP	Facultative oxidation ponds
GAAP	Generally Accepted Accounting Principles
HDPE	High-density polyethylene pipe
KPI	Key Performance Indicators
LA	Local Authority
LAPP	Local Authority Protection Programme Disaster Fund
LTCCP	Long Term Community Plan

Term	Definition
NAMS	National Asset Management Steering Group
NCS	Napier Computer System
NPV	Net present value
NRSA	Nelson Regional Sewerage authority
NRSBU	Nelson Regional Sewerage Business Unit (replaced NRSA in July 2000)
NTL	Network Tasman Ltd
NUGS	The Nelson Urban Growth Strategy
P/S	Pump station
PACC	Renewal strategy based on Performance, Asset criticality, Capacity and Condition
QA/QC	Quality Assurance and Quality Control
RCRRJ	Reinforced concrete rubber ring joint pipe
RMA	Resource management act
SCADA	Supervisory control and data acquisition
SS	Suspended solids
STP	Sewerage treatment plant
TA	Territorial Authority
TKN	Total kjeldahl nitrogen
TP	Total potassium
TSS	Total suspended solids
uPVC	Unplasticised Polyvinyl Chloride pipe
WWTP	Waste water treatment plant

11.0 APPENDIX B - BIBLIOGRAPHY

Title	Date	Author
Bells Island WWTP Treatment Capacity Report	November 2006	Waste Solutions Ltd
NCC Wastewater Asset Management Plan	2005	Nelson City Council
The Development of Business Process Mapping for Asset Management Systems	June 2000	Opus International Consultants Ltd
New Zealand Infrastructure Assets Grading Guidelines	1999	NZWWA
NRSBU Wastewater Management Plan 2003	August 2003	OPUS
NCC LTCCP 2006-16	2006	
TDC LTCCP 2006-16	2006	
TDC Trade Waste Bylaw		
NCC Trade Waste Bylaw		

12.0 APPENDIX C – INDEX