Resisting the pressure for quick fixes to create long term infrastructure value

Quality Record Sheet

Resisting the pressure for quick fixes to create long term infrastructure value
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1.0 ABSTRACT

Resisting the pressure for quick fixes to create long term infrastructure value.

A case study in innovative thinking, management and design leading to high quality, sustainable and cost effective infrastructure solutions.

The long term goal of effective asset management is achieving the most sustainable and economic delivery of service to the community possible. The acquisition of major civil infrastructure to deliver services is a large community investment, and given the long asset lifecycles and high purchase costs, requires careful and considered planning, design and construction. When problems present with major infrastructure, particularly involving environmental considerations, immense public and regulator pressure can be brought to bear to produce quick fixes that solve the perceived problem.

Within the last decade three Council's – North Shore City, Hastings District and Timaru District, have found themselves in this situation relating to wastewater systems. In each case considerable pressure for quick fixes was directed at the Council. In all three cases the Councils resisted the pressure to deliver an immediate short term result and took a longer term, more strategic asset management informed view of their problem which in turn created opportunity for innovative management, design and engineering solutions.

This Case Study of the three Councils actions examines the external pressure for quick fixes, the asset management analysis involved, and subsequent innovations that in each case delivered long term value and high quality service delivery outcomes.

Brief biography on the presenter:

Ross Waugh, Director, Waugh Infrastructure Management

Ross is the founder of Waugh Infrastructure Management and is an asset management and systems integration specialist with over 25 years experience in local government infrastructure asset management and engineering. Ross has been consulting in infrastructure management for 11 years, in the areas of transportation, utilities, community facilities and property. Ross has contributed to a number of New Zealand national data capture, advisory and infrastructure standard setting projects.

Ross is passionate about assisting people to practice infrastructure asset management holistically and comprehensively yet practically. His strategic analysis of client practices is balanced with a strong practical background that always ensures results not theory. Ross has experience of four cycles of integrating infrastructure asset management planning with long term financial planning within the New Zealand context.

Ross takes an active interest in on-going International infrastructure asset management trends. Ross has presented internationally on infrastructure asset management, most recently in October 2009 at the US Transportation Research Board of the National Academies, National Transportation Asset Management Conference. Ross has also provided input into International Asset Management Practice Reviews.

2.0 BACKGROUND

New Zealand needs careful and innovative expenditure spending, to ensure that at a macro level we get as close to the maximum long term benefit from infrastructure that we can. The background context for this requirement is briefly outlined below.

2.1 The National Infrastructure Spend

During the period 1971 – 1986 the national infrastructure expenditure was high, both in % of GDP terms, and in comparison with international averages.

1971 – 1986 = 8% GDP.

Assisted by 2 major construction phases – Think Big, 1980's 'Construction Boom'

1986 – 2008 = 4% GDP
1996 – 2001 = 2.8% GDP c.f. OECD average 4.4% GDP
2001 – 2006 almost at OECD average

Source: The Role of Infrastructure In Developing New Zealand's Economy, Arthur Grimes, Motu Sept 2008

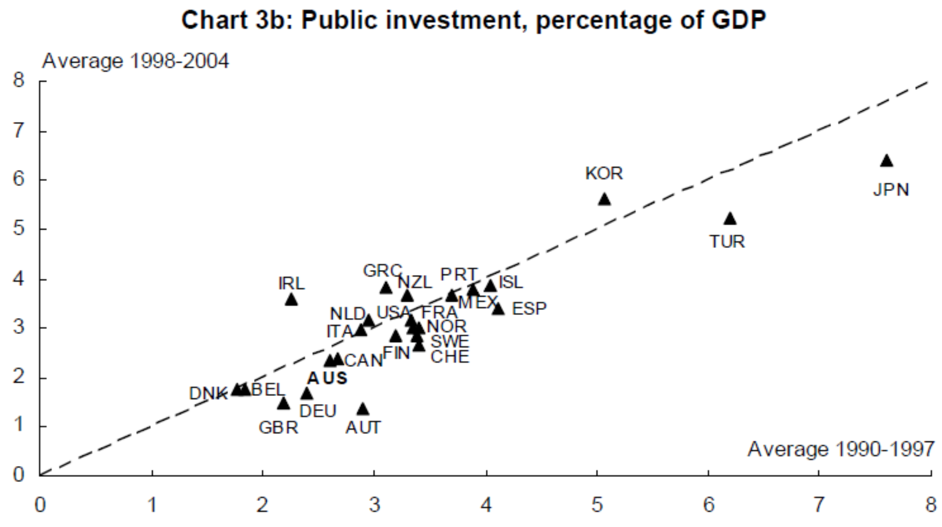
2010 = 6.8% GDP NZ infrastructure expenditure

NZ GDP $133B
Crown Infrastructure Expenditure: $6B pa
Local Government $3B pa
(Note: Roads 1.4% GDP up from 1% in 1999/2000)

Total Infrastructure Spend $9B pa / $133B GDP = 6.8% GDP

Source: National Infrastructure Plan, March 2010

Figure 2.1: Public Investment, percentage of GDP



Source: OECD (2006a), data for 25 OECD countries.

1998 – 2004 New Zealand infrastructure investment about OECD average, but total infrastructure stock as % of GDP was relatively high (and relatively new) due to the 1971 – 1986 infrastructure investment programme.

Figure 2.2: New Zealand GDP commentary

Japan and New Zealand have by far the highest public infrastructure stock-to-GDP ratios, but have been excluded from the scatter plot. It is well known that the Japanese government repeatedly attempted (in vain) to reinvigorate the sluggish economy with the help of large public construction programmes. New Zealand undertook a major infrastructure programme over 15 years to the mid-1980s, thus the average age of the infrastructure stock is young and hence the capital stock value is high relative to other OECD countries. New Zealand also over-provided infrastructure. Since the mid-1990s New Zealand has dropped back to low investment rates of between 2 to 3 per cent of GDP.

Source: Trends in Infrastructure, Australia – Greg Coombs and Chris Roberts

Figure 2.3: Selected International Comparisons

The New Zealand Council for Infrastructure Development's (NZCID's) "New Zealand's Infrastructure Development Priorities" provides the following recent international comparisons:

Table 17: Selected international comparisons

	NZ	IRELAND	FINLAND	NORWAY	DENMARK	AUSTRALIA
Land area (sq km)	268,680	70,289	304,473	307,442	42,394	7,617,930
Population (m) 2007 est	4.2	4.2	5.2	4.6	5.5	21.0
GDP/Capita PPP $US 2007 est	26,400	43,100	35,300	53,000	37,400	36,300
Railways (km)	4,128	3,237	5,749	4,114	2,644	38,550
Roads (km)	92,931	96,602	78,821	92,946	72,362	812,972
Expressways (km)	171	200	700	664	1,032	
OECD Ranking 2005	20th	5th	14th	3rd	8th	10th
Transport Ranking (IMD)	31st	35th	7th	23rd	4th	21st
Energy Ranking (IMD)	35th	34th	8th	11th	4th	27th
Broadband Ranking (Internet NZ)	22nd	24th	9th	3rd	15th	17th
Investment (gross fixed) as % GDP (2007)	23%	25%	20%	21%	23%	27%
Public Debt as % GDP (2007)	21%	25%	31%	71%	26%	15%
Sources NZCID: CIA World Fact Book /IMD Executive Ranking of 36 nations with GDP>$US10,000 per capital.						

Source: Source: National Infrastructure Plan, March 2010

By 2007 is can be seen that the gross fixed % of investment at a % of GDP had fallen to below comparator countries. Pressure is on for New Zealand to lift the level and quality of infrastructure investment. The current investment at 6.8% of GDP reflects this.

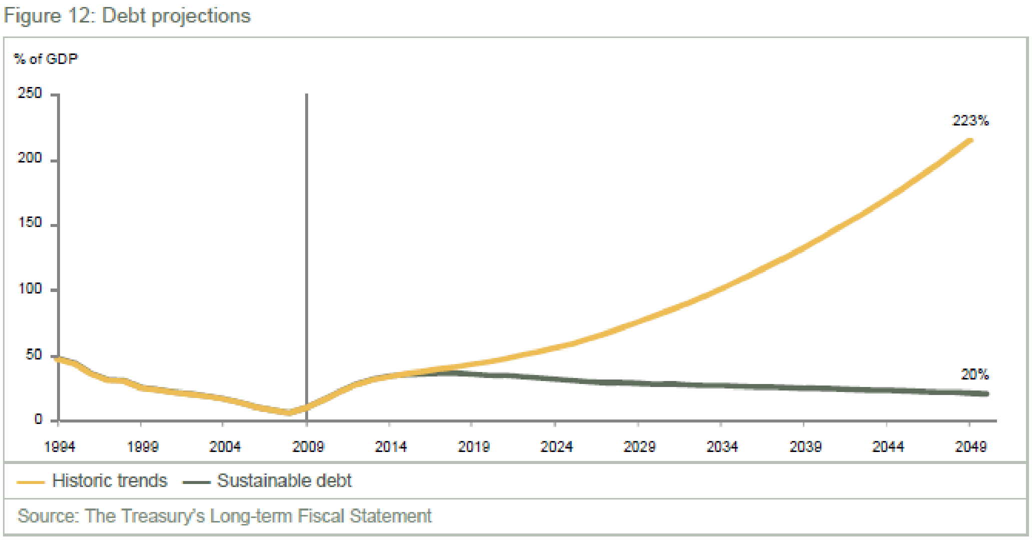
2.2 Expenditure Priority Tensions

It is clear looking at New Zealand's long term fiscal expenditure that in the future – particularly the period 2030 – 2050 there will be a range of expenditure demands on public expenditure that will create tensions in the economy that will be very difficult to resolve politically

Table 2.1: Expenditure Priority Tensions

Expenditure Area	2010 - %GDP	2030 - %GDP	2050 - %GDP
Debt Projections	10%	55%	223%
Superannuation	4%	7%	9%
Education	6%	5%	5%
Health	6%	9%	12%
Total S+E+H	16%	21%	26%
Difference 2010		+5%	+10%
Infrastructure	7%	? 4%	? 2%

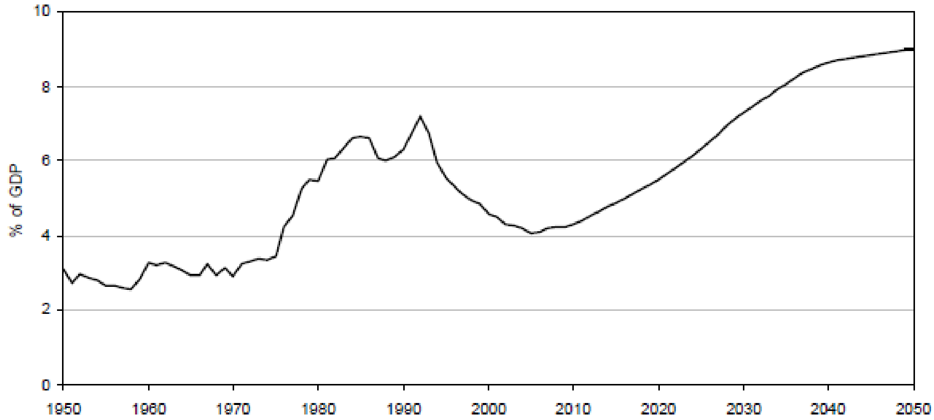
Figure 2.4: New Zealand Debt Projections



Source: Source: National Infrastructure Plan, March 2010

Figure 2.5: NZ Superannuation Expenditure Projections

Figure 2 New Zealand Superannuation and its predecessors

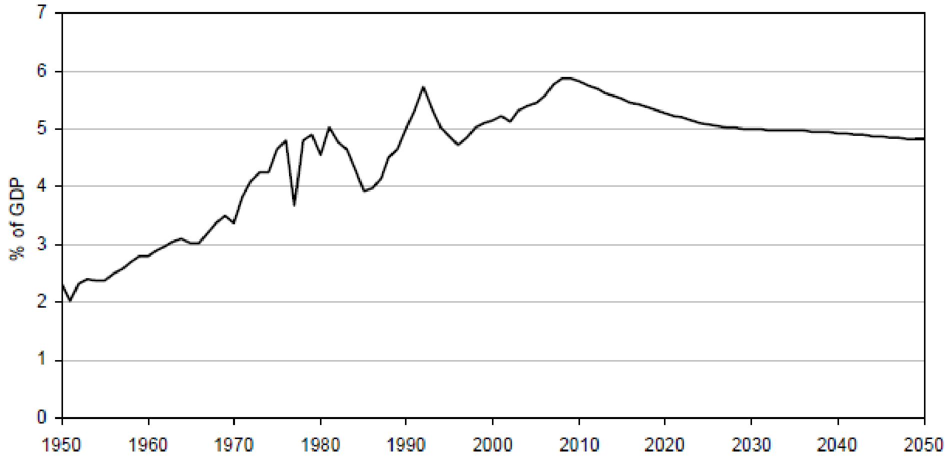


Source: The Treasury

Source PPP 06/01 – Modelling New Zealand's Long Term Fiscal Position

Figure 2.6: NZ Education Expenditure Projections

Figure 18: Demographics reduce the projected GDP share of education spending

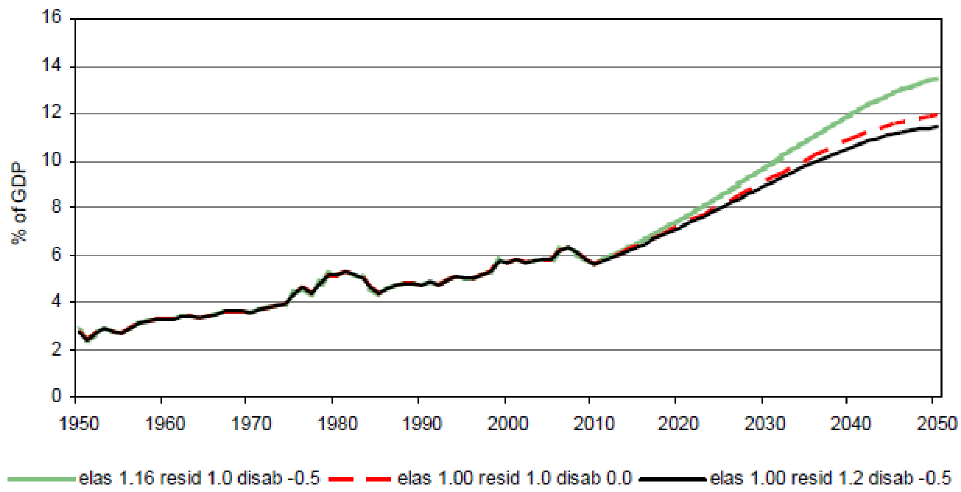


Source: The Treasury

Source PPP 06/01 – Modelling New Zealand's Long Term Fiscal Position

Figure 2.7: NZ Health Expenditure Projections

Figure 24: The GDP share of Core Crown Health spending continues to grow



Source: The Treasury

Source PPP 06/01 – Modelling New Zealand's Long Term Fiscal Position

2.3 The Impact on Future Infrastructure Spend

It is reasonably clear that whilst New Zealand is spending a relatively high proportion of GDP (7% currently) on infrastructure over the next period, say 2010 – 2030, there will inevitably be pressure for this level of expenditure to reduce as other expenditure demands in the economy increase.

The size of this potential decrease will be dependant of economic, migration, population and a host of other factors over the next 20 years – but is it is quite possible that national expenditure on infrastructure could more than halve from current levels by 2050.

The conclusion from this is that, as always – infrastructure expenditure is expensive, and that infrastructure built will have to last a good long time. Achieving as close as possible to optimal infrastructure lifecycle costs is increasingly important given New Zealand's projected fiscal position over the next 40 years.

3.0 SHORT TERM PRESSURE TO ACT

Despite the fact that infrastructure provision, construction and management is a very long term industry, with some asset lives well in excess of 100 years, we live in a society that demands instant action for problems and issues. Drivers for short term action are outlined below.

3.1 Media

The following are my observations about how the media operates in New Zealand

- Short term
- Sensationalist,
- Not much in the way of long form journalism able to deal with complex issues in NZ
- Councils and Infrastructure owning authorities are easy targets for criticism.
- Likes to simplify problems and be seen to be making a difference

Examples

3.1.1 Northern Advocate, 7th January 2010

WDC defends strategy over sewage spills

Andre Hueber | 7th January 2010

- Email Story
- Print
- larger | smaller

The Whangarei District Council has hit back at claims its planned sewerage system upgrade is tinkering with a failing system and its "pipes and pumps" approach should be ditched.

Whangarei's Save Our Harbour Coalition (SOH) says the council's plan to install a new pipe at Okara Park, a storage tank at Hatea and to upgrade the town's sewage treatment plant is "insufficient".

3.1.2 ODT, 18th November 2009

Odour in bay coming from sewer manhole

Home » Your Town » Timaru

Wed, 18 Nov 2009

The Regions: Canterbury | Your Town: Timaru

CLICK PHOTO TO ENLARGE

Former Timaru resident Megan Waghorn is happy to see Caroline Bay has been redeveloped, but she is horrified a sewer manhole is ruining its appeal by creating an intermittent odour.

There is a problem hanging around Timaru like a bad smell - and that is just what it is.

It appears to be most noticeable in the area just in front of the whale pot at the northern entrance to Caroline Bay.

This is not the first time Timaru residents have complained about an odour.

A series of articles appeared in The Courier in May last year, in which many Timaru residents spoke of a smell lingering around the business district.

The source of the smell was never confirmed.

3.1.3 Auckland Herald – March 17, 2010

Auckland: Our failing city

By Eloise Gibson View as one page
4:00 AM Wednesday Mar 17, 2010

1. Facebook
2. Twitter
3. Email
4. Print

Auckland is growing by 50 people a day -they need 21 homes and bring in 35 additional cars. Now, a report warns of the pressures on the new-look Super City

Expand

A warning sign on a beach tells people to stay out of the water due to a sewage overflow. Photo / Dean Purcell

Auckland's natural environment is in decline and will continue to worsen unless the new Super City council delivers a shake-up, say monitoring officers.

The region's environment monitors told would-be civic leaders they would inherit a natural environment threatened by ageing and overloaded infrastructure and a rapidly rising population.

Issuing the final State of the Region report before the Auckland Council takes over, the Auckland Regional Council's general manager of monitoring and research, Grant Barnes, said the region was growing by more than 50 people a day, requiring 21 new homes and bringing 35 new vehicles to the city.

3.1.4 Dominion Post 26/03/10

Polluted Beach Closed for Eighth Week

Owhiro Bay

3.1.5 Summary of Media Issues

Infrastructure problems are generally expensive, long term and complex – and do not lend themselves to considered reporting within the New Zealand media context.

Infrastructure owning authorities and engineers are not good at handling media

This creates pressure for short term fixes to make the problem go away.

3.2 Regulators

New Zealand public infrastructure authorities are subject to a range of regulators, a sample is included in the table below

Table 3.1: Summary of Infrastructure Industry Regulators

Expenditure Area	Financial	Legal, Standards
Roads	Office of Auditor General (OAG) NZTA	NZTA
Water Utilities	OAG	EPA, MOH, MfE, Regional Councils
Parks and Recreation	OAG	Regional Councils
Buildings	OAG	BIA, Consents

Infrastructure owners are subject to a number of regulators all of whom have a job to do. When a problem is perceived regulators will:

- React to try and resolve to problem
- In some cases use the media to build the case for their action, proposed solutions
- Prosecute
- Suggest standards based solutions, based on local or other standards
- Rarely be handled or promoted by experts in the infrastructure management field – this expertise hardly ever resides in regulators

Resulting from this, infrastructure owners and managers need to be aware of the pressures and shortcomings of regulator lead approaches. Infrastructure owners and managers need to be willing to use a range of dialogue, communication and education to assist regulators to reach a reasoned and educated understanding of the issues being managed, and the longer term and complex nature of the solutions.

3.3 Political

Infrastructure issues also make easy targets for populist politicians with their easy slogans and simplistic solutions to complex problems.

Media and other pressure can often transfer very quickly translate to political pressure both local and national to solve whatever the problem of the day is.

As the case studies will show – the simplistic and quick solution is often not the best one, and runs large risks of producing less than optimal lifecycle costs and solutions.

Rushed simplistic solutions do not allow for reflection, looking at the problem in different ways or ‘outside the box’, and subsequent insights that lead to innovation.

The requirement to manage political pressures on infrastructure project solutions needs to be recognised and planned for.

3.4 The role and use of standards

Standards describe the agreed industry position on any given topic. Standards development boards, and review teams generally consist of industry expects on the subject.

It must be noted that due to the authorisation, development and review cycle standards are generally up to 2 years behind the ‘state of the art’ in any industry.

Therefore, standards act as very good guidance for industry practice and a baseline for what is acceptable, but should not constrain innovation in any particular industry area.

This is problematic when regulators desire to see the use of standards in the resolution of a problem – the safe position, and the infrastructure owner wants to innovate to deliver long term optimal value.

It should be remembered that industries constantly innovate in one form or another, building on past successes.

Industry innovation eventually informs and updates standards.

The tension that innovation brings with defenders of the status quo and with regulators needs to recognised and managed.

3.5 Not an excuse to do nothing

The points raised in this Section are not an excuse to do nothing – rather an awareness raising of the pressures to develop short term fixes at the possible expense of long term optimal value.

4.0 INFRASTRUCTURE MANAGEMENT GUIDANCE

Much of the public infrastructure that gets built has long lives. This is highlighted in the Table below which provides a sample of these assets, and in Section 9.0, which has been added for reference.

Table 4.1: Sample of Asset Lives

Expenditure Area	Asset	Life (years)
Roads	Pavements	35 - 100
	Shoulder	10 - 100
	Traffic Islands	30 - 100
	Footpath Surface	20 - 75
	Surface Water Channels	50 - 100
	Drainage	50 - 100
	Bridges	75 - 150
	Major Culverts	70 - 100
	Retaining Walls	70 - 100
	Tunnels	500 - 1000
	Underpasses	50 - 150
Water	Pipes	50 - 150
	Valves / Hydrants	25 - 75
	Pump Stn Structures	50 - 1000
	Inlet/Outlet Structures	75 - 100
	Mechanical Gates	50 - 100
	Tanks	40 - 100
	Structures	75 - 100
Wastewater	Pipes	40 - 150
	Manholes	60 - 100
	Structures	40 - 100
Stormwater	Pipes	60 - 150
	Channels	60 - 100
	Structures	50 - 100
Parks	Trees	50 - 100
	Structures	50 - 100
	Concrete Walls	50 - 100
	Bridges	50 - 80
	Service Connections	50 - 100
	Base – courts/surfaces	80 - 100
Buildings	Foundation	100 - 125
	Floors	75 - 100
	Walls	75 - 100
	Concrete Tile Roofing	75 - 100
	Precast concrete walls	100 – 150
	Windows – metal / wood	50 - 75

Construction of assets with long lives requires careful consideration of lifecycle costs, demand for the assets, and willingness of the asset users to pay the lifecycle costs.

The greatest ability to influence these lifecycle costs of any asset is at the planning and design phases of the asset. Similarly the planning, design and construction cost is a major lifecycle cost.

This is shown in the following figures drawn from industry manuals.

Figure 4.1: Typical Cost Reduction Opportunities Remaining

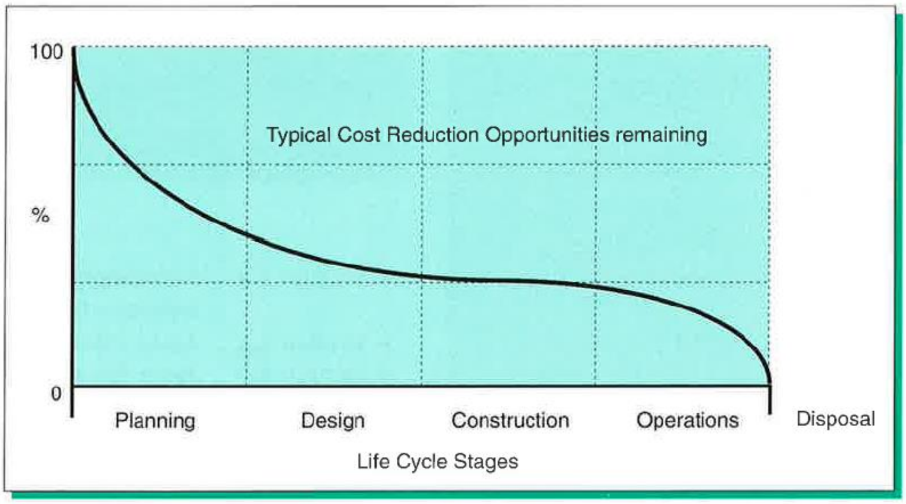
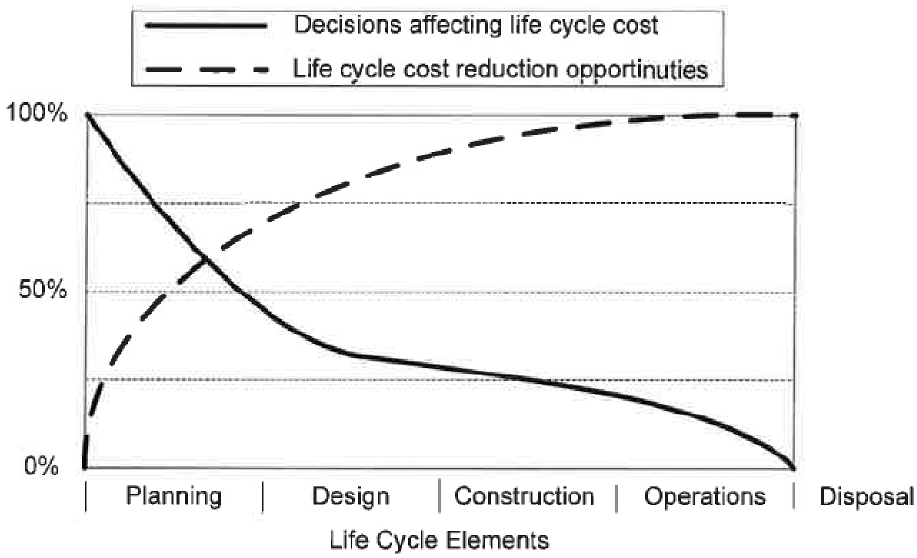


Figure 2.1.3: Lifecycle Cost Reduction Opportunities

Source: NZ Infrastructure Asset Management Manual, 1996

Figure 4.2: Lifecycle Cost Reduction Opportunities

Fig 4.1: Life Cycle Cost Reduction Opportunities



Source: IPWEA, 1999, National Asset Management Manual, Fig 3.1.3.1, p 3.6

Source: Australian Infrastructure Financial Management Guidelines, 2009

Figure 4.3: Lifecycle Cost Profile

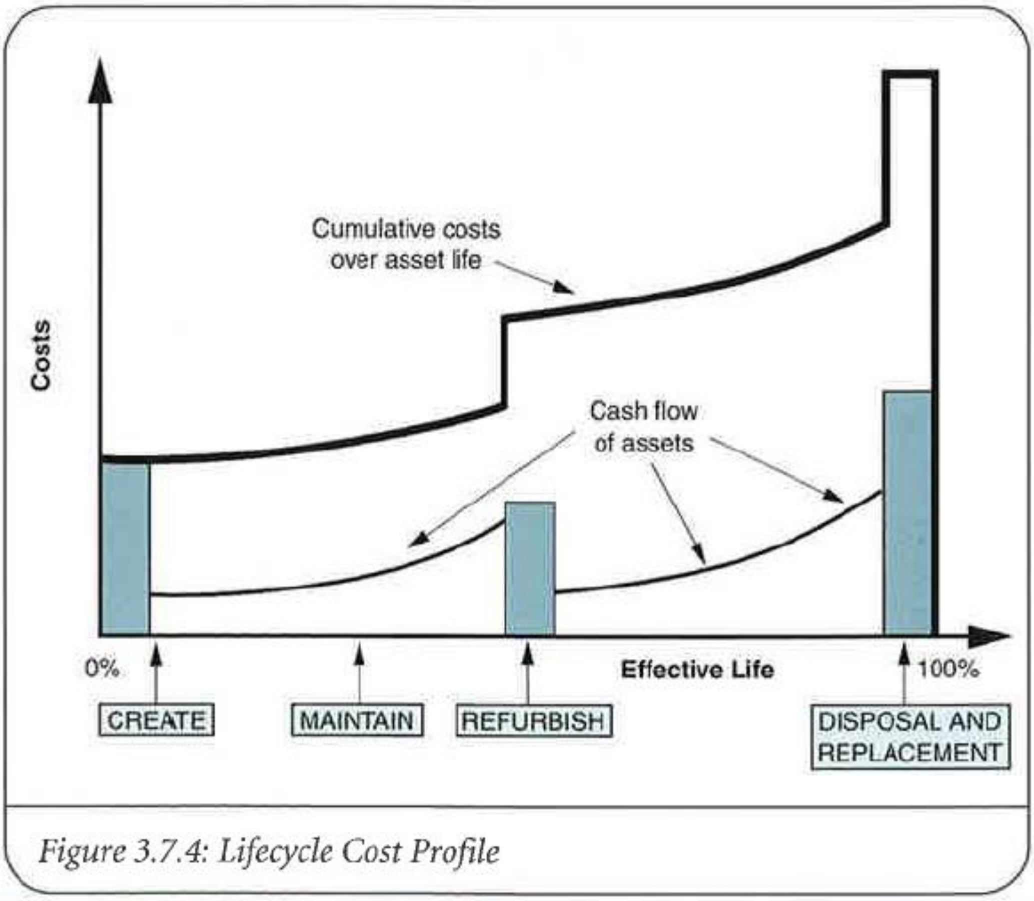


Figure 3.7.4: Lifecycle Cost Profile

Source: International Infrastructure Management Manual, 2006

Figure 4.4: Lifecycle Cost Profile (2)

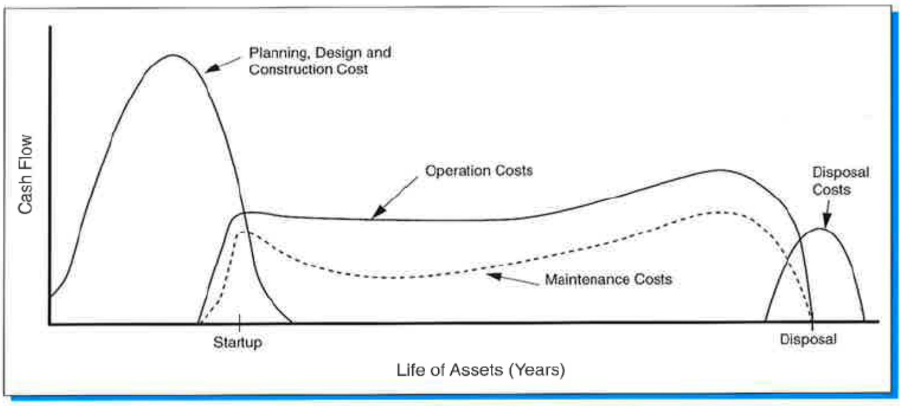


Figure 4.7.1: Lifecycle Cost Profile

Source: NZ Infrastructure Asset Management Manual, 1996

Infrastructure Management Guidance Conclusion

A great deal of care needs to be given to the planning and design phase to ensure that the lifecycle costs of the infrastructure being considered are optimised. The care required does not suggest rushed, simplistic or reactive solutions.

5.0 CASE STUDY 1: TIMARU DC MAIN TRUNK SEWER RENEWAL

5.1 Project Summary

Table 5.1: Timaru DC Main Trunk Sewer Renewal Project Summary

Item	Description	Notes
Project Cost	$32M	Main Trunk Sewer Renewal
Project Initiation	1998	
Project Completion	2013	
Project Duration	15 years	
Asset Lives	100 years	Major components
Action Pressures	Regulator (Ecan)	2 prosecutions
	Local Media	
Suggested Solution	Tanks at Pump Stations	
	4 hours storage	ARC standard
Adopted Solution	New tunnels, new alignment	Away from coast
	Waste Stream separation	
Innovation	Reconfiguration of trunk network	
	Use of modern construction techniques to achieve results	
Design Solution	Modelling of effects, risk, costs	
	Long term optimised lifecycle cost	Included achievement of multiple goals
	Major Environmental risk reduction from current situation	By realignment of sewer and waste stream separation
	Wastewater Working Party formed	Consultation involved major stakeholders

Figure 5.1: Overview Schematic of Timaru MTSR project

5.2 Introduction

The Wastewater Management Strategy for the Timaru District has developed and been progressively implemented since before 1995. A study was commissioned in September 1994 to investigate treatment and disposal strategies for Geraldine and Temuka in response to the Opihi River Regional Plan and the need to secure new discharge consents.

The Timaru District Council set up the Wastewater Working Party in 1997 to provide community input to the development of the Wastewater Management Strategy. The Wastewater Working Party recommended the following strategy:

- Upgrading of the Inland Towns Wastewater Treatment Plants.
- Conveyance of the treated Inland Towns wastewater to the Timaru marine outfall (initially direct to the ocean outfall, but ultimately via new Timaru maturation ponds/wetlands at Aorangi Road).
- Separation of Timaru industrial and domestic wastewater streams.
- Construction of new oxidation ponds, maturation ponds and wetlands for the Timaru domestic stream.
- Treatment of Timaru industrial wastewater in anaerobic lagoons (or equivalent) and possible UV disinfection (or equivalent).
- Continuing discharge of all Timaru and Inland Towns treated wastewater to the Pacific Ocean, via the existing submarine outfall.

Oxidation Pond Upgrades

Improving the level of treatment at each of the three oxidation ponds serving the Inland Towns communities of Temuka, Geraldine and Pleasant Point was proposed.

The oxidation ponds upgrade consisted of fitting aeration devices, influent screening and pond segmentation to provide maturation ponds and incorporating rock filters, which were completed in 2001 at a construction cost of $150,000.

Inland Towns Pipeline

Continued discharge of wastewater to surface waters for the Inland Towns communities of Geraldine, Pleasant Point and Temuka was not favoured. The option of conveying treated wastewater from the Inland Towns to the Timaru marine outfall structure for disposal was proposed.

After extensive consultation with the public and key interest groups, this Inland Towns pipeline was fully investigated, detailed, designed and constructed, being commissioned in 2003.

The construction cost of the Inland Towns pipeline was $4.2 million.

5.3 Pressure to Act

Pressure to act regarding the Main Trunk Sewer Renewal started to build in the mid- to –late 1990's with the overflow of a pump station into Caroline Bay on several occasions. These overflows lead to two prosecutions by Environment Canterbury for breaches of the Resource Management Act.

Environment Canterbury proposed that the appropriate standard was 4 hours storage at the pump stations, based on the Auckland Regional Council standard that was operative (but not complied with in the Auckland Region) at the time.

The overflows and subsequent prosecutions lead to much local media commentary and the pressure to act (and act quickly) was building.

Analysis of the condition of the main trunk sewer at the time showed that the problem was wider than just pump station storage, and given the scale of the likely works, there was opportunity to reconfigure the entire main trunk network to achieve multiple goals including waste stream separation, and a significantly decreased risk of unplanned overflows to the environment.

Strict operational controls were instituted to minimise the overflow risks whilst a range of modelling and testing was undertaken to test the scenarios and determine to optimum lifecycle solution for the Main Trunk Sewer Network.

Timaru District Council was able to manage the pressure to act quickly using suggested standard solutions and over time develop, fund and build an optimum solution.

5.4 Solution Chosen

In 1998, Timaru District Council also decided to formulate a long-term strategic plan for the Timaru sewerage system, incorporating trunk gravity sewers, pumping stations and rising mains to ensure that these vital assets provide a reliable, functioning level of service well into the future.

Timaru District Council investigated the condition of the major components of the sewerage systems, and based on these findings and the ability of the system to cope with existing and future flows, a long-term sewer system renewal strategic plan was developed, with the objective of providing a conveyance system that reflects the Timaru District Council policy of "No direct discharges of untreated sewage to natural waters".

This sewerage strategic plan has formed the basis of the Main Trunk Sewer Renewal (MTSR) project. This project has seen the construction of a new 1000mm diameter polyethylene trunk main installed from Station Street in the Timaru CBD to the northern end of Caroline Bay (MTSR Stage 1) completed in 2004 at a construction cost of $4.2 million.

MTSR (Stage 2) consisting of a 1200mm diameter polyethylene trunk main installed from Alliance Smithfield around the edge of Washdyke Lagoon to connect to the existing Main Trunk Sewer adjacent to McCain Foods, was completed in 2006 at a construction cost of $2 million. The obsolete trunk main that crossed Washdyke Lagoon in an embankment, and which due to its poor condition was a significant vulnerability to the system and the environment, was subsequently removed.

A duplicate 1200mm diameter polyethylene industrial main trunk pipeline has been installed from Alliance Smithfield around Washdyke Lagoon to McCain Foods in conjunction with the MTSR Stage 2 domestic wastewater pipeline, completed in 2006, also at a construction cost of $2 million.

MTSR Stage 3 consisting of the construction of three tunnels, each over 2 metres in diameter and 400 metres long, by Harker Underground Ltd, a specialist tunneling contractor, has been completed at a construction cost of $15.7 million

MTSR Stage 4 consisting of the installation of the interlinking main trunk pipes to connect MTSR Stage 3 to MTSR Stages 1 and 2 has been completed at a construction cost of $2.5 million

Industrial pipelines also form part of the MTSR Stages 3 and 4 contracts.

Once the planned industrial pipelines are installed from McCain Foods to the Wastewater Treatment Plant in Aorangi Road, at an estimated cost of $5.6 million, in two to three years time separation of the industrial wastewater stream from the Port to the Treatment Plant will be complete.

5.5 Asset Lifecycle Innovation

The asset lifecycle innovations with this project were:

- Use of a Wastewater Working Party to integrate all major stakeholders and gain agreement on a path forward
- Use of a holistic strategy which all new and renewal work conformed with
- Reconfiguring the main trunk sewer network to reduce environmental risk and take advantages of technological (micro tunnelling) advances since the original network was installed
- Using the network reconfiguration as an opportunity to achieve waste stream separation (Timaru has a large industrial waste stream)
- Using extensive modelling and financial analysis to develop and model an optimum lifecycle cost and result

5.6 Acknowledgements

Major projects always require a team effort across Council, Consultants and Contractors. In this project acknowledgement is given to:

TDC staff:
Ashley Harper
Bill Voice
Dave Hooke
Grant Hall

Consultants:
Beca CH2M Hill

Contractors:
Downer EDi Works (MTSR 1, 2 and 4)
Harker Underground Ltd (MTSR 3)

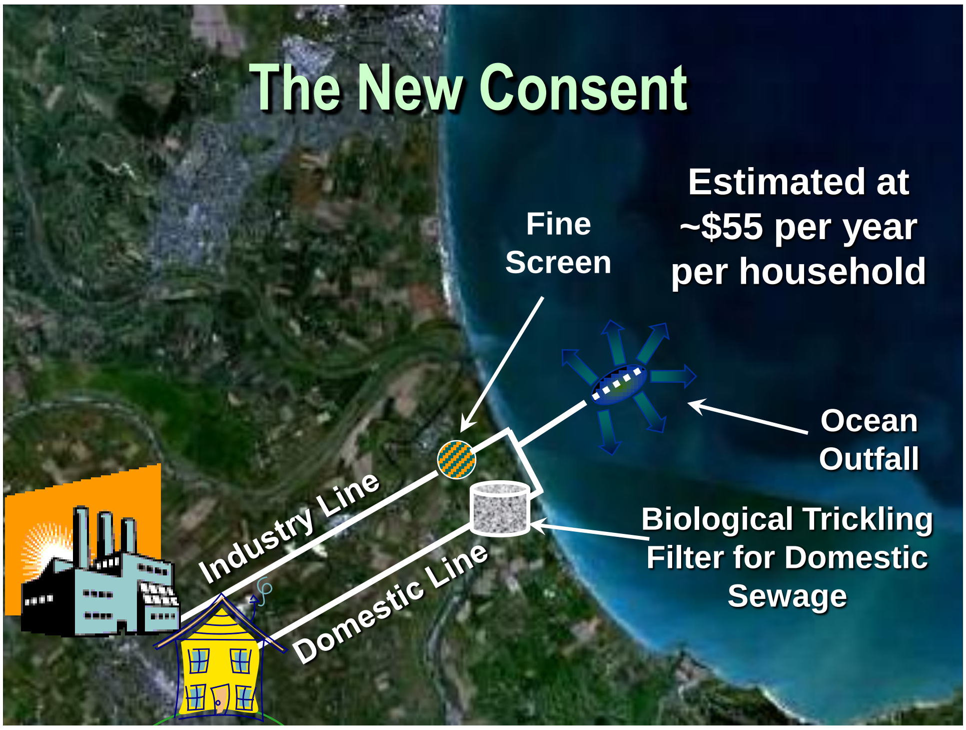
6.0 CASE STUDY 2: HASTINGS DC WASTEWATER TREATMENT

Table 6.1: Hastings DC Wastewater Treatment Project Summary

Item	Description	Notes
Project Cost	$55 / household / year	
Project Initiation	1998	Consent lodged
Project Completion	2009	Project completed
Project Duration	11 years	
Asset Lives	75 years	Major structures
Action Pressures	Regulator (HBRC)	
	Iwi Concerns	
Suggested Solution	Status quo consent – fine screen plus outfall	
Adopted Solution	Intermediate and finished solution	
	Alternative treatment configuration that addresses cultural concerns	
Innovation	Innovative project governance and management	Stand ‘shoulder to shoulder’ with Maori
	Two stage consent and solution	
	Innovative Technological approach	
	Reduced costs per household	
Design Solution	Use of multi criteria assessment and decision making	
	Lateral thinking by Tangata Whenua – good relationships with Council	
	New approach to treatment	
	Huge savings (1/3 of traditional approach)	
	Consent changed without hearing	

East Clive Pilot Plant

Figure 6.1: HDC Treatment Schematic with the New Consent



6.1 Introduction

Acknowledgement of source:
HOW AN "HISTORIC AND PROBABLY UNIQUE ACCORD" WORKS, by Mark von Dadelszen (Lawyer and Associate Member, NZPI), Paper to NZPI

The Hastings District Council ("HDC") lodged, in 1998, an application to renew its restricted coastal activity consent to discharge fine-screened wastewater to Hawke Bay via a 2.75 km long ocean outfall pipeline.

Despite an in-depth programme of pre-application consultation, Mäori considered that they had not been listened to, and also considered that consultation with HDC staff and consultants was inadequate without involvement of the decision-making HDC politicians.

The Hearing Commissioners in 1999 concluded that "on the scientific evidence thus far heard the proposed discharge would cause no adverse effects that cannot be appropriately remedied or mitigated under RMA as per the proposed conditions," but that HDC had not met tangata whenua and community concerns about the discharge of relatively untreated human waste to the sea.

At the HDC's request the hearing was adjourned.

6.2 Pressure to Act

Hastings District Council chose to adjourn the hearing for the Wastewater treatment and disposal consent, and meet with Tangata Whenua on a journey of discovery.

HDC Councillors, key staff, and senior representatives of tangata whenua workshopped options, went on a hikoi of discovery around New Zealand wastewater treatment plants, and agreed on a technical solution.

6.3 Solution Chosen

- Innovative and 'risky' governance structure, Joint Wastewater Committee
- Council and Maori standing 'shoulder to shoulder'
- Intermediate solution developed
- Current solution develops over time, is unconventional, but proved during pilot testing and development
- Innovative technological approach using Biological Trickling Filter
- Similar capital costs to conventional approach – but much cheaper to run – long term lifecycle cost is optimised
- A 'no sludge' treatment approach

6.4 Asset Lifecycle Innovation

The asset lifecycle innovations with this project were:

- Pausing consent process to extensively consult and resolve iwi concerns
- Cultural awareness and lateral thinking
- New approach – no primary treatment, output acceptable for ocean discharge
- Treatment now secondary instead of primary
- Huge savings – a third of the traditional $
- Use of multi-criteria assessment and decision conferencing
- Consent changed without a hearing

6.5 Acknowledgements

Major projects always require a team effort across Council, Consultants and Contractors. In this project acknowledgement is given to:

HDC staff:
David Fraser
Bob McWilliams
HDC Staff Team who worked on the project

Consultants:
MWH:
Paula Hunter, Planner
Jim Bradley, Engineer
Pete Loughran, Engineer

Bannister and von Dadelszen:
Mark von Dadelszen, Lawyer

Ngati Kahungungu elders

7.0 CASE STUDY 3: NORTH SHORE CC PROJECT CARE

Table 7.1: North Shore CC Project Care Project Summary

Item	Description	Notes
Project Cost	$500M	2010 costs
Project Initiation	1998	
Project Completion	2020	
Project Duration	22 years	
Asset Lives	90 years	Detention Tanks
Action Pressures	Regulator (ARC)	
	Media – massive commentary	Closing very high profile popular beaches
	Council – fix it	
Suggested Solution	Mix of conventional and alternative technologies	
Adopted Solution	Extensive use of modelling	
	Optimised decision model	
	Construction of major components	
	Re-analysis and optimisation cycle	
Innovation	Integrated modelling	
	Optimised cost decision model to test options and ideas	
	Re-use of existing assets where optimal	
	Innovation in new asset design and construction – optimise lifecycle costs	
Design Solution	Extensive modelling	
	Network consent	
	Storage Tanks	
	Reuse of existing assets where possible	
	Tunnels installed where optimal	

Project CARE is a massive and integrated project to improve the North Shore City wastewater and stormwater system, and to protect the East Coast beaches and coastal environment.

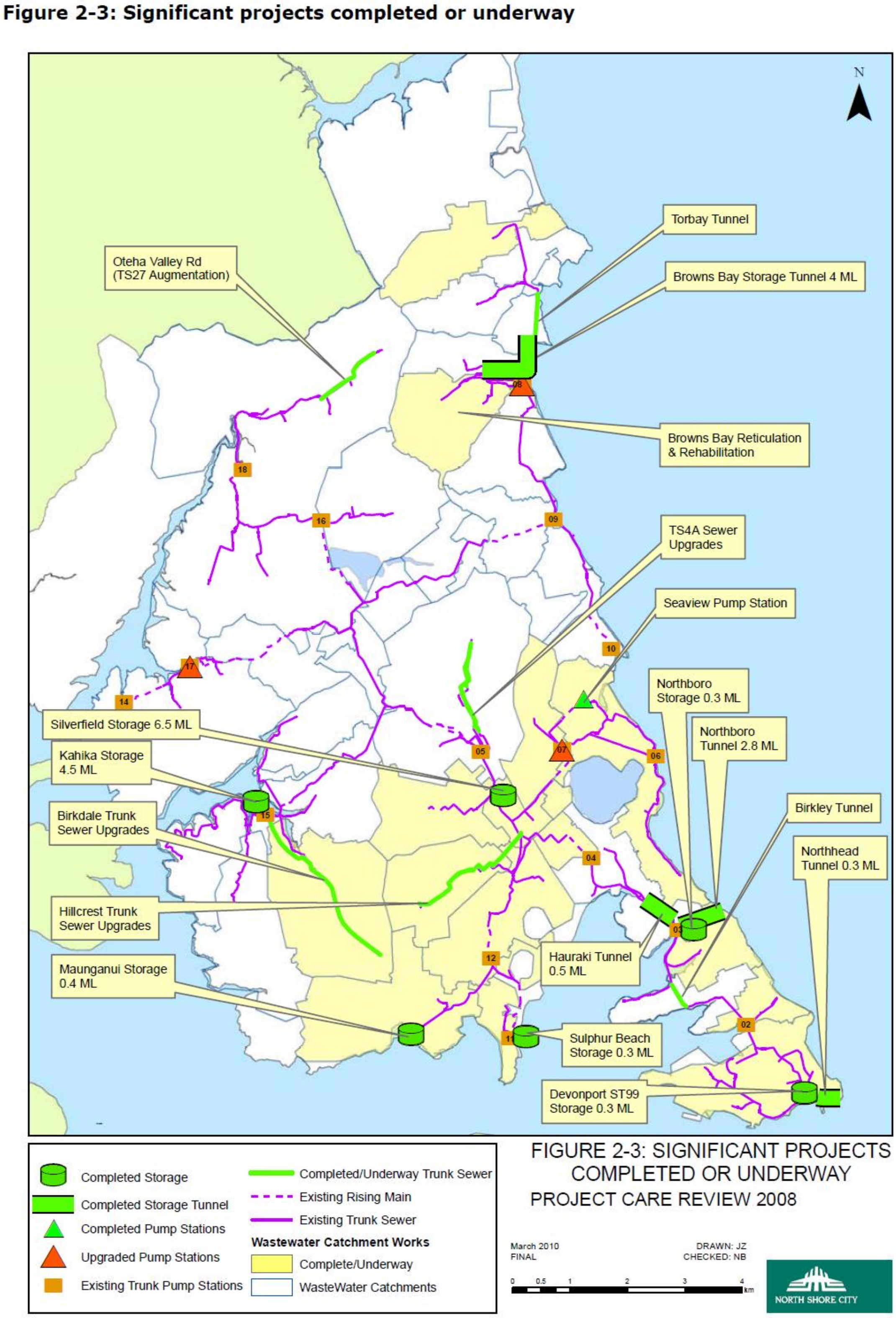
The information below is drawn from two large NSCC reports on Project CARE – Project CARE Report, 1 August 2004, 181 pages, and Project CARE Programme Review Report, 2008, 73 pages

The snap shots of information presented below are intended to provide a very quick overview of the infrastructure management innovation that has occurred in this major project, particularly with regard to benefits of longer term optimised lifecycle planning.

A key driver for North Shore City Council during Project CARE has been to:

Spend the money wisely

Figure 7.1: Project CARE Significant Projects Completed or Underway



7.1 Introduction

CARE is an acronym for **C**ouncil **A**ction in **R**espect for the **E**nvironment.

Project CARE was initiated by North Shore City Council (NSCC) in response to public concerns regarding wastewater overflows and bacteriological pollution resulting in the display of warning signs at popular East Coast beaches. The wet weather overflows and the treatment plant outfall were perceived to be the major problem. However it was found important that a full understanding of the problem was required as a basis for strategic planning to ensure a comprehensive programme at least costs.

Project CARE was launched in 1998 to apply an integrated approach to resolving the beach pollution problem.

At the start of the process the aim for Project CARE was agreed as:

Table 7.2: Project Phases

Phase	Description	Purpose
1	Project Planning – What is the long-term strategy?	• Information gathering. • Scoping the long-term strategy.
2	Knowing the system - How bad is it?	• Assessment of existing system performance: wastewater, stormwater networks and treatment plan outfall. • Developing the toolbox.
3	Options for improvement – What do we want?	• Identification of the most cost effective solutions for system improvement by cost optimisation • Cost benefit analysis. • Public consultation. • Setting containment standards and targets for 2050.
4	The recommended programme - How do we get there?	• Development of the Wastewater Network Strategic Improvement Programme (WNSIP). • Detailed planning and review.

Figure 7.2: Project Phases

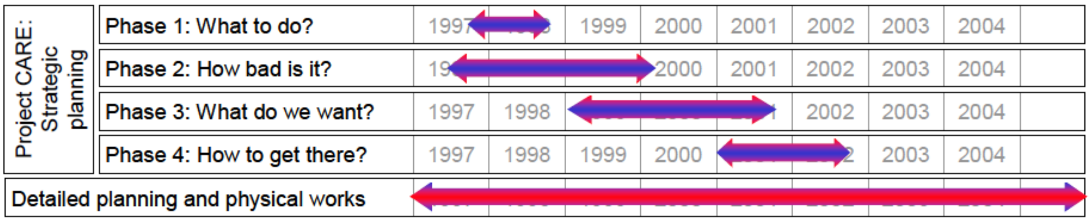


Table 7.3: Key Completed Projects, Costs and Benefits

Table 2-2 Key Completed projects, costs and benefits

Name	Cost	Size	Benefits
Browns Bay Storage tunnel	$13.9 million	4,000 m^3	Overflow frequencies reduced: in Browns Bay from 6 to 0.4 per annum in Mairangi Bay from 9 to 6.5 per annum
Northboro storage tunnel	$166,00	3,000 m^3	Overflow frequencies reduced in Devonport Pennisular
Silverfield storage tank	$7.9 million	6,500 m^3	Overflow frequencies reduced from 8 to 1.3, network operational benefits
Kahika storage tank	$4.2 million	4,500 m^3	Overflow frequencies reduced in Beachhaven from 6 to 1 per annum
Oteha Valley trunk sewer upgrade	$2.1 million	1 1 - 0.600m dia trunk sewer	Allows for growth in Albany without increasing overflow frequency
Wairau TS4A trunk sewer	$7.1 million	1 m dia trunk sewer	Increasing capacity to get local flows to Wairau Pumping station and storage tank
Seaview pumping station in Milford	$3.0 million	100l/s	Overflow frequencies reduced in Black Rock area
Beach haven Trunk upgrades	$1.8 million	various	Increasing capacity to get local flows to Kahika Pumping station and storage tank
Chelsea Bay storage tank	$400,000	350 m^3	Overflow frequencies reduced in Chelsea Bay
PS11 Sulphur Beach storage tank	$400,000	300 m^3	Overflow frequencies reduced in Shoal Bay
Devonport (STO99) storage tank	$20,000	300 m^3	Overflow frequencies reduced in Devonport

The total actual expenditure to-date (30 June 2009) is approximately $124 million, including expenditure related to projects underway.

Figure 3-3: Total costs for 2001-2050

Phase 4 WNSIP	(2001-2050 whole programme) $M	
Capital New (CARE)		**174.66**
Infill Growth	24.35	
Sewer Overflow: Pump stations	2.77	
Sewer Overflow: Sewers	75.31	
Sewer Overflow: Storage	28.48	
Sewer System: Albany	22.74	
Sewer System: Greenhithe	12.01	
Sewer System: Long Bay	9.00	
Capital Renewal (CARE)		**91.85**
I/I Renewal	91.85	
	$266.51	

7.2 Pressure to Act

A6 NZ Herald Friday, September 8, 2000

METRO

7.5km 'tank' could ease sewage woes

Wastewater system at full stretch

By WAYNE THOMPSON

A 7.5km-long tunnel for storing sewage beneath three North Shore suburbs is being mooted as a way of providing quick relief from the city's beach pollution woes.

The tunnel tank — and satellite waste treatment plants — are fresh ideas revealed yesterday in an engineering update on plans to improve the city's struggling wastewater system.

Overflows of raw sewage now happen monthly after heavy rain, resulting in bathing bans at city beaches as a health precaution.

System improvements costing from $100 million to $600 million are being assessed by engineers for consideration later in the year by the council and citizens in Project Care.

They are in addition to $60 million of work already under way to reduce the level of city sewer overflows in wet weather.

Moving and storing sewage in a tunnel would produce a quick and significant reduction in sewer overflows, the council's wastewater planning engineer, Jan Heijs, said yesterday.

It would also help operation of the city's ailing sewer network and take the pressure off the Rosedale treatment station when it could not cope with suddenly increased inflows.

Mr Heijs said Wairau, and Bush Rd in the central city, needed new pumping stations and transfer routes to the Rosedale plant.

Storage tanks would also need to be provided along these new routes.

These works would be disruptive to residents and take considerable time to prepare and build.

It was appropriate to assess the tunnel alternative in parallel with the conventional works.

A tunnel would run from the municipal golf course at Takapuna, to the west of the Northern Motorway, through Glenfield, Unsworth Heights and North Harbour to the Massey University campus at Albany.

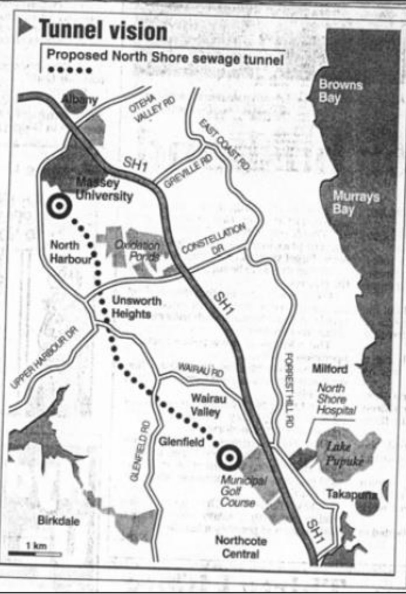
Mr Heijs said the tunnel could cost $60 million — making it $10 million more expensive than conventional storage tanks.

But not all the benefits of such a tunnel had yet been calculated. It could take six months to work out whether a tunnel was preferable to conventional works.

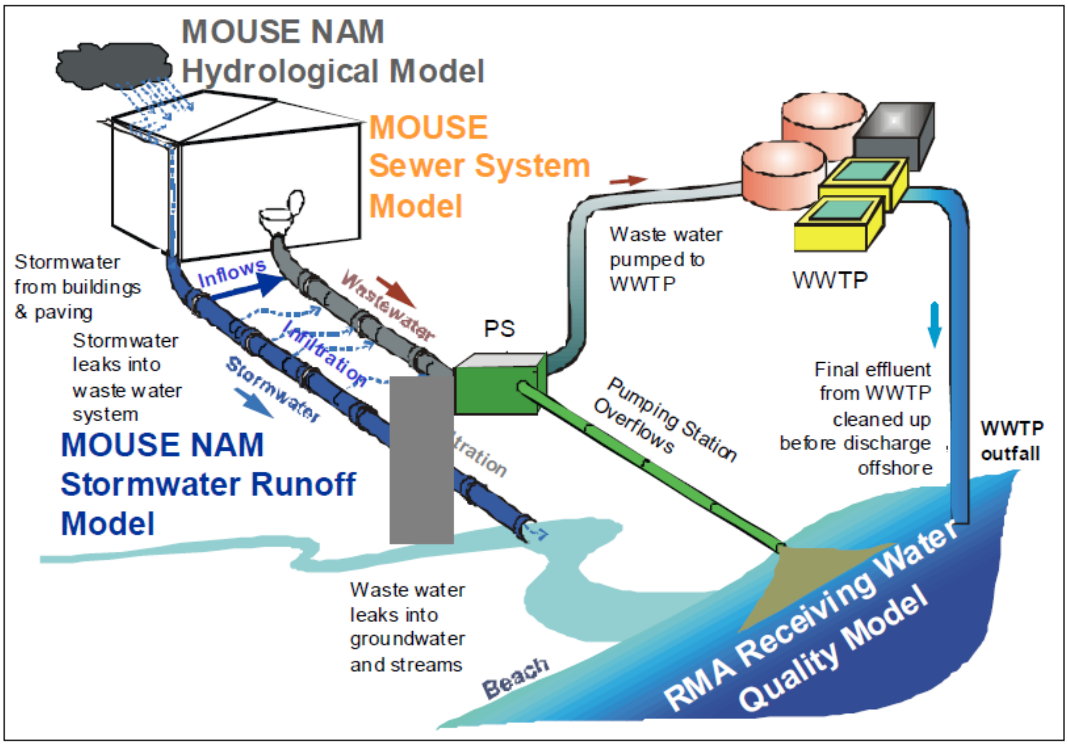
Tunnels were being built in Hong Kong, Singapore and Sydney.

Mr Heijs said a study was also being made into the possibility of relieving the network by building local treatment stations — for example, at Long Bay.

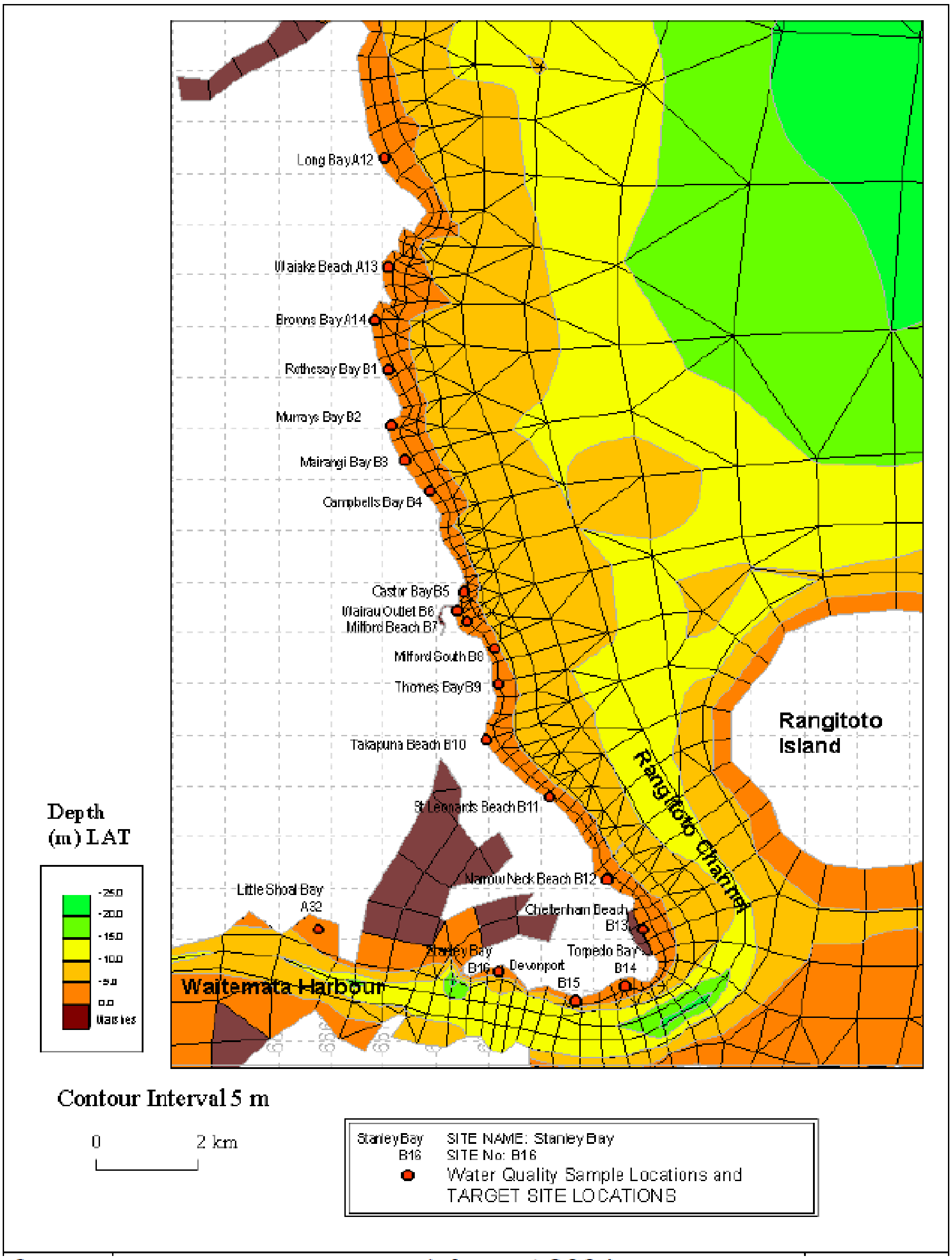
But the chairman of the council's works and environment committee, Bruce Lilly, played down the possibility of Long Bay being a likely candidate for local treatment, despite its growth and the need to provide expensive sewer links to the Rosedale plant.



7.3 Solution Chosen


MOUSE NAM
Hydrological Model
MOUSE
Sewer System
Model
Stormwater
from buildings
& paving
Inflows
Wastewater
Infiltration
Stormwater
leaks into
waste water
system
Stormwater
MOUSE NAM
Stormwater Runoff
Model
Waste water
pumped to
WWTP
WWTP
PS
Pumping Station
Overflows
Final effluent
from WWTP
cleaned up
before discharge
offshore
WWTP
outfall
Waste water
leaks into
groundwater
and streams
Beach
RMA Receiving Water
Quality Model


N
Great Barrier Island
North Shore City's East Coast Beaches
Model Seaward Boundary
Finite Element Model Mesh
Hauraki Gulf
Coromandel Peninsula
Whangaparaoa
Wider Region Influencing Study Area
Rangitoto Island
Auckland City
Manukau Harbour
North Shore City's Sewer & Stormwater Loads



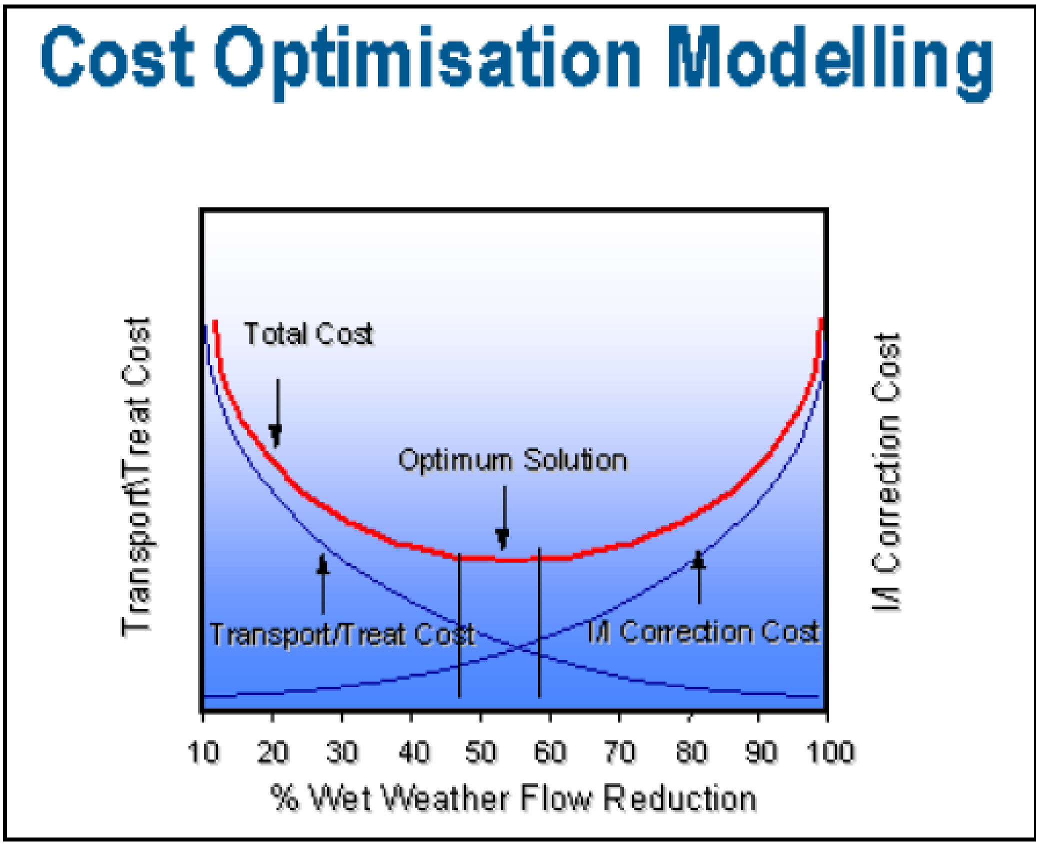
Cost optimisation model

2.3.4.4 Cost optimisation model (SEWCOM)

The Sewer Cost Optimisation Model (SEWCOM) uses an iterative process with performance/cost relationships of each component in the system to perform an option analysis. This model was originally developed for the Sydney Clean Waterways Programme.

The SEWCOM programme lists the various components that make up the overall optimal solution. This includes the:

- Degree of inflow and infiltration rehabilitation that should be conducted for each catchment
- Capacity for new and upgraded components of the wastewater system
- Volumes of storage that would be needed at the desired locations.



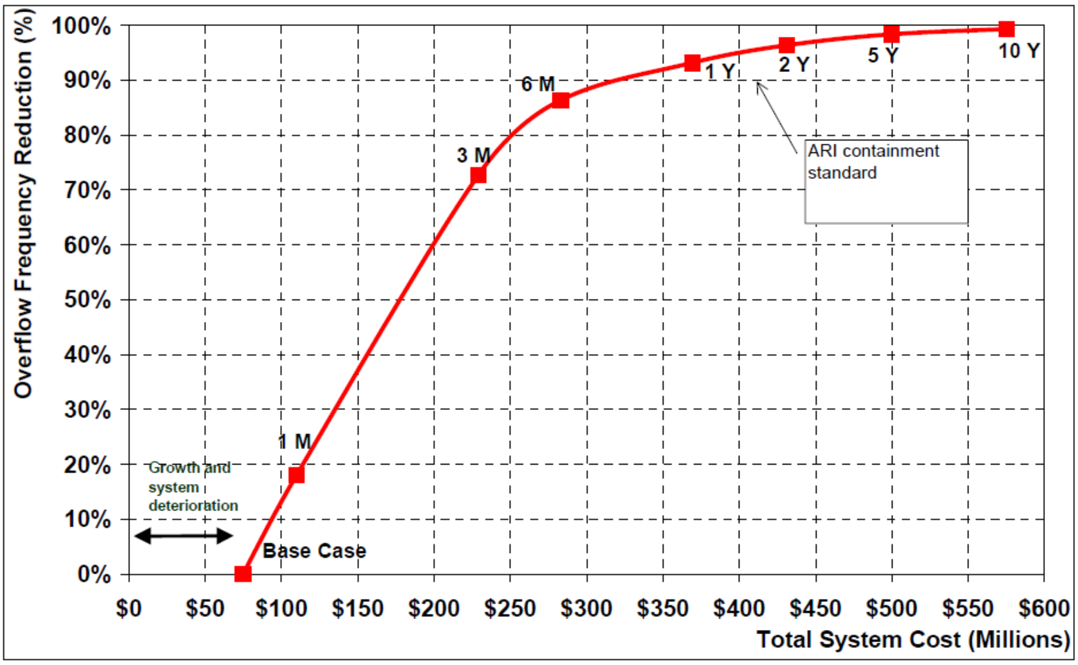


Figure 3-5: 2001 Open Trenched Gravity Pipe Costs.

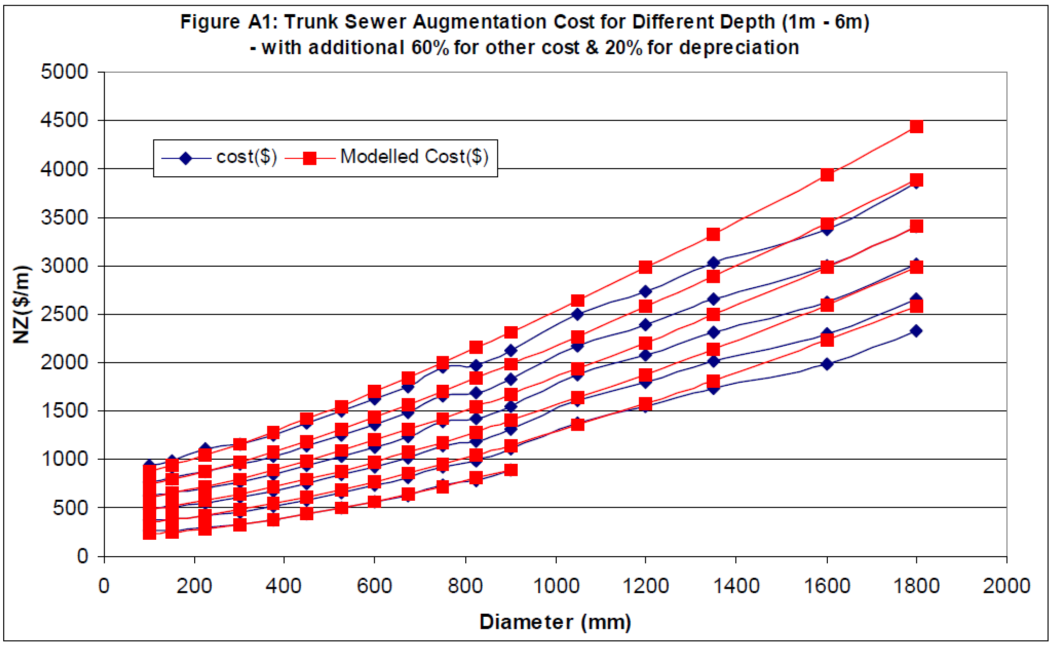
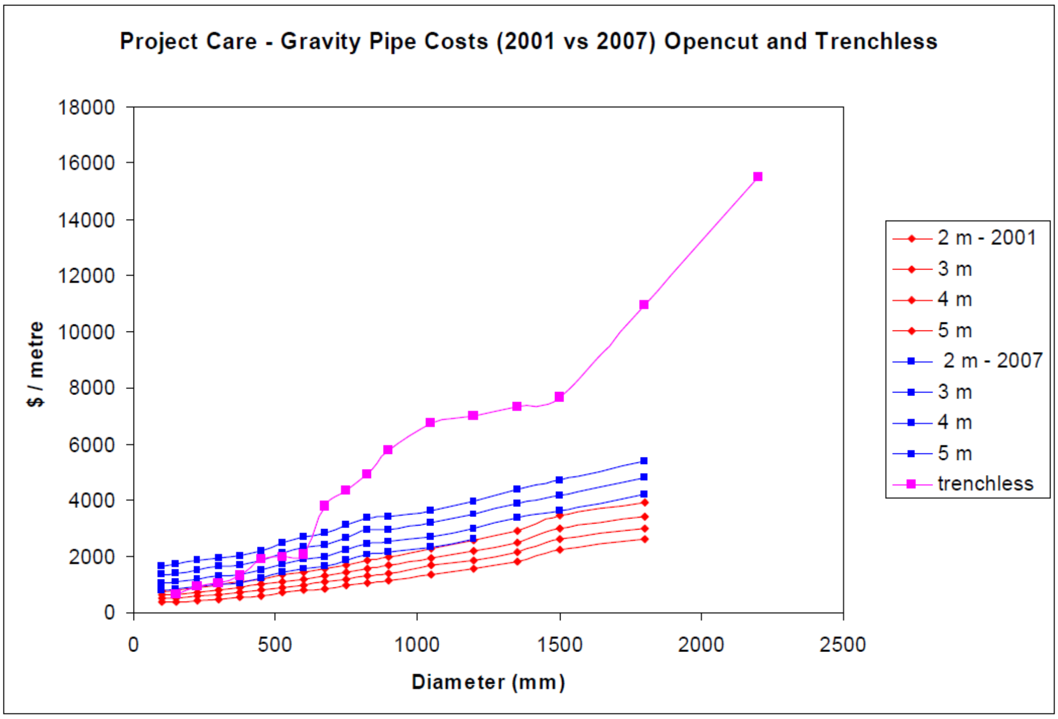


Figure 3-6: 2001 and 2007 Gravity Pipe Costs compared.



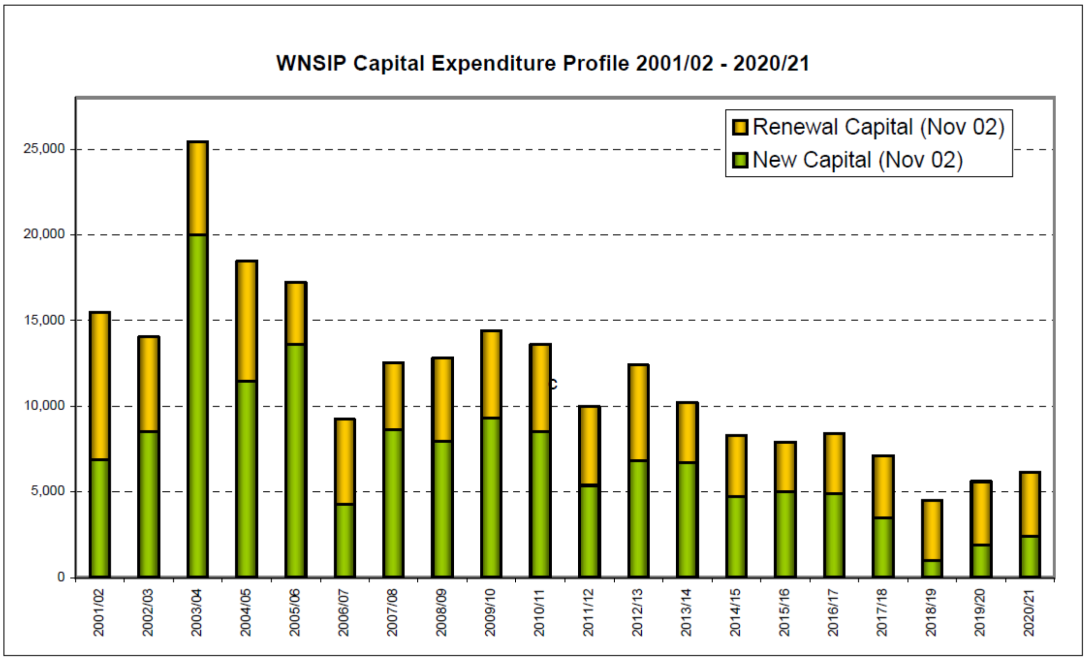
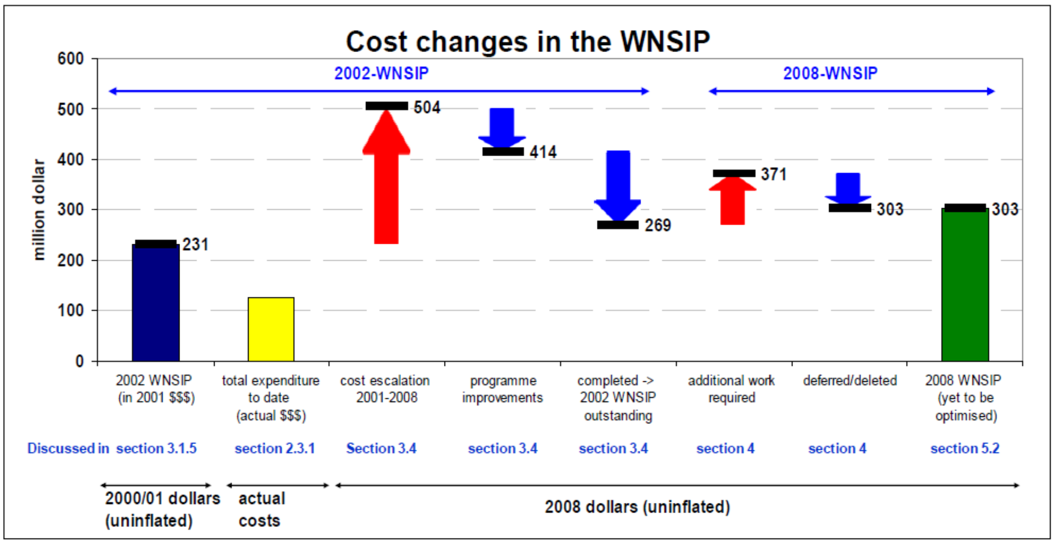


Figure 5-1: Changes in costs between 2002 and 2008.



Project category	**2008 WNSIP Outstanding** 2008 dollars
Storage Tanks	$48 m
Trunk Sewer	$36 m
Pumping Stations and Rising Mains	$54 m
Local Sewers	$98 m
Rehabilitation	$64 m
Planning	$3 m
Total	$303 m

7.4 Asset Lifecycle Innovation

Figure 1-1: Project Care Review Process

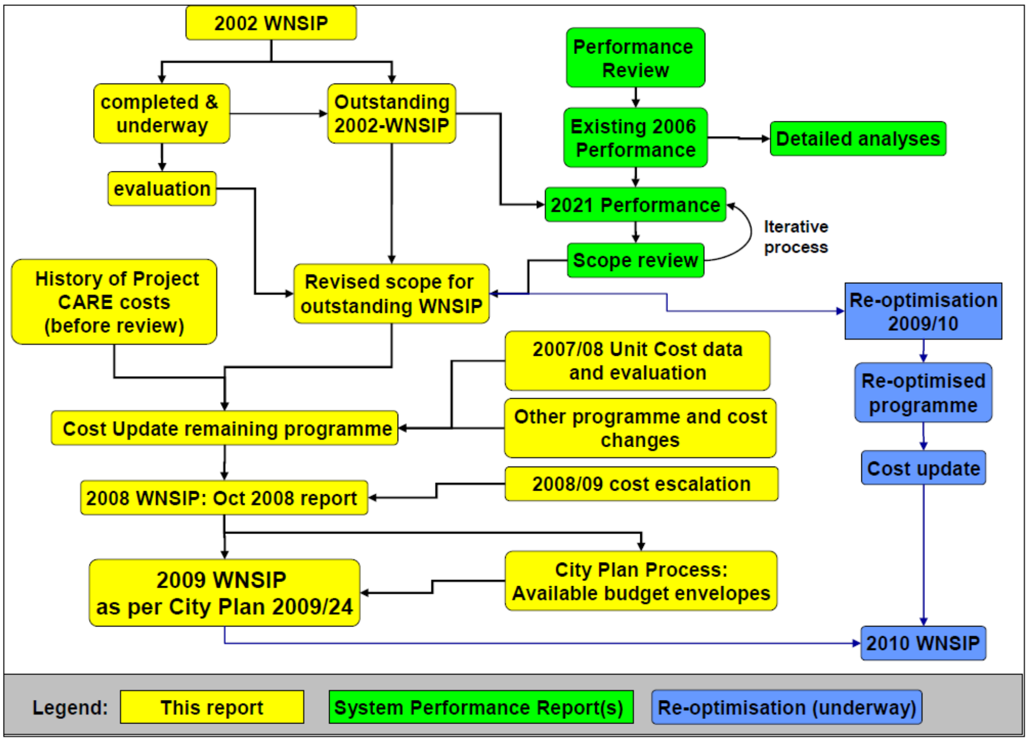


Figure 2-2: trenchless technologies are often used

7.1 The need for re-optimisation

In project CARE, optimisation was used to identify the most optimal mix between different technologies to improve the performance of the network. These technologies are:

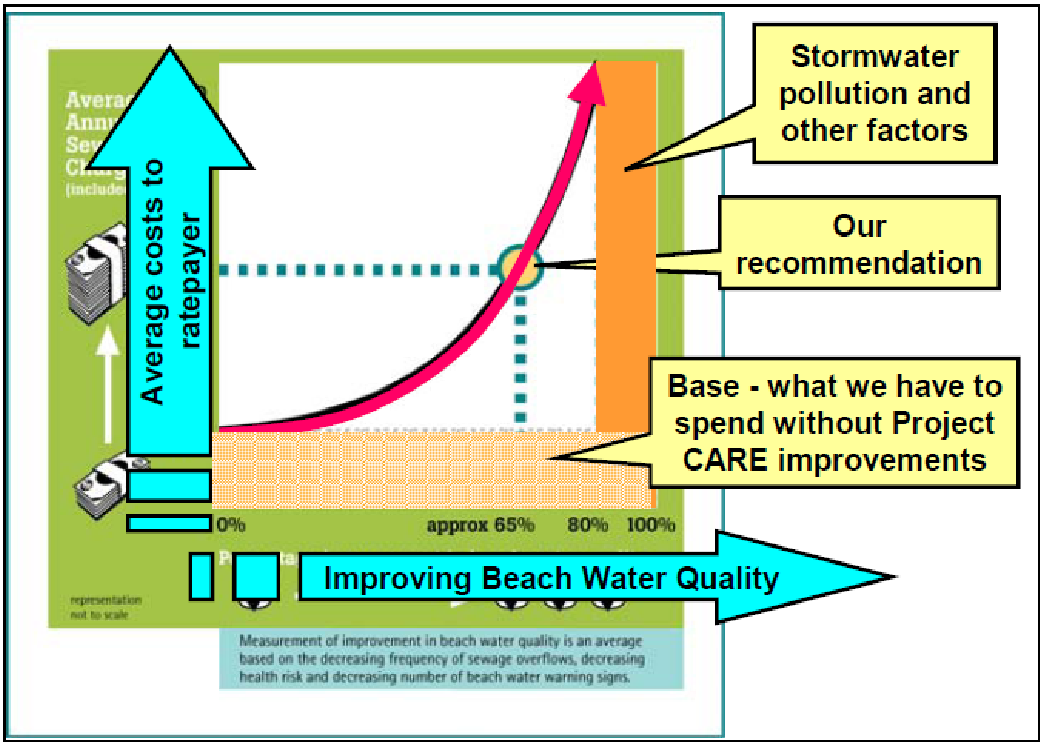
- Sewer rehabilitation aimed at reducing inflow and infiltration
- Increase the capacity of the
  - Trunk Sewer capacity (gravity system, pumping stations and rising mains)
  - Local Reticulation
  - Wastewater treatment plant
- Build network storage capacity
- Provide alternative routes to transfer flows

It is recommended to re-optimise the system as a subsequent phase of the CARE review for the following reasons

- Unit costs have gone up at different rates between the different technologies which will result in a different mix of technologies to achieve the target.
- The additional work identified in section 4 has been based on initial engineering assessments. It is more likely than not that optimisation can identify further savings on the total programme.
- The computer model (SEWCOM) that was used at the time is not commercially available. Other, commercially available software has become available. We have used this software as a pilot in the Albany basin where a further 5 million saving was identified compared to the solution included in the WNSIP. Note that these improvements have subsequently been included in the 2008-WNSIP. We have now chosen to use this new model. It is important to use and test this model to ensure continuity in the future

At the moment this report was finalised (March 2010) the re-optimisation was well underway with reporting expected before 30 June 2010.

Figure 7.3: Cost Benefit Curve



7.5 Acknowledgements

Major projects always require a team effort across Council, Consultants and Contractors. In this project acknowledgement is given to:

NSCC staff:
Geoff Mason
Jan Heijs
Keith Morris
Dave Wood

Consultants:

Jim Hodges

Contractors:

During the planning process a number of papers were accepted in national and international conferences, in recognition of Project CARE. These are summarised in the following Table.

Title of paper accepted	Conference	Focus
An Holistic Approach to Waste Water System Management (Mason, Cadden)	1999 NZWWA Conference	Background, scope and aim
Managing and communicating care for the environment (Wilkinson, Oldham)	1999 NZWWA Conference	Project Management and Consultation
Modelling care (Couriel, Carne)	1999 NZWWA Conference	Modelling tools and methodology
Swimming in yesterday's rain (Hartley, Lewis, Heijs)	NZWWA Conference 2001	Beach water quality sampling
Project CARE (Heijs)	NZWWA modelling workshop, 26 September 2000	Model methodology and lessons learned
Community involvement in stream monitoring programmes on the north shore (Kaczor, Hartley, Heijs)	June 2001, NZWWA stormwater conference	WaiCare and Stream sampling project. Community Involvement
Project CARE: Reducing Wet Weather Overflows to Improve Beach Water Quality (Heijs, Wilkinson, Couriel)	World Water Congress; Berlin 15 – 19th October 2001	Overview, key outcomes, lessons learned
Project CARE; Is sewer rehabilitation really effective?	NZWWA, September 2003	Results of work in Devonport and comparison against what is achieved elsewhere

8.0 INNOVATION TAKES EFFORT AND TIME

9.0 REFERENCE - ASSET LIVES

The tables below are sourced from the New Zealand Infrastructure Asset Valuation and Depreciation Guidelines, 2006

9.1 Road Assets

Asset Group	Asset Type	Component	Typical Useful Lives (Years)
Road	Land	Land under roads	Not applicable
	Carriageway	Pavement formation	Not applicable
		Pavement sub-base	35 - 100 (or not depreciated)
		Pavement basecourse	35 - 100
		Pavement surface	2 - 20
		Shoulder	10 - 100
		Traffic islands	30 - 100
	Footpath/ Footpath crossing	Base	20 - 50
		Surface.	20 - 75
	Berms	See parks section 5.4.	
	Surface water channels	Dished channel Kerb Kerb and channel Surface water channel Slot channel.	50 - 100
	Drainage	Culvert Sump Grid (intake/ outlet) Subsoil drain Water race Catchpit Manhole	50 - 100
Structures	Bridges	Deck	70 - 150
		Beams	70 - 150
		Bearings	30 - 150
		Sub-structure	70 - 150
		Abutments/ retaining walls	70 - 150
		Guard rails	50 - 100
	Major Culverts	Pipes/ barrel Inlet/ outlet structures	70 - 100
	Retaining walls	Main wall Tie backs Drainage system	70 - 100
	Miscellaneous	Underpasses	50 - 150
		Tunnels	500 - 1,000
		Pedestrian bridges	50 - 100
Traffic facilities	Signs	Signs	10 - 15
		Posts	10 - 30
	Hazard marking	Edge marker posts	10 - 15
		Bollards	10 - 15
		Chevron boards	10 - 15
		Bridge end markers	10 - 15
	Railings	Barrier	10 - 15
		Guardrail	10 - 15
		Sight rail	10 - 15
	Markings	Reflective markers	2 - 15
		Edge/ centre lines	1 - 5
		Pedestrian crossings	1 - 5
		Painted shoulder/ islands	1 - 5
		Lettering	1 - 5
		Etc.	
	Traffic Signals	Poles	15 - 30
		Controller	15 - 30
		Aspects	8 - 15
		Cables	30 - 60

Table 5.2.1: Component level and typical useful lives (page 1 of 2) *continued*

Asset Group	Asset Type	Component	Typical Useful Lives (Years)
Street lights	Street lights	Poles Brackets Lanterns Cables (depending on point of supply)	25 - 50 25 - 50 10 - 25 25 - 50
Other	Cycleway	Basecourse Surface	As for footpaths/ carriageways
	Carparking (offstreet)	Pavement layer Pavement surface	As for carriageways
	Parking facilities	Meters Pay display	10 - 20 10 - 20
	SCATS	Telemetry Software Hardware	10 - 20 5 - 10 5 - 10
	Road Reserve Amenities	Seating Rubbish bins Bus stops shelters	5 - 15 3 - 10 15 - 40

Table 5.2.1: Component level and typical useful lives (page 2 of 2)

9.2 Water, Wastewater and Stormwater Assets

Asset Group	Asset Type	Component	Typical Useful Lives (Years)
Water Supply			
Consent			Term of consent
Reticulation	Trunk mains	Pipes	50 - 150
		Line valves	25 - 75
		Hydrant	25 - 75
		Scour valves	25 - 75
		Meters	10 - 35
	Mains	Pipes	50 - 150
		Line valves	25 - 150
		Scour valves	25 - 150
		Meters	10 - 35
	Service lines	Pipes	50 - 100
		Line valves	25 - 100
		Meters	10 - 35
Pump stations	Pump station	Structure	50 - 100
		Electrical control equipment	15 - 35
		Telemetry	10 - 25
		Pumps	10 - 35
		Valves	10 - 35
		Metres	10 - 25
		Pipe-work	15 - 35
Headworks	Intake system	Pipes/ barrel	50 - 100
		Inlet/ outlet structures	75 - 100
	Bores	Bore casing	50 - 75
		Screen	25 - 75
		Pumps	12 - 35
		Electrical Control	15 - 35
		Telemetry	10 - 25
	Dams	Structure	75 - 100
		Mechanical controls	50 - 100
		Electrical controls	15 - 30
	Pump station	(See above)	
Treatment Plant	Site	Land/ landscaping	Not depreciated
		Access roads	50 - 100
		Lighting	15 - 30
		Fences & gates	20 - 50
	Inlet chamber	Structure	75 - 100
		Mechanical gates	50 - 100
		Electrical control	15 - 30
	Settling tanks	Tank	40 - 100
		Valves	20 - 50
	Filter	Structure	40 - 75
		Filter media	5 - 10
	Chemical equipment	Mixing tank	20 - 75
		Doser	10 - 20
		Mixer	10 - 20
		Electrical control equipment	15 - 30
	Pump equipment	See pumping stations above	
	Pipework	Pipes	50 - 100
		Valves	25 - 50
		Meters	25 - 50
Storage	Reservoirs	Site (as for treatment above)	
		Main structure	40 - 100
		Valves	20 - 100
		Meters	10 - 25
		Pipe-work	15 - 100
		Telemetry	10 - 25

Table 5.3.1: Component level and typical useful lives (Page 1 of 4) *continued*

Asset Group	Asset Type	Component	Typical Useful Lives (Years)
Wastewater			
Consent			Term of consent
Reticulation	Gravity Mains	Pipes	40 - 150
		Manholes	60 - 100
		Cleaning access	75 - 100
		Flush tanks	75 - 100
	Service lines	Pipes	40 - 150
		Chambers	60 - 100
	Rising Main	Pipes	40 - 100
		Valves	20 - 50
	Outfall	Structure/ diffuser	60 - 100
		Pipes	60 - 100
		Chambers	60 - 100
	Pump stations	Structure- wet wells	50 - 100
		Structure- pump house	35 - 100
		Electrical control equipment	10 - 30
		Telemetry	10 - 20
		Pumps	10 - 30
		Valves	15 - 30
		Meters	10 - 25
		Pipe-work	15 - 30
Treatment Plant	Site	Land	Not depreciated
		Landscaping	Not depreciated
		Access roads	50 - 100
		Lighting	15 - 30
		Fences & gates	15 - 50
	Inlet works	Chambers	75 - 100
		Screens	15 - 50
		Channels	75 - 100
		Electrical controls	15 - 30
	Sedimentation tanks	Structure	50 - 100
		Bridges/ handrails	50 - 100
		Valves	15 - 50
		Scrapers	25 - 50
		Pipe-work	50 - 100
		Electrical control	15 - 30
	Trickling Filter	Structure	40 - 100
		Filter media	5 - 15
		Pipes	40 - 100
	Digesters	Structure	40 - 100
		Mixer	10 - 25
		Electrical control	15 - 30
	Chemical equipment	Mixing tank	15 - 75
		Doser	5 - 25
		Mechanical Mixer	10 - 25
		Electrical control equipment	15 - 30
	Oxidation ponds	Earthworks	Not depreciated
		Liner	50 - 100
		Waveband	25 - 75
		Inlet/ outlet structures	50 - 75
	Pumping Equipment	(See pump stations above)	
	Pipework	Pipes	40 - 75
		Valves	25 - 75
		Meters	10 - 25

Table 5.3.1: Component level and typical useful lives (Page 2 of 3)

continued

Asset Group	Asset Type	Component	Typical Useful Lives (Years)
Stormwater			
Consent			Term of consent
Reticulation	Gravity Mains	Pipes	60 - 150
		Manholes	60 - 100
		Pits	60 - 100
		Inlet/ outlet structures	60 - 100
		Dissipaters	60 - 100
		Drop structure	60 - 100
	Rising Mains	Pipes	50 - 80
		Valves	25 - 40
	Open Channels	Channel	60 - 100
		Channel lining	20 - 75
		Control structure	50 - 100
	Pump stations	Structure - wet wells	50 - 100
		Structure - pump house	35 - 100
		Electrical control equipment	15 - 35
		Telemetry	10 - 20
		Pumps	10 - 35
		Valves	15 - 35
		Meters	15 - 35
		Pipe-work	15 - 35

Table 5.3.1: Component level and typical useful lives (Page 3 of 3)

9.3 Parks and Recreation Assets

Asset Group	Asset Type	Component	Typical Useful Lives (Years)
Parks and Gardens			
Horticulture & Arboriculture	Shrubbery - Ornamental - Native	Irrigation	20 - 40
		Plants	15 - 25
		Mulch	Not capitalised
		Edging - Concrete/stone	30 - 40
		Edging - Timber	10 - 30
	Gardens	Annual beds	Not capitalised
		Rose beds	10 - 15
		Shrub beds	15 - 25
		Mulch	Not capitalised
		Irrigation	20 - 40
		Edging - Concrete/stone	30 - 40
		Edging - Timber	10 - 30
	Grassland	Grass	Not capitalised
		High amenity grass	Not capitalised
		Grass sports field	20 - 35
		Sand carpet field	10 - 20
		Drainage	20 - 40
		Irrigation	20 - 40
	Trees	Tree	50 - 100
		Stake / support	Not capitalised
		Protection cage	Not capitalised
		Mulch	Not capitalised
		Irrigation	20 - 40
Park furniture and fittings	Play Equipment	Under-surfacing (rubber, bark, sand)	8 - 15
		Under-surfacing edging (timber)	8 - 15
		Structure	
		- Modern modular small	10 - 25
		- Modern modular medium	10 - 25
		- Modern modular large	10 - 25
		- Old Adventure Fort / Structure	20 - 30
		- Individual Item	10 - 25
	Barbecue	Barbecue (electric, gas, open)	15 - 25
		Roof (Tile)	25 - 30
		Structure (Stone)	50 - 10
	Flying Fox	Gantry/ Landing platform	15 - 25
		Cable	15 - 25
	Seating	Seat (timber, metal, plastic)	15 - 25
	Picnic Tables	Table (timber, metal)	15 - 25
	Rubbish Bins	Bin (timber, steel/ wire mesh, metal, plastic, concrete)	8 - 12 (or not capitalised)
	Lights	Poles	15 - 30
		Brackets	15 - 30
		Lanterns	15 - 30
		Cable	15 - 30
	Signs	Sign	8 - 15
		Posts	8 - 15
	Fences	Fence (timber, steel, wire)	20 - 30
		Barriers (timber, chain, tube)	15 - 25
	Gates	Gate -timber, steel	20 - 30
		Gate- wrought iron	50 - 80
Structures	Walls	Wall -stone, concrete	50 - 100
		Wall - punga, timber	15 - 30
	Bridges	Bridge- timber	25 - 50
		Bridge- stone masonry	50 - 80
	Monuments/ Memorials	Structure - stone, masonry	70 - 80
	Pergolas	Structure- timber	25 - 50

Table 5.4.1: Components and Useful Lives for Parks and Recreation Assets (Page 1 of 3) *continued*

Asset Group	Asset Type	Component	Typical Useful Lives (Years)
Parks and Gardens (continued)			
Water Features	Fountains	Structure Pumps Electrical components Pipe-work and fittings	50 - 80 15 - 25 15 - 25 15 - 25
	Ponds	Structure	30 - 50
Services			
Roads & Parking Areas	Pavements	See road section.	
Footpaths	Footpaths	See road section.	
	Unsurfaced Track	Track sub-base Edging	15 - 25 10 - 25
	Timber Steps And Boardwalks	Deck Beams Sub-structure Hand rails	25 - 40 25 - 40 25 - 40 15 - 25
Artificial/ Natural Surfaces	Natural (Lime, Soil, Clay, Sand & Shell)	Edging	15 - 25
	Textile (Open Textured, Particle/ Water Filled e.g. Astroturf)	Base construction Surface Irrigation	80 - 100 20 - 40 20 - 40
	Polymeric (Rubber, PU, Acrylic, PVC e.g. Rubcor)	Base construction Surface type Edging	80 - 100 20 - 40 20 - 40
	Court Surfacing (e.g. Synpave/ Plexipave)	Base construction Surface type Edging	80 - 100 25 - 40 20 - 40
Irrigation	Pipelines	Construction material Bedding material	20 - 40 80 - 100
	Fittings	Valves Sprinkler heads	8 - 15 10 - 15
Sewer		See wastewater section.	
Stormwater		See stormwater section.	
Water		See water supply section.	
Buildings/Facilities			
Buildings	Site	Landscaping Driveways/ car parking Paths Lighting (lanterns, poles, cables) Fences	15 - 25 20 - 75 20 - 75 25 - 50 20 - 30
	Structure	Walls (concrete, timber, brick, etc.) Roof (steel, tile)	50 - 100 25 - 30
	Fittings & furnishings	Floor coverings (carpet/ vinyl, tiles, rubber, etc). Interior Lighting Plumbing	

Table 5.4.1: Components and Useful Lives for Parks and Recreation Assets (Page 2 of 3) *continued*

Asset Group	Asset Type	Component	Typical Useful Lives (Years)
Buildings/Facilities (continued)			
	Mechanical and Electrical Plant (General)	Lifts Fire Protection System Security System/Alarms Electrical switchboard HVAC System - mechancial plant HVAC System - electrical equipment	10 - 50
	Service connections	Sewerage Water supply Gas Electricity	50 - 100
Aquatic Facilities	Building/Site/ Services	As above	
	Pool	Structure	
		Lining (e.g. tiles)	
	Equipment	Diving board Time-clock Lane dividers	30 - 50 15 - 25 10 - 15
	Water treatment	see water section.	
Outdoor Sport Facilities	Hard Courts	Base Surface Fences Lighting	80 - 100 25 - 40 20 - 30 15 - 30
	Artificial Playing Surfaces	Base Surface	80 - 100 25 - 40

Table 5.4.1: Components and Useful Lives for Parks and Recreation Assets (Page 3 of 3)

9.4 Property Assets

Component Level 1	Component Level 2	Component Level 3	Types/materials	Typical Physical Life
STRUCTURE	Foundation	Base	Concrete Block or Slab	100-125
		Piling	Concrete or timber	50-100
	Floor Structure	Main floor sub-structure	T&G, particle board, etc	75-100
		Internal Stairs & Landings	T&G, particle board, etc	75-100
	Frame / Structural Walls	Walls	Brick Masonry, concrete, pre-cast, blockwork, steel framed, structural steel, timber framed	75-100
		Roof Structure / Frame		
	External Wall Cladding	External wall cladding	Aluminium, brick cladding, curtain walling, fibrolite, hardiplank, marble, metal, plaster, plywood, precast concrete, PVC weatherboards, shiplap.	50 – 75
			Marble, precast concrete panels	100-150
	Roof	Roofing	Butynol, colour steel, compressed fibre, decramastic, metal, shingles	20 - 50
			Concrete slabs, concrete/ slate tiles	75 - 100
			Paint Finish	10-20
		Skylight	Skylight	30-50
		Soffits	Soffits - Fibrolite, timber	50-75
		Downpipes/spouting	Metal/PVC	25-40
	Windows & External Doors	Doors	Sliding, double, single, timber, metal clad, glass	35-50
			Automatic Opening Doors	25-35
		Windows	Aluminium, louvre, timber	35-50
FITOUT	Ceilings	Ceiling/lining	Particle Board, fibrolite, gib-board, timber.	50-75
		Fibrolite	Fibrolite	50-75
		Insulation	Insulation	50-75
		Finish	Paint	10-20
			Plaster/pinex/panel	50-75
	Internal Walls	Lining	Hardboard, gib-board, tiles, timber, fibrolite, melteca, particle board, glass	35-75
		Finish	Paint/wallpaper	10-20
			Plaster/pinex/panel	50-75
	Exterior Trimmings	Covers	Canopies / Sun Screens / Awnings/ verandah roof	20-30
		Staircase	Metal/timber	50-75
		Verandah / decks / covered ways		50-75
	Windows & Doors	Doors	Accordion / Folding / solid timber/ hollow/ fire doors/ metal/ sliding	20-50
		Windows	Metal/timber	50-75
	Floor Finishes	Floor finishes	Carpet, polyurethane, vinyl,	10-25
			Ceramic tiles, parquet	30-50
	Fixtures & Fittings	Fixed Desks, Tables, Seating	Fixed Desks, Tables, Seating	20-50
		Joinery Fttgs - Built-in	Joinery Fttgs - Built-in	40-75
		Kitchen Bench S/S	Kitchen Bench S/S	40-65
		Paint Finish	Paint Finish	10-20
		Shelving	Shelving	35-50
		Work Benches	Work Benches	40-75
		Hot Water Cylinder	Hot Water Cylinder	25-35

Table 5.6.3: Typical Physical Lives for Property Assets (Page 1 of 2)

Component Level 1	Component Level 2	Component Level 3	Types/materials	Typical Physical Life
		Zip Heater	Zip Heater	15-25
		Stoves	Stoves	15-25
SERVICES	Electrical Services	Cabling / Internal Wiring	Cabling / Internal Wiring	40-75
		Lights	Display, exit, emergency, flood, fluorescent, incandescent, points, security	15 - 30
		Main Fusebox	Main Fusebox	40-60
		Main Switch Board	Main Switch Board	40-60
		Meter Boxes	Meter Boxes	40-60
	Heating & Ventilation	Air Conditioners - through wall/window		10-25
		Air Handler Units		20-30
		Boilers		20-35
		Chillers		20-35
		Cooling Tower		20-35
		Ductwork		25-40
		Fan Coil Units		20-30
		Fireplaces		50-75
		Flues		35-50
		Heat Exchanger		25-40
		Piping		25-50
		Radiators eg Oil Filled		30-50
		Space Heaters		25-40
		Split Air Conditioning Units		10-25
		Underfloor, Wall &/or Ceiling Heating		35-50
		Water Pump		7-15
	Lifts / Hoist	Cleaner Cradle - BMU		25-35
		Escalators		25-40
		Goods and Service Lift		30-50
		Passenger Lift - Traction		30-50
		Passenger Lift - Hydraulic		25-40
		Pulley hoists		25-35
		Walkways (moving)		25-35
	Sanitary Plumbing	Bath	Bath	50-75
		Handbasin	Handbasin	35-50
		Laundry Tub	Laundry Tub	35-50
		Mirror	Mirror	20-30
		Shower Unit(s)	Shower Unit(s)	35-50
		Vanity Unit incl Basin	Vanity Unit incl Basin	25-40
		Grabrails	Grabrails	25-40
		Taps	Generic Taps	20-50
		Toilets	Toilet Bowl /Cistern	35-50
		Urinal		35-50
	Special Services	Barrier arms	Barrier arms	20-30
		Card Reader	Card Reader	15-25
		CCTV Camera / Monitor	CCTV Camera / Monitor	5-7
		Electronic Security System		10-15
		Fire services	Extinguishers, heat detectors, sprinklers, alarms, pumps	10-30
		Generators (Standby)	Generators (Standby)	20-30
		Ventilating Fans	Ventilating Fans	25-35
		Pool	Chemical Dosing Equipment/tanks	10-20
			Concrete Tank	50-70
			Filters	25-35
			Heaters / Boilers	15-25
			Piping (PVC)	40-60
			Pumps	5-15
			Tiles	10-20
			Valves	10-20
SITE FEATURES	Driveway / Access	see table 5.2.1		30-50
	Drainage	see table 5.3.1		35-50
	Footpaths/Fences/etc	see table 5.4.1		40-60

Table 5.6.3: Typical Physical Lives for Property Assets (Page 2 of 2)