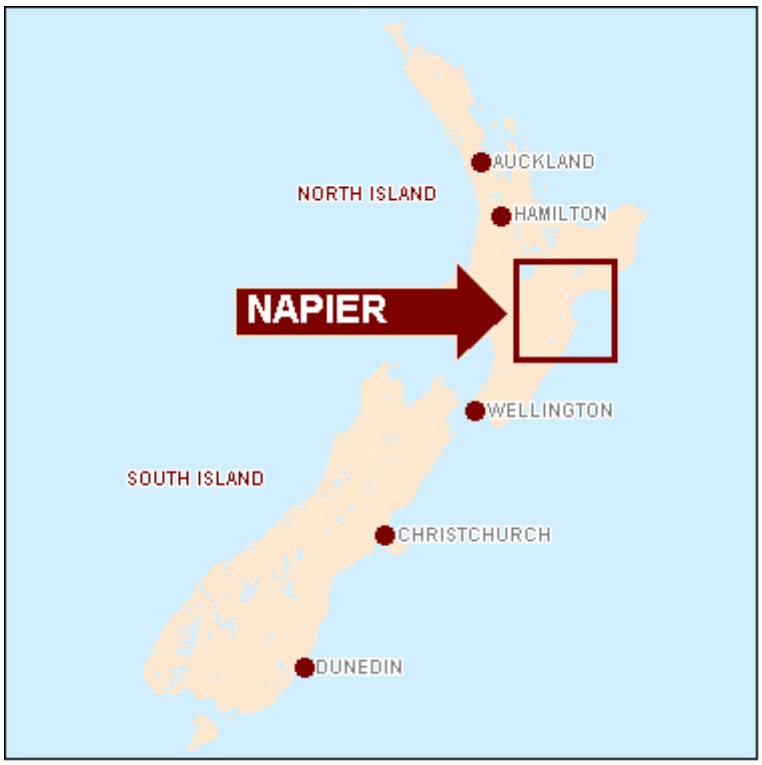
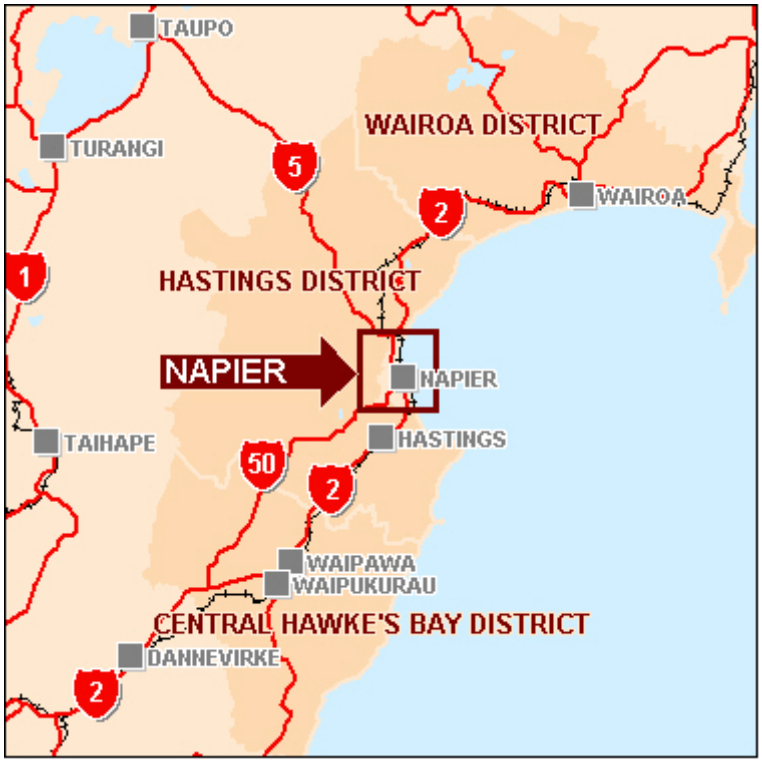
WATER AND SANITARY SERVICES ASSESSMENT 2005

22 June 2005





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OVERVIEW

This Water and Sanitary Services Assessment describes how water and sanitary services are provided in the Napier District, who provides them, where the public and private delineation of responsibility lies, and the authoritative liaisons in place to monitor public health aspects of these services.

Water services are Water supply, Stormwater disposal, Wastewater disposal, and Wastewater Treatment. Sanitary services are Public Toilets, Cemeteries, and Crematoria.

The assessment defines community areas in the Napier City Council District and describes the current resident population, from the 2001 Census and the expected population growth as identified in the Napier Urban Growth Strategy 1999. It describes the effect growth has on services and the current and future demand for services. It also identifies options and describes Napier City Council's role and proposals in meeting these demands.

A description of the water and sanitary services currently serving each community allows identification of any inadequacy of water and sanitary services, based on 2001 census population, current infrastructure capability, and currently available information on private services.

For all reticulated water and sanitary services, the assessment shows how current and future needs are addressed through the 10-year capital plan. Water services in privately served areas are predominantly non-reticulated. The assessment has not identified any areas where public health is at risk at present, and shows that the planning and regulatory controls in place are sufficient to protect public health into the future. However, the assessment identifies potential issues relating to operation and maintenance of privately owned systems, such as rainwater supplies and poorly maintained septic tanks. The assessment provides information on control measures.

A comprehensive description of the health impact of services shows the potential risks associated with inadequate public and private water and sanitary services, and helps address any identified public health risks, of current or future inadequacy of service, point by point.

The information on available technologies for services, provides a wide range of options when determining solutions to service needs, and shows the suitability of the options to the Napier City Council geographical area.

Finally presented are the limitations to the completeness of the assessment and the comments from the Medical officer of Health. Given, for future reference, are some recommended health risk management guidelines, relating to private systems, for further exploration and potential use by both private owners and Council.

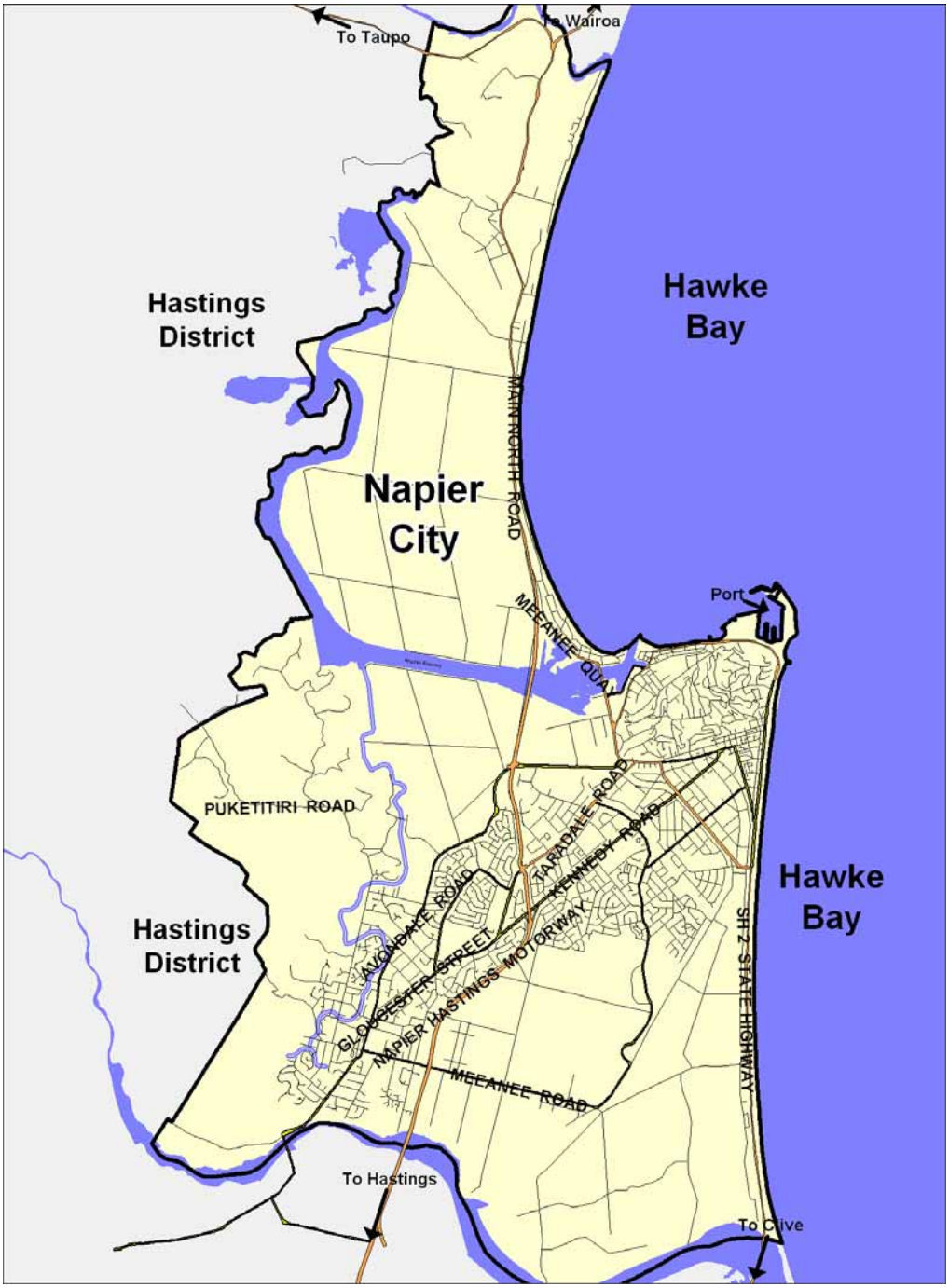
To Taupo
To Wairoa
Hastings District
Hawke Bay
Napier City
MAIN NORTH ROAD
MEEANEE QUAY
Port
PUKETITIRI ROAD
TARADALE ROAD
KENNEDY ROAD
AVONDALE ROAD
GLOUCESTER STREET
NAPIER HASTINGS MOTORWAY
MEEANEE ROAD
SH 2 STATE HIGHWAY
Hawke Bay
Hastings District
To Hastings
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TABLE OF CONTENTS

Abbreviations

EIT	Eastern Institute of Technology
ESR	Institute of Environmental Science and Research Limited
GIS	Geographical Information System
GPS	Global Positioning System
HBRC	Hawke's' Bay Regional Council
HDC	Hastings District Council
HPFCS	Heretaunga Plains Flood Control Scheme
IT	Information Technology
LGA	Local Government Act
LIM	Land Information Memorandum
LTCCP	Long Term Council Community Plan
MoH	Ministry of Health
NCC	Napier City Council
NZDWS	New Zealand Drinking Water Standards
RRMP	Regional Resources Management Plan
RMA	Resource Management Act
SWTS	Secondary On-site Wastewater Treatment System
WSSA	Water and Sanitary Services Assessment

Index of Tables

Index of Figures

1 INTRODUCTION

1.1 Legislative Requirements

Section 125 of the Local Government Act 2002, requires that Council, from time to time, assess the provision of water and other sanitary services within its district. This includes both private arrangements and the Council owned and operated services.

The Long Term Council Community Plan 2003 does not include a Water and Sanitary Services Assessment, as is permitted by legislation, LGA section 125: therefore, pursuant to Section 285, one must be adopted by 30th June 2005, using the special consultative procedure.

1.2 Scope

The specific obligation to assess water and sanitary services requires the Council to assess provision within its district of Water Services and Other Sanitary Services, and allows that they may be assessed together. The assessment relates to water services and other sanitary services available to communities in the Napier City Council district. Note it does not include assessments in relation to individual properties. For the purposes of this assessment;

Water services are:

- Water supply
- Stormwater disposal
- Wastewater disposal
- Wastewater treatment

Sanitary services are:

- Public Toilets
- Cemeteries
- Crematoria
- Refuse

The focus of the assessment is public health issues relating to water and sanitary service provision or the lack thereof. The environmental standpoint of water use and sanitation is also an important issue: however, it is generally outside the scope of this assessment and this report generally does not directly address the subject.

Public health risk in the context of this assessment relates to the disease transmission and potential for illness from in-sanitary conditions, rather than any threat of physical injury from water and sanitary services activities. Health and Safety legislation, building regulations and civil defence practises adequately cover physical injury aspects.

The growth figures used in this assessment are for the planning period 2004-2021.

1.3 Definitions

Interpretation of terms for the purpose of this assessment from LGA 2002, section 124 and the Health Act 1956 Section 25 (1 a-d, h & i) are shown in Table 1.

Table 1 – Water and Sanitary Services Definitions

Term	Meaning
Water Services	Water supply and wastewater services
Wastewater services	Sewerage, treatment and disposal of sewage, and stormwater drainage
Water supply	Provision of drinking water to communities by network reticulation to the point of supply of each dwelling house and commercial premise to which drinking water is supplied
Other sanitary services	Works for the collection and disposal of refuse, night soil, and other offensive matter
	Sanitary conveniences for the use of the public
	Cemeteries
	Crematoria

Under LGA 2002, section 129, the Council must endeavour to make a full and balanced assessment. However, the extent to which information is required is that which the Council considers appropriate with regard to:

- the significance of the information
- the cost and difficulty in obtaining the information
- the extent of Council resources
- the possibility that the Council may be directed under the Health Act 1956 to provide the services

Finally, the Summary of Water and Sanitary Services Assessment required for the special consultative procedure, section 89 LGA 2002, must be a fair representation of the major matters and may be in any suitable form determined by Council.

1.4 Frame of Reference

This assessment identifies the links and interactions between aspects of water and sanitary services both within Council, by communities, private properties and other organisations. It identifies the effects relating to health that planning, engineering, and environmental health activities have and demonstrates how Council manages this process.

The services assessment has reviewed all geographical areas in the Napier District, grouped into appropriate communities, in order to fully describe both public and private services in their current form and identify current demands. The assessment also identifies inadequacies or limitations of the existing systems, and indicates how to manage expected future demands. The description of the wastewater, water supply, and stormwater services lend heavily from the Essential Services Development Reports 2000.

Note; the diagrams in this document are schematics only and serve as a guide. They are compiled from Napier City Council records where they exist but their accuracy or completeness is not

intended or guaranteed. All serving requirements must be discussed with the services engineer on a case-by-case basis.

1.5 Purpose

The full identification of water and other sanitary services activities is important in directing plans to alleviate any health issues. Where comprehensive information is available, it allows better management of the environmental impact of activities on surrounding areas.

The services assessment gives a risk assessment of each designated area or system and provides a variety of information relating to health and related environmental impacts. The assessment also identifies all areas in the district where there may be a need for a future additional public or private reticulated water supply system. More specifically, the assessment indicates the limits of Council responsibility by identifying all communities in the district where the Council currently has no intention of providing water services in the future, unless a (presently unforeseen) public health hazard becomes evident, or the local residents ask the Council to do so and they (and any affected sub-dividers/developers) are prepared to meet the costs.

1.6 Inclusions

The process for making the Water and Sanitary Services Assessment takes account of the duties of section 23 of the Health Act 1956, which relates to improving, promoting, and protecting public health. In assessing the current and future demands, a full range of options are considered, and their environmental and public health impacts, including,

- on-site collection and disposal
- grey water and storm water re-use and recycling where water is scarce
- demand reduction strategies
- the full range of technologies available
- what is already being used, considered and promoted

In accordance with LGA 2002 section 128, comments from the Medical Officer of Health are considered and are included in the conclusion.

1.7 Exclusions

Refuse services are not included in this plan as it is considered to have been adequately addressed in the Solid Waste Management Plan 2000 as permitted by the LGA, section 128.

1.8 Consultative Procedure

The Draft Water and Sanitary Services Assessment (WSSA) was subject to Public Consultation fully in accordance with the Local Government Act 2002, summarised as follows;

A brief overview of the information contained in the DRAFT Water and Sanitary Services Assessment was published in the edition of "Proudly Napier" distributed to households as an insert in the Napier Mail on 16 Feb 2005.

The Draft WSSA and the Summary of the Information contained in the Draft WSSA document were available for viewing at the Council offices, Taradale Library and Napier Library. It was also available on the NCC website www.napier.govt.nz.

The **Timetable for Consultative Procedure for the WSSA** was

Wednesday 2 March 2005 3.00pm	Decision of Council to adopt the Draft WSSA
Saturday 5 March 2005	Draft WSSA available to public and public submissions open
FRIDAY 15 April 2005 NOON	**SUBMISSIONS CLOSED**
Thursday/Friday 26/27 May 2005 9.00am – 4.00pm	Hearings Committee Meeting heard and considered public submissions
Wednesday 22 June 2005 3.00pm	Ordinary Council Meeting at which the WSSA was adopted

All enquiries about the WSSA should be directed to: Works Asset Department, Phone 835 7579.

2 PROVISION OF WATER AND SANITARY SERVICES

2.1 Public/Private Responsibility

The provision of water, sanitary and other services are by:

- Council owned and operated reticulated services
- Non-Council owned and operated reticulated services
- Privately owned on-site systems serving single dwellings

Residents choose to live in rural un-serviced areas, for reasons of economy or lifestyle, and it is their responsibility to provide the on-site services, i.e. A 'user pays' principle. Private serviced areas can incur significant costs of providing water and sanitary services including:

- Drilling of bores
- On-site wastewater systems
- Treatment systems
- Excavation/earthworks

Napier City Council's view on providing public services is that there is an existing customer base, and it is they as beneficiaries (ratepayers) that fund the current infrastructure including operation, maintenance and replacement expenditure. Developers or owners meet the cost of initial installation of systems and ratepayers meet the ongoing costs.

In terms of the District Plan, for in-fill and greenfield development, the well-established financial contributions cover any upgrade costs to the system to cater for the extra demand. Changes in level of service are funded by the whole of the community.

For greenfield development and infill outside the reticulated areas, the options for providing reticulated services (whether by Council or private owner) are more fluid, based on considerations such as:

- Scale of development
- Cost effectiveness
- Proximity and compatibility to existing system
- Effect on existing system
- Existing/new customer benefit ratio
- Technical feasibility
- Ownership

The developer is still responsible for all the costs involved in upgrading the system if needed and providing the local off site infrastructure.

2.2 Levels of Service

Council maintains the standard of public and private services through regulatory requirements[1], which define the specific requirements for individual property owners and developers regarding infrastructural services. These rules cover all properties, where people live or work, thus maintaining a minimum standard of habitation that ensures public health protection. The NCC environmental health unit responds to any failure of the service, to provide a sanitary environment, once reported.

The legislative requirements are the most important from a health perspective, as it is here where Council is obliged to provide a minimum level of service, which protects public health. However, there will always be technical limitations to the capacity the system can offer, where the increase in level of service benefit is disproportionate to the additional cost.

Expectations of communities alone are not enough to prompt the provision of services. There must be clear acknowledgment by residents of the private/public benefit principle, and compromise with Council on an affordable solution. If cumulative problems arise in the effectiveness of private services, that have a public health implication, it is unreasonable for owners to expect Council to bear the costs of any solutions.

In the event of an identified public health issue, Council may pursue the provision of services. Available methods, depending on the identified benefits to individuals and the wider community, include fully funded provisions, if necessary, or through enforcement and working with other agencies to require owners, at their own cost, to provide upgrades or improvements to private property.

2.3 External Liaisons

In addition to the District Plan regulations, the Hawke's Bay Regional Council regulates the effects relating to the provision of water and sanitary services, through such management tools as the Heretaunga Plains Flood Control Scheme, for stormwater. Resource consent is required for discretionary, restricted discretionary and controlled activities, which with relevance to this assessment include:

- discharging waste into water, onto land or into air
- taking, damming or diverting natural water

[1] Code of Practice for Subdivision and Land Development-Parts A, B & C.

Under the RMA 1991 water abstraction for ones own reasonable[2] individual domestic use is allowed as of right, therefore resource consent is not required. However, a bore permit is needed. Under Rule 51 of the HBRC Regional Resource Management Plan 2001, Up to 20m^3/day is permitted for other purposes except in the excluded groundwater management zones shown in schedule VI of the plan. For the Napier district area not serviced by the Council reticulated water supply, these communities are the Redclyffe Hills, Poraiti Hills and the northern spur of Bay View Rural. In these areas, all takes for other purposes, including community bores, are subject to resource consent.

Health related standards applicable to water and sanitary services are:

- Health Act 1956
- Burials and Cremations Act 1964
- Building Act 1991 and 2004 - sanitation provisions
- NZ Drinking Water Standards 2000

The Medical Officer of Health monitors incidence of disease in the region and liaises with NCC officers and asset managers on potential health risks.

2.4 Environmental health monitoring

2.4.1 Procedures/Policies

The environmental health unit generally monitors and reports on public health issues on a case-by-case basis. Their well-established standard practices take guidance from Planning Policy – Dangerous and In-sanitary Buildings: Council: 24/2/93 B80-0001, and the Health Act 1956.

2.4.2 Targeted Data Collection

The environmental health officers have begun a process of targeted data collection at the individual property level for rural private water services, in aspects of:

- provision and location
- treatment
- adequacy
- adverse effects

This process has been running approximately 1 year but does not yet include all rural areas. The data so far relates mainly to Poraiti, and a little for Kaimata and Meeanee rural. The purposes of this data collection is to provide a meaningful picture at a broader level, thus it needs to be

[2] Definition: With respect to the taking and use of an Individual's reasonable domestic needs, as a guideline this should involve the taking and use of up to 15m^3 over any seven day period per dwellinghouse. Glossary, Regional Resource Management Plan 2001, HBRC

collated and extended where insufficient information is currently available in the existing set for particular areas. The process is resource intensive and time consuming, and is currently on hold.

2.4.3 Monitoring Water quality

Any water supply in the district that serves at least 25 people, for at least 60 days of the year, should be registered with the Ministry of Health. See section 5.4.3.4 on page 88 for details. It is the operator's responsibility to comply with monitoring requirements. The NCC reticulated system is a Ministry of Health registered water supply monitored in accordance with the NZ Drinking Water Standards. The Ministry of Health advises Council of newly registered private water supplies, used for purposes of land information memorandum property advice only. Reciprocally, Council advises the Ministry of Health about supplies, which should be registered, when any are discovered through the normal course of other Council activities.

3 THE COMMUNITY

3.1 Community Zones and Population

This assessment is essentially interested in peoples water use and sanitation practices in the home, work place or community facilities. Thus, all areas where dwellings or buildings exist are relevant to this assessment. Therefore, it excludes the uninhabited areas of the NCC region for the purposes of this investigation.

The inhabited areas are predominantly urban and most new developments are also within the urban area. However, the rural areas included in the assessment generally are serviced by private systems and thus present the greatest challenge for assessment due to the availability of information. The definition of the Napier City Council water and other sanitary services community areas is shown in Figure 1.

The most recent census (2001) designations and demographic data are shown in Table 2.

Table 2 – Census Population and Dwellings

Area name	Population	Dwellings
Bay View	1,755	660
Poraiti	594	201
Redclyffe	25*	9*
Napier/Taradale	49,814	19,512
Meeanee	1,167	405
Awatoto	297	123
TOTAL	**53,652**	**20,910**

Source: Statistics NZ 2001 except *(aerial map estimate)

The community areas used for the purposes of this assessment are sub-parts of the census areas as shown in Table 3. A combination of geographical features, census area boundaries, reticulation limits, and potential extensions, and concentrations of dwellings defines the areas.

The Landcorp Farm, Department of Conservation and Reserves community area has less than 10 dwellings in the singly owned and managed Landcorp farm, is of low significance to this assessment so will not be subject to great scrutiny.

Bay View rural is flat except for a small inland hill area, but as the dwellings have similar arrangements to the other dwellings in this same group, this hill area is not considered separately. The Ballantyne subdivision, on this hill has a small private reticulated water supply detailed in section 5.4.

Figure 1 – Water and Sanitary Services Assessment Communities

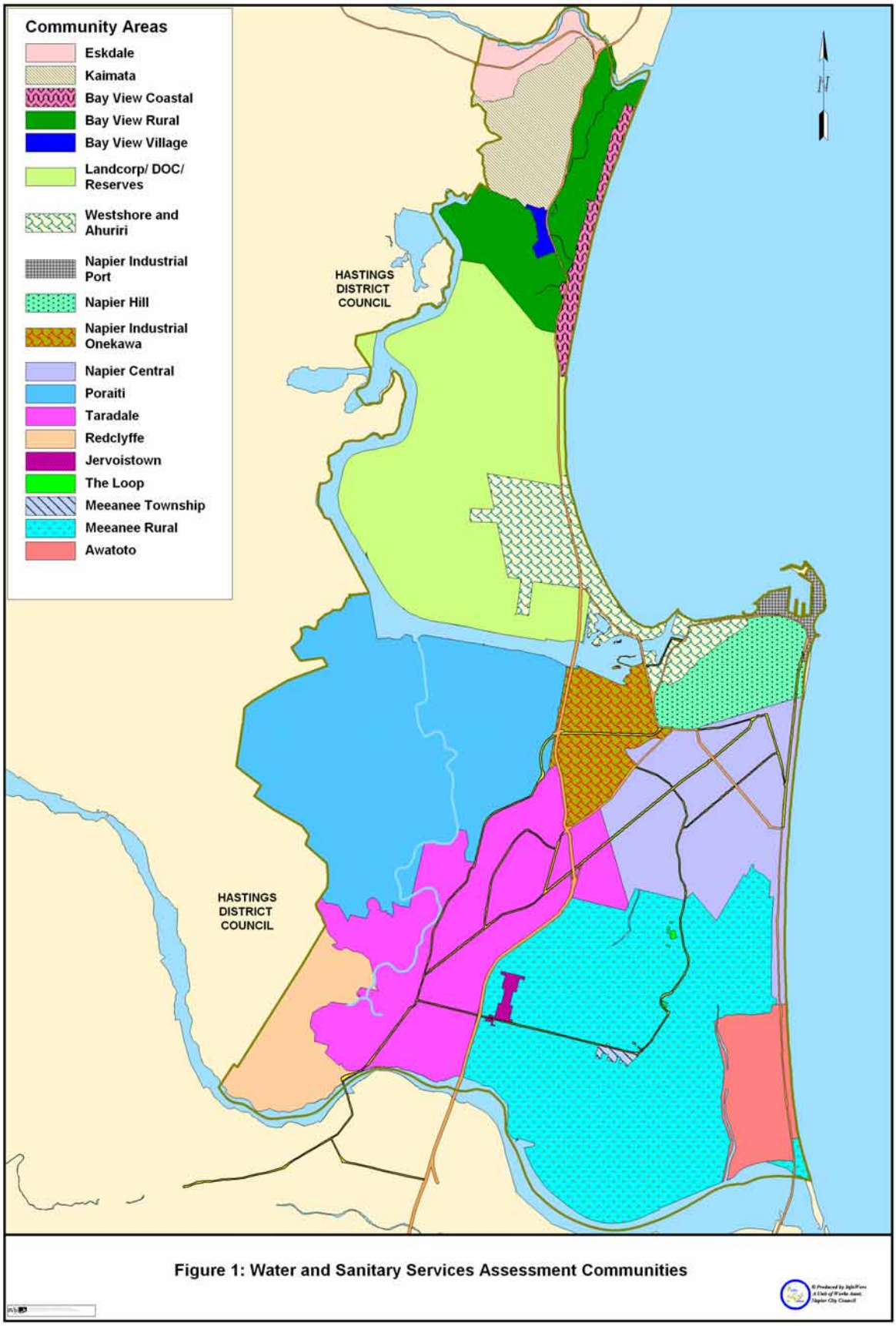


Table 3 – Water and sanitary services assessment community areas

Census Area name	Community For the purposes of this assessment	Area Description For the purposes of this assessment	District Plan Zoning (see plan for full descriptions)	Population	Dwellings
Bay View	Eskdale	Rural Flat	Main Rural	21	8
	Kaimata	Rural Hill	Rural residential	186	70
	Bay View Rural	Rural Flat	Main rural Rural residential	189	71
	Landcorp/DOC/reserve	Rural Flat	Rural conservation	29	11
	Bay View Village	Semi-Urban Flat	Rural settlement	324	122
	Bay View Coastal	Semi-Urban Flat	Rural settlement	1,005	378
Poraiti	Lagoon farm	Rural Flat	Rural conservation Main residential	6	2
	Poraiti	Rural Hill	Rural residential	588	199
Redclyffe	Redclyffe	Rural Flat/Hills	Main rural Rural residential	25	9
Napier Taradale	Napier Central	Urban Flat	Various Zones. Residential, Commercial and Industrial Environment	18,072	6,954
	Taradale	Urban Flat		24,188	8,160
	Napier Hill	Urban Hill		5,589	3,510
	Westshore & Ahuriri	Urban Flat		1,842	834
	Napier industrial	Urban Flat		123	54
Meeanee	Jervoistown	Semi-Urban Flat	Rural settlement	386	134
	Meeanee rural	Rural Flat	Main Rural	620	215
	The Loop	Semi-Urban Flat	Rural settlement	43	15
	Meeanee township	Semi-Urban Flat	Rural settlement	118	41
Awatoto	Awatoto Residential	Semi-Urban Flat	Main residential	297	123
	Awatoto Industrial	Semi-Urban Flat	Main Industrial		
		TOTAL		**53,652**	**20,910**

Source: Statistics NZ 2001 and TM 1: Bay View Reticulation – Options Evaluation – March 2002

The community areas are loosely defined boundaries solely for the purposes of this assessment to group service provisions and for addressing the health status generally as a whole community. In some areas , such as Bay View, there is a mix of reticulated and un-reticulated wastewater systems and stormwater systems which give rise to different considerations. Notwithstanding this, the areas lie within the same catchments for stormwater and groundwater purposes and must be considered as an integrated whole. These communities are not intended for planning purposes, which is done strictly by the District Plan. The areas are not intended as a definition of the limits of service provision for individual properties, or clusters of properties, therefore should not be used

in this way. Where points of interest have cross boundary issues with Hastings District Council, services may be assessed by disregarding the territorial boundary.

The range of available technologies for water and sanitary services considered in the assessment of NCC community areas is shown in appendix 2.

3.2 Water Services

3.2.1 Water Sources

Possible water sources for communities are:

- Surface water – lakes, streams, rivers
- Groundwater
- Rain water

Ministry of Health information indicates approximately half of New Zealand's drinking water is from groundwater.

3.2.2 Surface water

Surface water takes are not a realistic option for most of the Napier City Council area as it is not readily available. There are no lakes or catchment reservoirs and none of the 4 rivers in the Hawke's Bay river system passes through the Napier City Council area. The Tutaekuri and Esk rivers are on the boundaries, so are poorly situated to serve all but the fringes of the area. A significant level of treatment would be required for these sources and the Ahuriri estuary. In the hill areas, there are few streams of sufficient quantities to be viable sources.

3.2.3 Groundwater

Groundwater is readily available in the southern part of the NCC region. The most productive aquifers are located here serving the public system and the non-reticulated area to the South of the urban area. In total the Heretaunga Plains, and environs, have 6 recognised aquifers[3]. The part relevant to NCC area is shown in Figure 2. The three aquifers relevant here, are:

- Main aquifer

This is a gravel aquifer recharged by the Ngaruroro and Tutaekuri rivers outside the Napier district. It is a confined artesian aquifer underlying Taradale/Napier Central and further in a southwesterly direction. It is located at a depth of 40 to 60 m within the NCC boundary, and the water quality is mainly good at these locations. The aquifer is abundant and The Hawke's Bay Regional Council regulates water takes from the aquifer to ensure the sustainable yield is not exceeded.

[3] Heretaunga Plains Groundwater Study, Volume 1:Findings. Institute of Geological & Nuclear Sciences, May 1997

- Esk aquifer

This is a beach, sand and gravel unconfined aquifer underlying Westshore, Bay View, Esk and beyond. The water table is 4-6 m and water quality is of concern due to the intrusion of seawater and the risk of localised on-site effluent disposal contamination.

- Peripheral Limestone (Western Hills)

The Poraiti area[4] geology comprises a multi-layer limestone/mudstone sequence, overlaid by a 4-10m tephra/loess layer. The principle aquifer is a limestone aquifer approximately 20-35 m thick. The water table fluctuates between 1 and 25 m and is highly seasonal. Recharge is from rainfall and runoff. The principal aquifer is semi-confined and not entirely protected from contamination. Recharge is solely from rainwater runoff. Well drawdown tests suggest that recharge of the aquifer is slow and the availability of groundwater is limited. Fresh water springs occur along the base of the hills on the Eastern face from Park Island northwards.

The groundwater level in the bores range from 1 to 45 m below ground level, however as the area is hilly the ground level also varies because of the many gullies, between 20m around the fringes to 120 m of the peaks such as Sugarloaf and around Tironui drive. The long-term groundwater level is somewhat inconclusive, but the short-term levels have shown no significant decline in the last 20 years. Bore yields are variable and there are seasonal fluctuations of the groundwater level. A significant factor in the poor performance seen at the relatively high elevation bores is the relatively large vertical distances required to pump water to the surface.

The areas where there is sometimes groundwater shortage during dry spells are Poraiti, Eskdale, Kaimata, and Bay View Rural. These areas supplement groundwater with rainwater collection.

3.2.4 Rainwater

Some properties particularly in Poraiti, Eskdale, Kaimata, and Bay View Rural, supplement bores with rainwater. Some properties use rainwater as their principle source and during dry spells supplement with tankered water.

3.2.5 Soil contamination

Generally, the most likely source of nitrate contamination in the Heretaunga Plains groundwater is septic tanks, especially where the aquifer is unconfined or semi-confined with shallow water table.[5] Other nitrates sources are fertilizer seepage and organic pollution. Semi-confined aquifers do not apply to Taradale, Napier Central and south of these areas, but it does apply to Redclyffe, Poraiti, Bay View, Kaimata, Eskdale, Landcorp and Lagoon Farm, the northern part of the region.

[4] Investigation of the groundwater supply beneath the western hills-Poraiti area – Hawke's Bay Regional Council 1995
[5] Heretaunga Plains Groundwater Study, Vol 1:Findings. Inst. of Geological & Nuclear Sciences, May 1997

In Bay View Village and Bay View Rural the high water table, and its variable depth, impedes the ability of septic tanks systems to dispose of effluent effectively. The low lying nature and poorly draining silt clay soil that predominates the area, will never be able to provide, at all times, the HBRC required separation distance of 600 mm between the disposal field and the ground water table[6]. Table 4 gives a comparison of water source availability for the privately served areas.

3.2.6 Systems approach

In a health impact assessment of water services, it is advisable to consider the three waters with regard to each other. They interact and affect each other and legislation allows that all services be assessed together. It is important to remember that water usage practises in individual dwellings affect the quantity of wastewater discharged. Water usage often increases when reticulated water supplies are installed. Pressures of demand often result in the installation of reticulated water services prior to reticulated wastewater services, resulting in overloading of on site disposal systems.

Similarly stormwater disposal at a localised level or catchment level have an interrelation effect with wastewater provisions in the event of flooding, an environmental impact with potential public health consequences. However, due to the complexity of the relationship between stormwater and wastewater, and that this assessment does not focus on environmental impact, the health consequences of each service are considered independently.

3.2.7 Sanitary services

Cemeteries and crematoria are discrete locations unrelated to individual dwellings so will be assessed in isolation, without reference to individual dwellings.

Refuse is covered by the Solid Waste Management Plan (2000) and all public health related issues regarding refuse disposal are covered there.

[6] Bay View domestic wastewater treatment systems, 1998, Hawke's Bay Regional Council

Figure 2 – NCC Area Aquifers

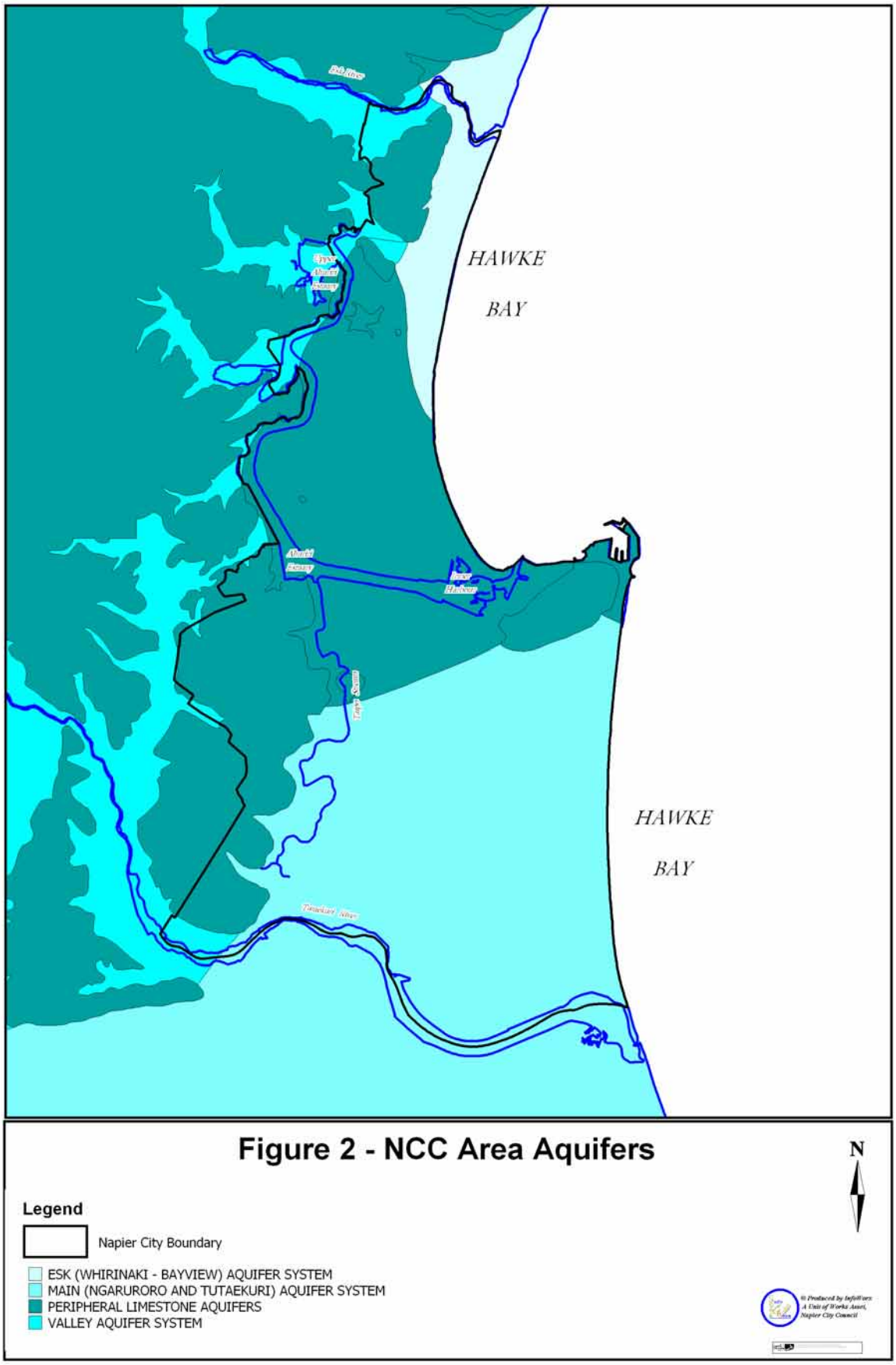


Table 4 – Water Source Viability Comparison for Non-Reticulated Areas

	Bore			Rain collection			Lake / river / stream		
Non-reticulated Communities	Readily available	Treatment generally not needed	Relatively cheap	Readily available	Collection Management Needed	Relatively cheap	Readily available	Treatment generally not needed	Relatively cheap
Eskdale	limited	case-by-case	✓	✓	✓	✓	unsuitable	×	×
Kaimata	limited	case-by-case	✓	✓	✓	✓	×	×	×
Bay View Rural	limited	case-by-case	✓	✓	✓	✓	×	×	×
Landcorp farm	limited	case-by-case	✓	✓	✓	✓	unsuitable	×	×
Lagoon farm	limited	✓	✓	✓	✓	✓	unsuitable	×	×
Poraiti	limited	case-by-case	✓	✓	✓	✓	×	×	×
Redcliffe	✓	case-by-case	✓	✓	✓	×	unsuitable	×	×
Jervoistown	✓	✓	✓	✓	✓	×	×	×	×
Meeanee rural	✓	✓	✓	✓	✓	×	unsuitable	×	×
The Loop	✓	✓	✓	✓	✓	×	×	×	×
Meeanee township	✓	✓	✓	✓	✓	×	×	×	×
Awatoto Residential	✓	✓	✓	✓	✓	×	×	×	×
Awatoto Industrial	✓	✓	✓	✓	✓	×	×	×	×

3.3 Future population projections

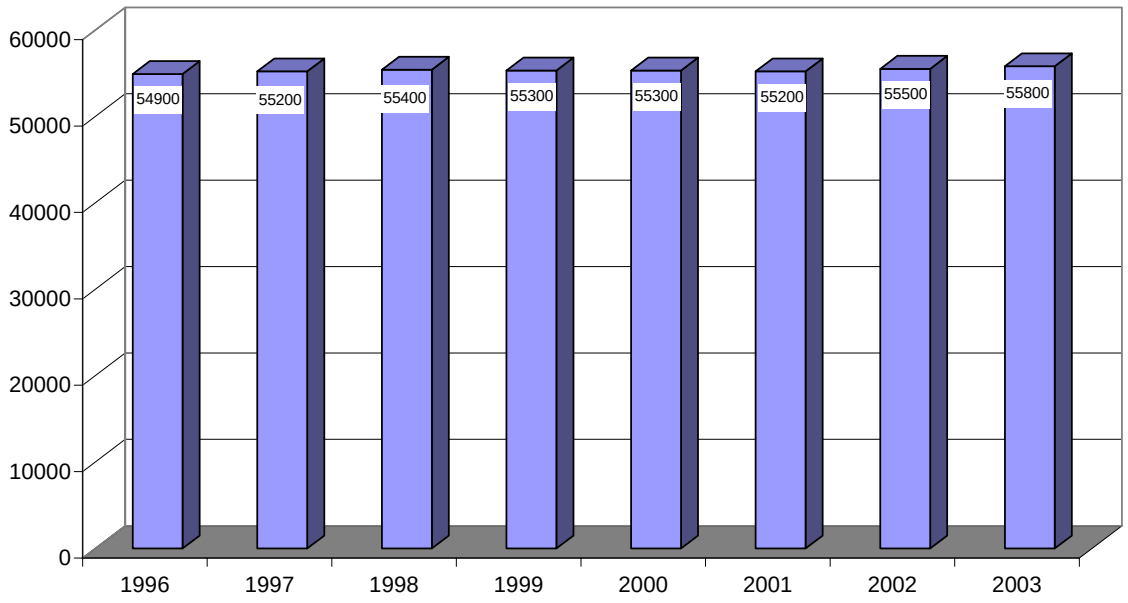
3.3.1 Total Population

Statistics New Zealand estimates indicate that Napier City's resident population stood at 55,800 or 38% of the Hawke's Bay region total, in June 2003. Figure 3 shows the annual trend in the City's population, since 1996. The population has increased overall by 900 or 1.6%.

3.3.2 Households and Families

At the 2001 Census, the total number of households in Napier stood at 20,598, an increase of 10% on the 1991 total. (Since 2001, a further 500 new dwellings have either been built or received consent to proceed in the City). In the period 1991-2001, Napier's population increased by 4.6%. Thus, the rate of growth in households in Napier has been much higher than its population growth, due to such factors as the ageing population, family breakdown, and increased demand for rental housing. At the last Census, the average number of persons per household in the City was 2.5, down from 2.6 in 1991.

Figure 3 – NCC Population Trend 1996-2003



3.3.3 Suburbs

The main trends to note for 1996 to 2001 for Napier's population and household base from a suburban perspective are as follows:

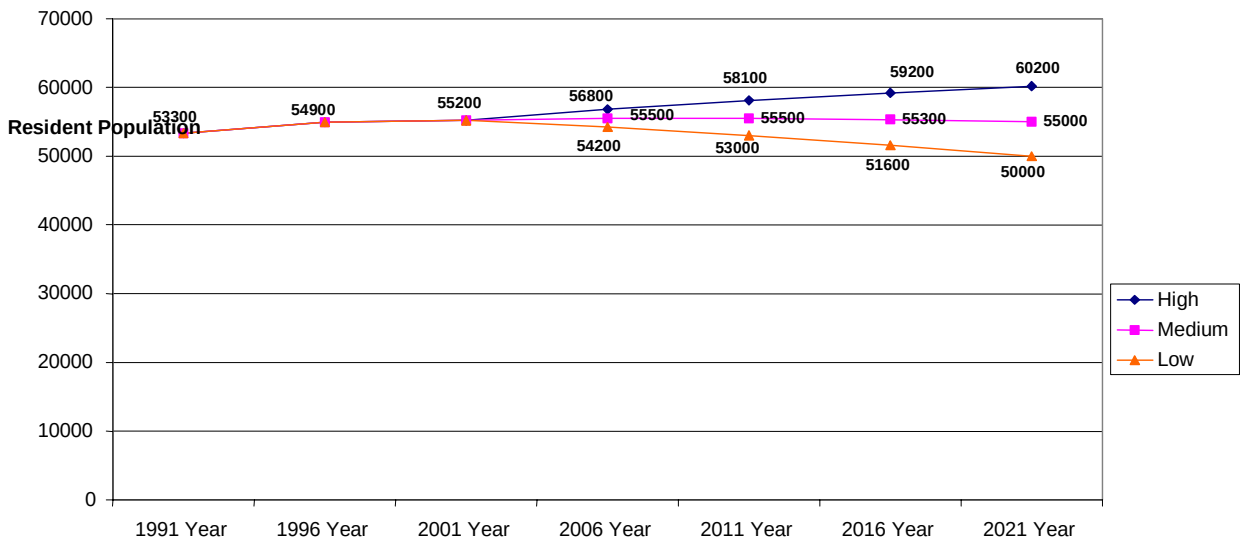
- Taradale, Greenmeadows, Napier Hill, and Onekawa had the highest populations in 2001
- Population growth was strongest in Greenmeadows, Ahuriri, Meeanee, and Bay View.
- Taradale, Greenmeadows, and Onekawa had the highest shares of the City dwellings total.
- Household growth was strongest in Greenmeadows, Poraiti, Bay View, and Taradale.

Figure 4 presents the projected trend in the City's population over the 2001-2021 period, under the standard growth scenarios (High or optimistic, Medium or 'middle of the road' and Low or pessimistic). These scenarios relate to different growth projections for natural population increase (births minus deaths) and net migration to the area, over the forecast period. Napier's population growth track since the 2001 Census, a 600 or 1.1% increase, indicates that the City's population has been growing in between the Medium and High projection scenarios. This situation sees the population tally growing from 55,200 in 2001 to around 57,000 in 2011 and 58,000 by 2021, at the current growth rate. It should be noted that with the Medium projection, Napier's youth (under 15) population is expected to fall by 25% over the 2001-2021 period and the 15-64 population by 3%, whilst the 65+ population increases by 50%.

3.3.4 Household projections

Over the same period, the most optimistic (High) household growth scenario sees the total number of households/dwellings in Napier increasing from 20,952 in 2001 to 24,728 in 2021, an increase of 3,776 or 18%. The record of new household formation since the 2001 Census suggests that the City presently achieves this projection path. New housing growth is expected to be located predominantly in the north-west part of Napier (Poraiti/Lagoon Farm/Taradale North) and, to a much lesser extent, Ahuriri, Taradale South, Westshore, Marewa and Napier Hill.

Figure 4 – NCC Population Growth 1991-2021



3.3.5 New growth areas

Infill Development means the further subdivision and/or development of an existing site, but excluding the development (greenfield) areas identified in Figure 5. For the purposes of the District Plan, all sites exist, except those specifically identified as Greenfield or development areas.

Figure 5 – Current District Plan Greenfield Growth Areas

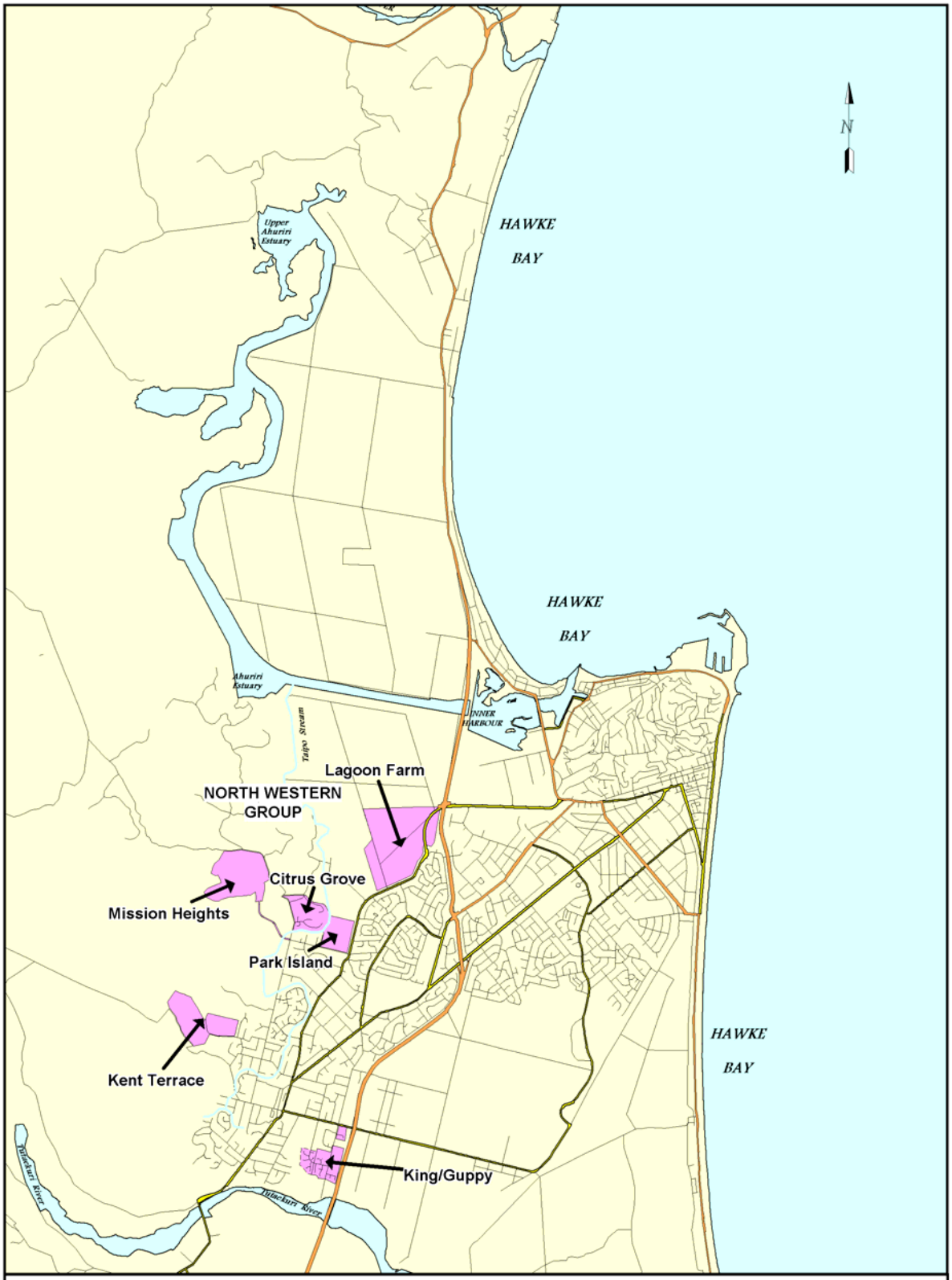


Figure 5:
Current District Plan Greenfield Growth Areas

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A Unit of Works Asset
Napier City Council

Greenfield Development means an area zoned for the purpose of intensive 'Land Development'. Existing Greenfield sites in the current district plan are identified in Figure 5 as 'Development Areas'. Current greenfield areas in the district plan, which provide for development until 2021 are:

- King/Guppy Road
- Citrus Grove
- Kent Terrace
- Lagoon Farm
- Mission Heights
- Park Island

For all Greenfield areas, Council indicates the services (including water and sanitary services) that the developer will provide, and the financial contributions required to avoid, remedy, or mitigate any environmental effects associated with land development. The infrastructure created by developers to service the greenfield developments is vested in Council.

With protection of public health being the priority, all new developments must provide the essential services of water, wastewater, and stormwater.

3.3.6 Additional households

The Napier Urban Growth Strategy 1999 identifies the projected additional households in the whole NCC area, from infill growth. The 2001 census has indicated the current growth in the medium to high growth rate thus the future growth figures used here for essential services projections, shown in Table 5, are based on the high growth rate to make the most conservative allowance for future needs. Historically, infill has been 65% of total growth, but this has slowed to 50% due to availability of land, so the current adopted policy for growth is a split of 50% infill and 50% greenfield.

Table 5 – Additional Infill and Greenfield Household Projections

Based on NUGS1999 - High growth scenario additional households projections						
			infill		greenfield	
Years	Total per year	Total per 5 years	%*	number	%	number
1996-2001	240	1200	60%	720	40%	480
2001-2006	180	900	50%	450	50%	450
(2004-2006)	190	380	50%	190	50%	190
2006-2011	190	950	50%	475	50%	475
2011-2016	190	950	50%	475	50%	475
2016-2021	190	950	50%	475	50%	475
	TOTAL	**3230**	**INFILL**	**1615**	**GREEN**	**1615**

*For the planning period until 2021, adopted policy is;
Availability of housing land;
Infill 50% and greenfield 50%

4 COUNCIL WATER AND SANITARY SERVICES

4.1 Source of Information

Asset Management Plans, Essential Services Development Reports, and the Long Term Council Community Plan, describe the Council facilities and services sufficiently well, so this section is brief. This is an overview concentrating specifically on issues relating to public health.

4.2 Wastewater

4.2.1 Current service requirements

4.2.1.1 Extent of the reticulated system

The Council wastewater service is a reticulated system, which disposes of domestic wastewater, and industrial/commercial effluent in the Napier Central/Taradale and parts of Bay View urban area. A sophisticated pumping system conveys the wastewater to a milliscreen plant then disposes the wastewater to the ocean.

The Napier City Council wastewater reticulated system extent is shown in Figure 6. This schematic shows the reticulated areas, the non-serviced areas, and the location of the milliscreen plant.

The number of people served by the reticulated system is 49,931 or 19,556 dwellings[7]. This represents 93% of the population.

The public system serviced area covers the communities of Napier Central, Taradale, Napier Hill, Westshore/Ahuriri, Napier Industrial, Awatoto Industrial, and Bay View Village as indicated in Table 6.

The desired outcome is to protect Public Health by means of collection, conveyance, and disposal of wastewater from urban areas. Specific policy is to construct, maintain, and operate the wastewater system to recognised standards for all urban areas.

[7] Population figures Statistics New Zealand
and TM 1: Bay View Reticulation – Options Evaluation – March 2002

Figure 6 – The Extent of the Napier City Council Wastewater Service

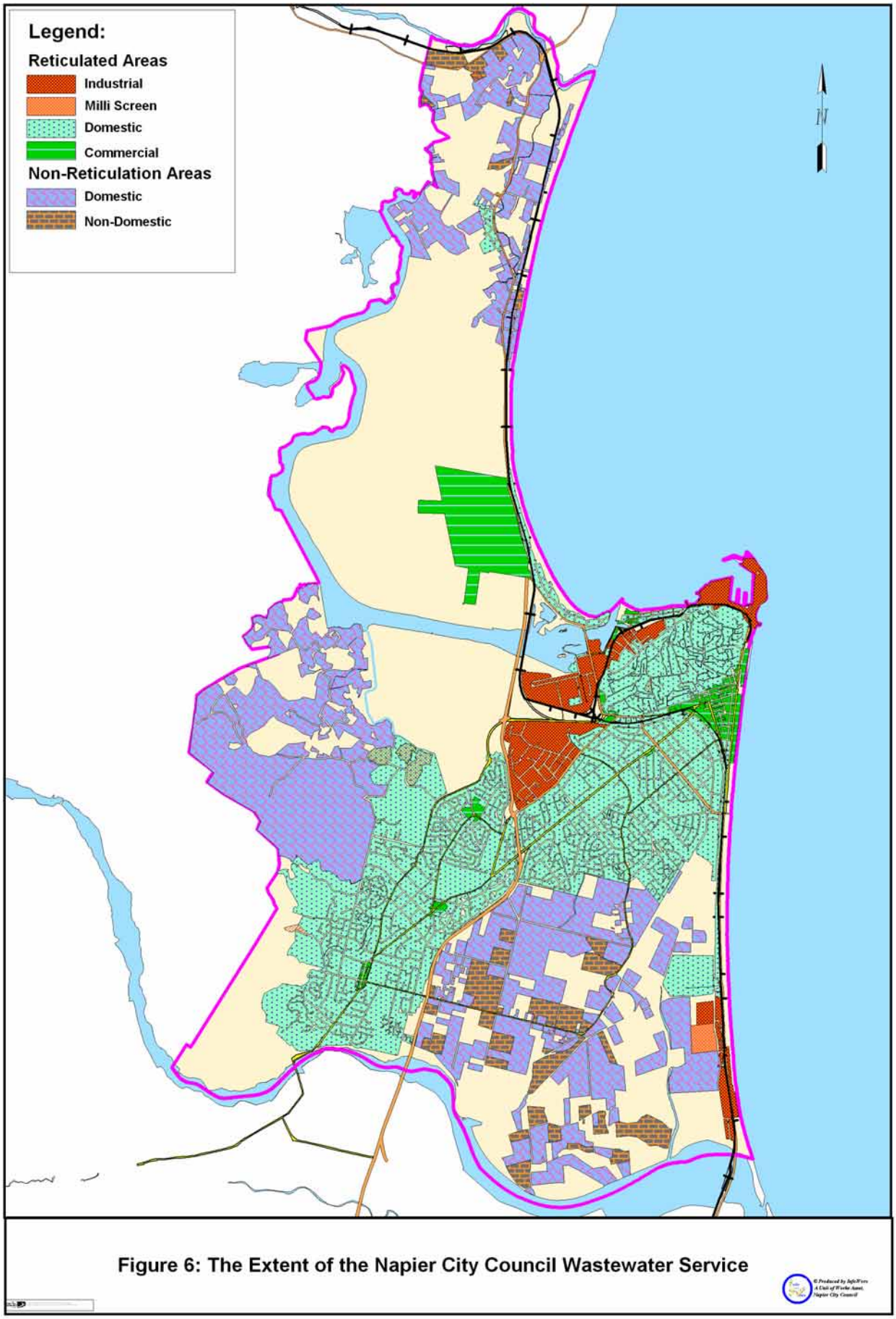


Table 6 – Summary of Wastewater Service Provision by Community Area

WASTEWATER						Served by Public system
Area name	**Community**	**Area description**	**Population**	**Dwellings**		
Bayview	Eskdale	Rural Flat	426	160		×
	Kaimata	Rural Hill				×
	Bayview Rural	Rural Flat/hill				×
	Landcorp farm	Rural Flat				×
	Bayview Village	Semi-urban Flat	324	122	*	✓
	Bayview Coastal	Semi-urban Flat	1,005	378	*	×
Poraiti	Lagoon farm	Rural Flat	594	201		×
	Poraiti	Rural Hill				×
Redcliffe	Redcliffe	Rural Flat/Hills	25	9	**	×
Napier/Taradale	Napier Central	Urban Flat	49,814	19,512		✓
	Taradale	Urban Flat				✓
	Napier Hill	Urban Hill				✓
	Westshore & Ahuriri	Urban Flat				✓
	Napier industrial	Urban Flat				✓
Meeanee	Jervoistown	Semi-urban Flat	1,167	405		×
	Meeanee rural	Rural flat				×
	The Loop	Rural flat				×
	Meeanee township	Semi-urban Flat				×
Awatoto	Awatoto Residential	Semi-urban Flat	297	123		×
	Awatoto Industrial	Semi-urban Flat				✓
		TOTAL	**53,652**	**20,910**		**50,138**
				population %		93.5%
				dwellings		19,634

Data Source: Statistics New Zealand 2001 except;
*TM 1:Bay View Reticulation – Options Evaluation – March 2002
**Aerial View MapIT estimate count of dwellings and population based on average per dwelling of Statistics NZ data

Note: Bay View Village has 44 dwellings currently connected as at Jan 2005.

NCC have resolved that connecting to the Bay View reticulated sewerage scheme is voluntary.

4.2.1.2 Method of wastewater disposal

As indicated in Table 6 the public serviced areas are all urban flat, with the exception of Napier Hill, thus the reticulated system is reliant almost entirely on pumping for the collection system, and for the trunk disposal mains to the milliscreen plant.

Both the residential and industrial effluent is pumped to the milliscreen plant at Awatoto where it currently undergoes a pre-treatment process, which removes solids larger than 0.75mm. Wastewater is discharged to the ocean via a 1,600 metre long outfall pipeline.

The Jan-Jun 2004 average flow rate was 314 l/s and average daily flow rate 27,115 m^3/day.

4.2.1.3 Extent of effluent treatment

The process currently does not include any biological treatment. The wastewater discharging to the ocean is untreated. The screening process removes solids larger than 0.75 mm. Most of the pathogens and dissolved contaminants remain in the wastewater.

In the mid to late 1990's, through consultation with all the ratepayers/residents of NCC, a significant number of stakeholders indicated their desire for improved quality of discharge, treated to secondary standard. The cost of moving from simple pre-treatment to secondary treatment processes is high and it was therefore agreed to implement wastewater treatment in a staged manner, initially to advanced primary standard. Treatment will be by chemically assisted sedimentation, which will increase the level of solid removal significantly, followed by ultraviolet disinfection. The facility to provide for advanced primary treatment until 2015 is under construction.

The discharge consent also provides for a review in 2011, and for the treatment of all domestic wastewater to secondary biological standard by 2015. The most significant consequence of wastewater treatment is the production of sludge, which requires an appropriate method of treatment and disposal if not to pose a health or environmental risk. The sludge will be disposed of by controlled landfill. Any future beneficial reuse options must comply with relevant standards.

4.2.1.4 Quality and Quantity of wastewater discharge

Effluent is disposed into the ocean 1.6 km offshore in Hawke Bay under a coastal permit[8]. The permit allows Napier City Council to discharge domestic wastewater and industrial wastewater into Hawke Bay at Awatoto via a marine outfall for the period expiring on 30 June 2025, subject to conditions relating to:

- Discharge quantity
- Discharge chemical quality
- Discharge physical quality
- Discharge biological quality
- Environmental effects
- Administrative requirements
- Monitoring requirements
- Reporting and reassessment requirements

For the purposes of this assessment, the quantity, quality, and environmental effects are of interest.

Quality

The environmental effects of discharge of pre-treated wastewater to the Ocean are controlled by compliance with the resource consent requirement as follows. The current discharge is only required to meet chemical criteria of the resource consent shown in Table 7

[8] HBRC Resource consent CD990400W granted from 24 May 2000 to 30 June 2025

Table 7 – Combined Wastewater Heavy Metal Treatment Standard from 2003-2025

Analyte	Maximum Concentration	Maximum Loading
	g/m^3	Kg/day
Chromium	4	120
Copper	0.5	15
Zinc	5	150
Cadmium	0.2	6
Mercury	0.01	0.3
Lead	0.5	15

Results from Jan-Jun 2004 show the discharge complied with all chemical criteria. These chemical criteria apply until 2025. Increasingly strict physical and biological treatment standards, as required by the resource consent, come into effect 1 July 2005. The combined separated-industrial and domestic (including non-separated industrial) discharged wastewater must be treated to a level equivalent to `advanced primary treatment' and to the minimum specified in Table 8 and Table 9.

Table 8 – Combined Wastewater Physical Treatment Standard from 2005-2025

Analyte	Mean Concentration
Suspended Solids	300 mg/litre
Oil and Grease	90 mg/litre
Biochemical Oxygen Demand (BOD)	600 mg/litre

The domestic (including non-separated industrial) wastewater treatment must be treated to the minimum specified in Table 9.

Table 9 – Domestic Wastewater Treatment Standard 2005-2025

Analyte	Mean Concentration	
	(Advanced Primary) 2005-2015	(Secondary) 2015-2025
Suspended Solids	200 mg/litre	50 mg/litre
Oil and Grease	50 mg/litre	10 mg/litre
Biochemical Oxygen Demand (BOD)	300 mg/litre	60 mg/litre
Faecal Coliforms	100,000 cfu/100ml	1,000 cfu/100ml
Enterococci	50,000 cfu/100ml	500 cfu/100ml

The monitoring requirements of the discharge are prescriptive and an annual monitoring report must be submitted to the HBRC, showing compliance with all aspects of the resource consent. It includes comments on the extent of compliance and adequacy of the monitoring programme relating to the purpose of the resource consent.

The resource consent was issued in September 2003, and the recent first annual report indicates full compliance with all conditions that are currently in effect.

Discussion of the health significance of lack of reticulated wastewater disposal is in chapter 6.

Quantity

For the duration of the resource consent, the discharge of wastewater shall not exceed a rate of 1,400 l/s or a daily volume of 120,960 m^3. In the first 6 months of 2004, the maximum measured discharge rate was 1,380 l/s and 39,999 m^3/day, therefore complying with the resource consent.

4.2.1.5 Suitability of system to meet current demands

The peak design capacity is the parameter that defines the demand by the population for a wastewater disposal service. The system capacity must be matched to the peak daily flow. In practice, because wastewater reticulation can never remain completely watertight, extra allowance is made to accommodate any infiltration, from ground and surface water.

The NCC system is designed to this peak wet weather design flow at 1,100 litres/person/day. However, excessive infiltration of groundwater to the reticulation and pumping stations during peak wet weather conditions is experienced. This can result in inadequate capacity of parts of the system depending on the level of rain, ground and surface waters in the various catchments. Potential environmental effects of excessive infiltration are contamination of land and stormwater runoff.

Some remedial works to address this inadequacy, and improve the situation, are already complete such as:

- upgrades to pumping stations
- house-to-house inspections

Other works are included in the 2005-2014 capital plan to address renewals or upgrades, as shown in Table 10. Note however, that worldwide experience suggests that infiltration problems will never be solved completely.

The Capital Plan is reviewed annually and any changes can be seen in the Annual Plan or LTCCP. In Table 10 renewals address remedying the depreciation of the infrastructure and vested assets address the additional local infrastructure specifically from new developments.

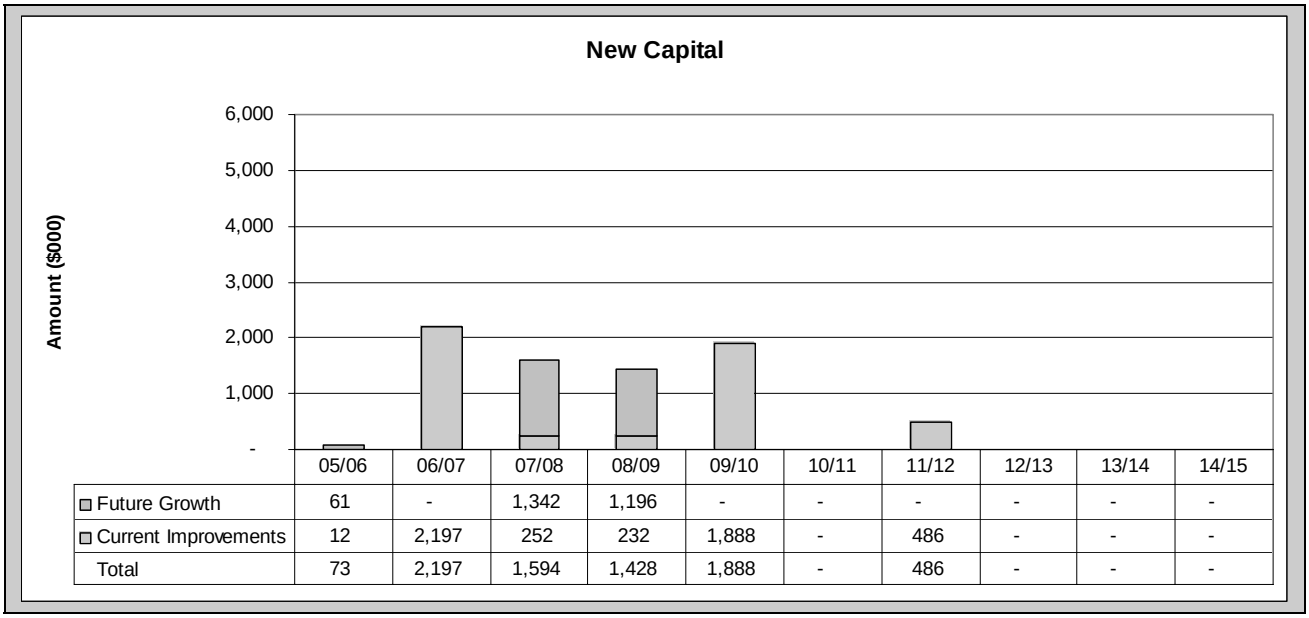
New capital addresses both the needs of current service inadequacies and future growth proportioned, as in Figure 7.

Table 10 – Wastewater Ten-Year Capital Plan

Description	Approved prior to 05/06					($000)						
New Capital												
Western Pumping Main	50	22	-	583	-	-	-	-	-	-	-	655 *
	12	12	-	252	232	1,888	-	-	-	-	-	2,396
	39	39	-	759	1,196	-		-	-	-	-	2,033 *
Taradale Rd Pump Station and Main	51	51	-	1,011	1,428	1,888	-	-	-	-	-	4,429
Riverbend Rd Trunk Main	-	-	-	-	-	-	-	486	-	-	-	486
	460	-	-	-	-	-	-	-	-	-		460
	1,240	-	~~442~~	~~574~~	-	-	~~1,757~~	-	-	-	-	1,240
Bay View - Develop Sewerage System	1,700	-	~~442~~	~~574~~	-	-	~~1,757~~	-	-	-	-	1,700
	13,280	-	-	-	-	-	-	-	-	-	-	13,280
	3,000	-	-	-	-	-	-	-	-	-	-	3,000
	7,000	-	-	-	-	-	-	-	-	-	-	7,000
Implement Advanced Sewage Treatment	23,280	-	-	-	-	-	-	-	-	-	-	23,280
Sludge Stabilisation	-	-	2,197	-	-	-	-	-	-	-	-	2,197
Sub-Total	**25,081**	**73**	**2,197**	**1,594**	**1,428**	**1,888**	**-**	**486**	**-**	**-**	**-**	**32,747**
Vested Assets												
Sewerage Vested Assets	N/A	395	395	395	395	395	395	395	395	395	395	3,950 *
Sub-Total	**N/A**	**395**	**395**	**395**	**395**	**395**	**395**	**395**	**395**	**395**	**395**	**3,950**
Renewals												
Milliscreen Replacement Programme	N/A	170	188	188	188	188	188	188	188	188	188	1,862
Asset Renewal Sewage Pumping Equipment	N/A	170	170	170	170	170	170	170	170	170	170	1,700
Sewerage Infrastructural Asset Renewal	N/A	721	716	716	716	716	716	716	716	716	716	7,165
Treatment Plant Renewal Programme	N/A	-	51	77	77	103	103	128	128	154	154	975
Sub-Total	**N/A**	**1,061**	**1,125**	**1,151**	**1,151**	**1,177**	**1,177**	**1,202**	**1,202**	**1,228**	**1,228**	**11,702**
Wastewater Management	**25,081**	**1,529**	**3,717**	**3,140**	**2,974**	**3,460**	**1,572**	**2,083**	**1,597**	**1,623**	**1,623**	**48,399**

* Item/part-item addresses future growth

Figure 7 – Projected Wastewater New Capital Expenditure



	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15
Future Growth	61	-	1,342	1,196	-	-	-	-	-	-
Current Improvements	12	2,197	252	232	1,888	-	486	-	-	-
Total	73	2,197	1,594	1,428	1,888	-	486	-	-	-

A description of the addition to the asset to meet future demand in relation to increases in population follows.

4.2.2 Future service requirements

4.2.2.1 Effect of growth

The effect of population increase from infill in the reticulated area and those greenfield development areas that connect to the reticulation is an increase in wastewater disposal volume. The history of growth suburbs as shown in appendix 7 indicates 7% (113 households) of infill growth is outside the reticulated area. 93% (1,502 households) of infill growth is in the reticulated area, and all the greenfield growth (1,615 households) is likely to be reticulated.

4.2.2.2 System Capacity

The reticulated disposal system is in three catchments that pump separately to the milliscreen plant:

- Greenmeadows
- Latham and Bay View
- Separated Industrial

The 93% of infill households, based on history of growth suburbs as shown in appendix 7, will be captured by the catchments as 60% in Latham and Bay View and 40% in Greenmeadows.

Although both the existing Greenmeadows and Latham street pumping stations are at, or near, their full capacity, the local wastewater pipe reticulation does not require any major increase in

system collection capacity to cater for the additional load from the 93% infill growth, for the period from 2006 to 2021. The control of rainstorm infiltration and improvement of the situation will allow the additional capacity. However, various conveyance pipe systems may need specific upgrades in the future.

Control of excess flow can be achieved through a long-term programme of collection pipe maintenance and replacement to improve water tightness, and is already included in the renewals programme shown in Table 10. Thus, there are no capital additions or upgrades proposed.

The health effect of infiltration is detailed in chapter 6.

Greenfield growth significantly affects the reticulated system, as it requires both a physical extension to the collection reticulation and an increase in the conveyance capacity. An additional delivery system will be required involving the construction of a new pumping station and pressure main to Awatoto.

The additional households (1,615 currently released to cater until year 2021) of the greenfield developments, all located on the northwest of the main urban, will be serviced by one or more new pumping stations (Taradale Road) and a pressure main to the milliscreen, and secondary pumping stations and trunk collection mains.

The requirements of these wastewater catchments to cater for the Current District Plan released growth in the 20 year 2006 to 2021 are summarised in Table 11.

Table 11 – Wastewater Reticulation Additions Proposed for Infill and Greenfield Growth

Catchment	Growth type	Additional households 2004-2021	Requirement of reticulation	New Capital Items*
Latham	Infill	904	Long-term Infrastructural asset renewal	Riverbend Road trunk main (2011/12)
Greenmeadows	Infill	590		
New Taradale Road	Released Greenfield	1,615	Increase capacity Collection extension	Taradale Road pumping Station and Main (2007-10) Western Pumping Main (2007/08) Vested assets from new subdivisions
Reticulated Growth		**3,109**	(96% of total)	
Non-serviced Growth		121	No reticulation requirements	
Total growth 2004-2021		**3,230**		

* See Table 10 for full details.

The separate industrial line serves a major part of Pandora and Awatoto. There is sufficient capacity to permit some future wet industry growth.

4.2.2.3 Treatment

The additional load due to growth also has consequential additional loading on the treatment plant.

Construction of the new advanced primary treatment plant is underway to cater for current public demand for increased treatment.

A by-product of the new treatment process with a potential public health issue is sludge disposal. The treatment plant will produce untreated primary sludge from the primary sedimentation stage, which must be disposed of safely and effectively. The sludge will be treated by dewatering and disposed initially to landfill.

The new advanced primary treatment plant will eventually produce around 9,000 tonnes of dewatered primary sludge each year, starting 2005. The current capacity of the Omarunui landfill allows for 5,000 tonnes dewatered sludge disposal per year. In the short-term, this will go to landfill, while exploring other better-suited long-term options, including beneficial re-use. Possible disposal options are:

- Composting: The equipment and space required for this process are readily available. Also, the process requires a large quantity of organic material for which a reliable source is yet to be identified. Possible sources are the existing household composting facility at the transfer station, or the horticultural and agricultural industries.
- Land application: The large proportion of horticultural land in Hawke's Bay presents a potential for land application of treated or heat dried sludge. However, feasibility hurdles include transportation logistics, poor public perception, and possible horticultural and fruit industry resistance to the concept for reasons of protecting international commercial reputation. Further investigation is required.

The treatment plant has been designed for growth for the next 20 years. A master plan provides for growth beyond that period.

4.2.3 Options

4.2.3.1 Non-reticulated areas

From 1992 to 1998, 7% of infill growth was in non-serviced areas. Based on these statistics 113 dwellings will be in non-serviced areas from 2004 to 2021. The most suitable systems for infill in these areas are shown in Table 12.

Table 12 – Wastewater Options for Non-Serviced Infill Development

Community	Current Method	Best Option for Infill
Eskdale	Septic tanks or SWTS	SWTS*
Kaimata	Septic tanks or SWTS	SWTS
Bayview Rural	Septic tanks or SWTS	SWTS
Landcorp farm	Septic tanks	N/A
Bayview Village	Reticulated/septic tanks/SWTS	Reticulated
Bayview Coastal	Septic tanks or SWTS	Reticulation
Lagoon Farm	Septic tanks or SWTS	N/A
Poraiti	Septic tanks or SWTS	SWTS
Redcliffe	Septic tanks or SWTS	SWTS
Jervoistown	Septic tanks or SWTS	Reticulation
Meeanee rural	Septic tanks or SWTS	SWTS
The Loop	Septic tanks or SWTS	SWTS/Reticulation
Meeanee township	Septic tanks or SWTS	SWTS/Reticulation
Awatoto Residential	Septic tanks or SWTS	Reticulation
*On-site Secondary Wastewater Treatment System		
NOTE: The options presented are based on a general assessment of geography, water table, lot size, available space, and proximity to the existing reticulated system. The suitability of methods is site specific and must be assessed on a case-by-case basis.		

4.2.3.2 Secondary on-site Wastewater Treatment Systems (SWTS)

These systems perform better than septic tanks if installed and maintained correctly. Contact HBRC where SWTS are likely to be required. The HBRC Regional Plan 2001 rules requires these systems for new houses on lot sizes less than 2500m^2 or lots zoned residential. The system is sized to suit the individual needs of the household.

4.2.3.3 Other disposal methods

Ponds and reedbed systems, for example, can be an alternative to the self-contained single site SWTS, for sites where there is plenty of space, flat ground, and suitable soil and water table conditions. The ponds are dug into the ground several metres deep so are not suited for places where the water table is high at any time of the year. They are better suited to multiple dwellings as a shared resource. See Appendix 2 for more details on this and other technology. They are generally not suited to the Napier district.

4.2.3.4 Extensions to reticulation

There is potential for reticulation for existing dwellings and infill in some areas that are currently not reticulated, given the right circumstance and funding. Examples areas are:

Bay View village and coastal

A reticulated system is already underway to cater for existing properties in the lower lying areas of Bay View, which also allows for limited infill development. See section 6.2.3 for details.

- **Jervoistown**

Jervoistown has some available space in terms of the District Plan for development sites as shown in Figure 8.

However, for further more intensive development or greenfield development to proceed, a complete wastewater reticulation and disposal system is required. The existing heavy soils and low-lying nature mean that septic tanks and infiltration systems do not always perform adequately. A reticulated system would require the construction of:

- new pumping station
- separate pumping main to link with Greenmeadows-Awatoto main

At present, there is no economically viable proposal for a reticulated scheme in Jervoistown.

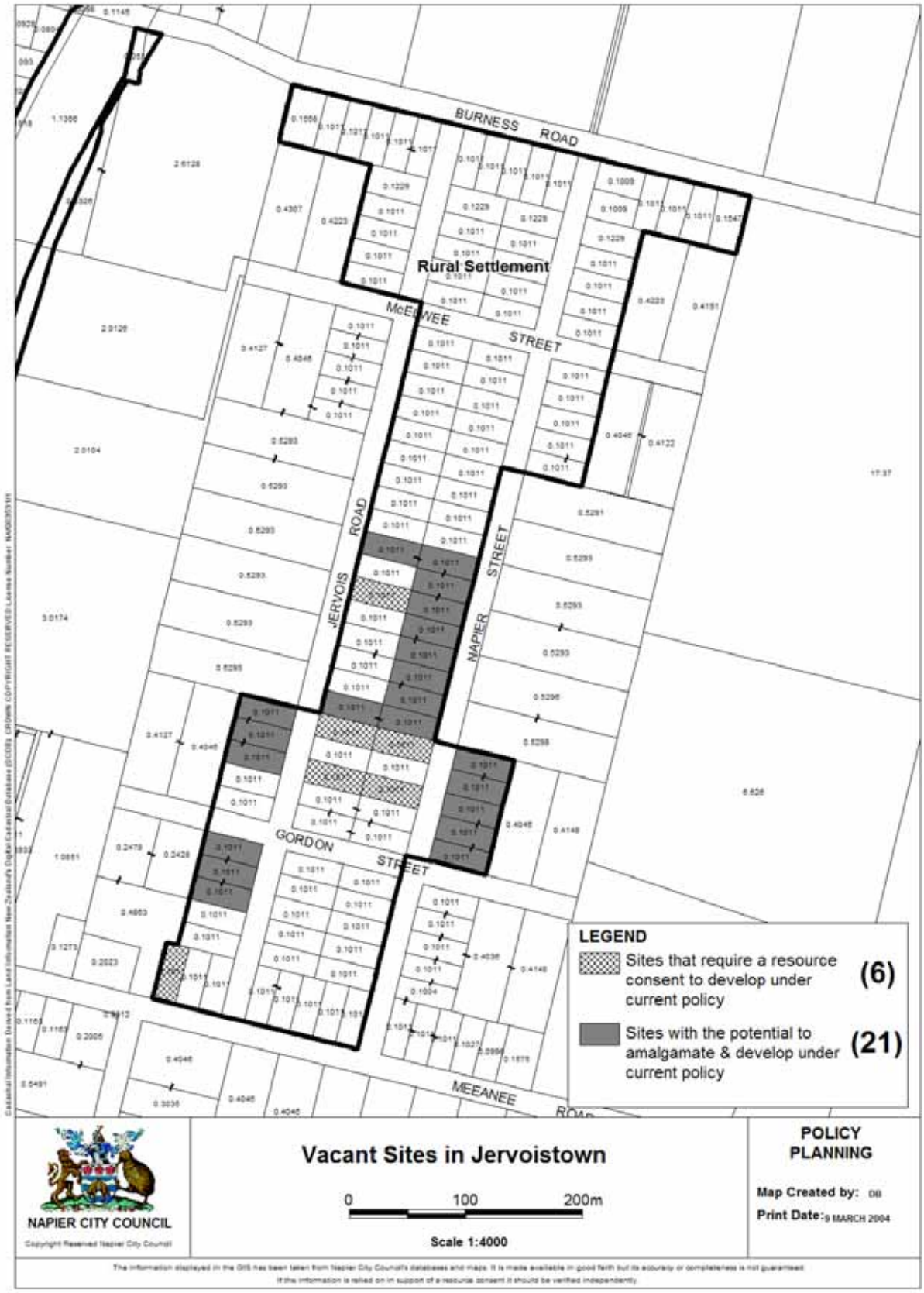
- **Awatoto residential**

An industrial reticulation system direct to the milliscreen already serves the Awatoto industries. The new advanced treatment plant will keep this industrial stream separate from residential and mixed streams as the treatment process is different.

There is currently no health issue or inadequacies or any anticipated in the future, as new houses are required to use SWTS as a minimum solution. These systems perform better than septic tanks if installed and maintained correctly. See section 5.3.4 for details. If any health issue became apparent in future with the residential on-site systems currently used here, there may be the possibility of extending the reticulated system from its current boundary at the end of Te Awa Avenue subject to a suitable funding proposal. There is currently no proposal for this work.

Any remaining infill growth not catered for in the 3 options above must provide on-site solutions.

Figure 8 – Vacant sites in Jervoistown



4.3 Water Supply

4.3.1 Current service requirements

4.3.1.1 Extent of the reticulated system

The Napier City Council owns and operates a reticulated system, which supplies drinking quality water to homes, businesses, and industrial properties in the Napier and Bay View urban areas. The number of people served is 51,237 or 20,047 dwellings[9]. This represents 95.5% of the population.

The community areas that are served by the City Council water supply system are Bay View village, Bay View Coastal, parts of Bay View Rural, Napier Central, Taradale, Napier Hill, Westshore/Ahuriri, and Napier industrial, as shown in Table 13.

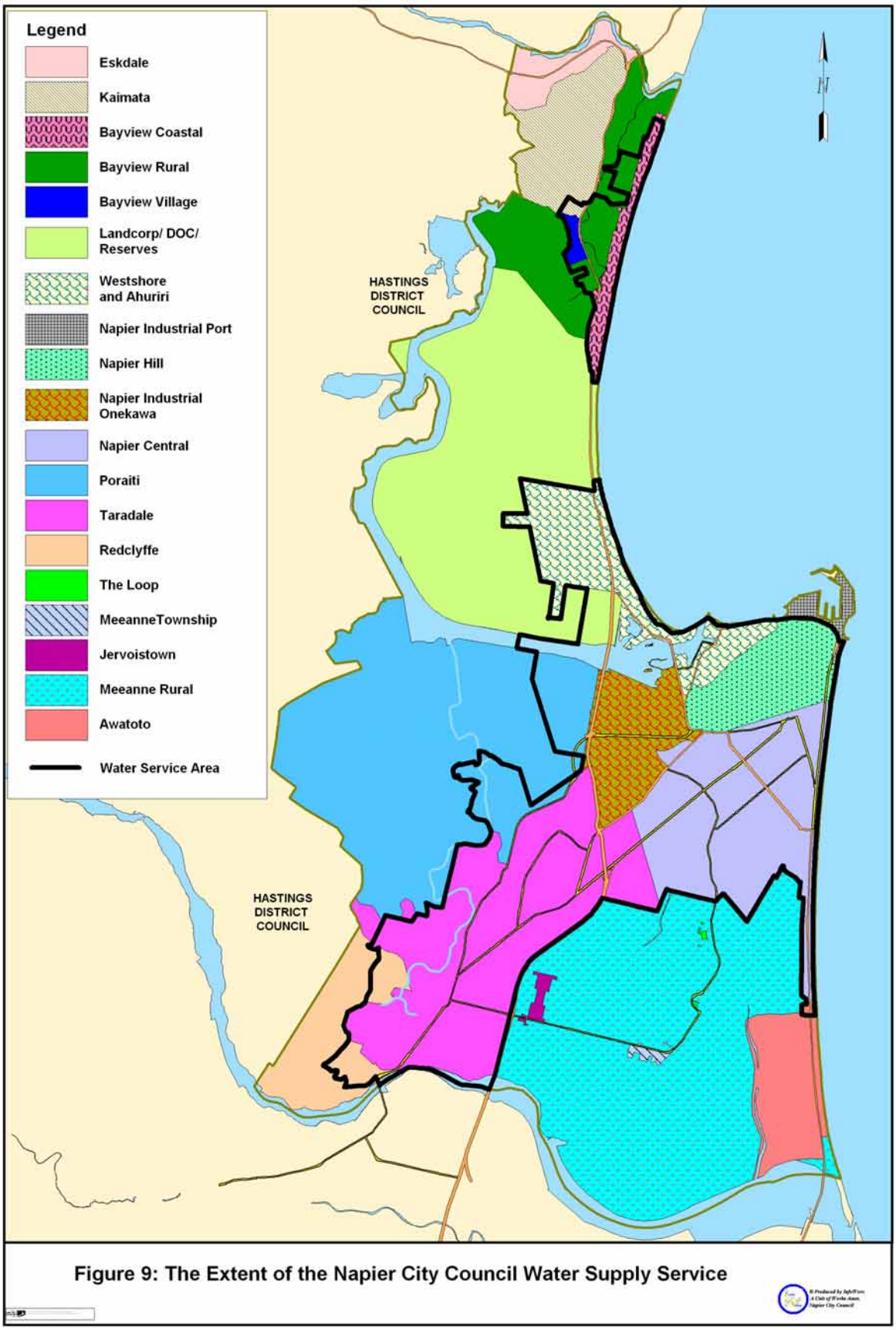
Table 13 – Summary of Water Supply Service Provision by Community Area

WATER SUPPLY						Served by Public
Area name	**Community**	**Area description**	**Population**	**Dwellings**		**system**
Bayview	Eskdale	Rural Flat	426	160	**	×
	Kaimata	Rural Hill			**	15%
	Bayview Rural	Rural Flat/hill			**	35%
	Landcorp farm	Rural Flat			**	×
	Bayview Village	Semi-urban Flat	324	122	*	✓
	Bayview Coastal	Semi-urban Flat	1,005	378	*	✓
Poraiti	Lagoon farm	Rural Flat	594	201		×
	Poraiti	Rural Hill				×
Redcliffe	Redcliffe	Rural Flat/Hills	25	9	**	×
Napier/Taradale	Napier Central	Urban Flat	49,814	19,512		✓
	Taradale	Urban Flat				✓
	Napier Hill	Urban Hill				✓
	Westshore & Ahuriri	Urban Flat				✓
	Napier industrial	Urban Flat				✓
Meeanee	Jervoistown	Semi-urban Flat	1,167	405		×
	Meeanee rural	Rural flat				×
	The Loop	Rural flat				×
	Meeanee township	Semi-urban Flat				×
Awatoto	Awatoto Residential	Semi-urban Flat	297	123		×
	Awatoto Industrial	Semi-urban Flat				×
		TOTAL	**53,652**	**20,910**		**51,237**
				population %		95.5%
Data Source: Statistics New Zealand 2001 except;				dwellings		20,047
*TM 1:Bay View Reticulation – Options Evaluation – March 2002						
**Aerial View MapIT estimate count of dwellings and population based on average per dwelling of Statistics NZ 2001 data						

The remaining community areas make private arrangements for their water supply. The separation of public and privately served areas is shown in Figure 9

[9] Population figures Statistics New Zealand 2001 census, aerial mapping estimates, and TM 1: Bay View Reticulation – Options Evaluation – March 2002

Figure 9 – The Extent of the Napier City Council Water Supply Service



4.3.1.2 Method of water supply

The reticulated system draws all its water from the main aquifer of the Heretaunga plains aquifers, the same one serving the wider area and Hastings District Council area. See the description of these aquifers in chapter 3 for more details.

The abstraction is by 10 artesian wells located in the Taradale and Pirimai areas. The water is pumped to storage reservoirs located in Taradale, Napier Hill, Bay View, and Kaimata, serving 3 zones of distribution, as shown in Figure 10. The water is not treated, and no chemicals are added.

4.3.1.3 Quality and Quantity of the drinking water

The reticulated water supply system must be kept and maintained in a manner such that the water is safe for human consumption. The Drinking Water Standards for New Zealand 2000 (DWSNZ 2000), released by the Ministry of Health, details how to assess the quality and safety of drinking water. The DWSNZ 2000 lists the maximum concentrations of chemical, radiological, and microbiological contaminants acceptable for public health in drinking water.

For community drinking-water supplies (defined as water supplies that serve more than 25 people for at least 60 days a year) the DWSNZ 2000 also specify the sampling protocols than must be observed to demonstrate that drinking-water complies with the Standards.

The supply is not chlorinated, because Napier's water is sourced from an aquifer that is free from surface or climatic influences at the points where water is abstracted, as detailed in a report by the Institute for Geological and Nuclear Sciences dated May 2002[10]. There is a slight but real possibility of contamination of unchlorinated water supply systems, and the water supply network is therefore monitored at a level 50% higher than required by the Standards.

The aesthetic quality of water in Napier South, Central Business District, and Napier Hill has been improved dramatically during the last decade as a result of the decommissioning of wells in Napier South, Maraenui, and Onekawa. New wells that produce water of a very high aesthetic quality have been developed in the Taradale area to replace the capacity that was lost. The iron/manganese deposit that was formed on the inside of pipes before the wells in Napier South, Maraenui, and Onekawa were decommissioned still exists, but the problems of odour and discolouration that used to occur is now almost something of the past. Mains flushing and cleaning programmes ensure that the frequency of these events stays low.

[10] Groundwater security at Napier City Council municipal supply wells based on tritium dating and hydrogeological data. Institute of Geological and Nuclear Sciences Ltd. May 2002.

As the Napier City Council system is a Ministry of Health registered supply, monitoring of water quality is carried out in accordance with the requirements specified in the Drinking-Water Standards for New Zealand 2000.

The compliance criteria for monitoring are classified according to the health risk posed by non-compliance. In order of importance they are:

- Priority 1 determinands
  Microorganisms of public health significance. Specifically the bacteria Escherichia coli (E. coli) which indicate the presence of faecal matter, and the protozoa Giardia and Cryptosporidium.
- Priority 2 determinands
  Chemical and radiological contaminants that may have adverse effects of public health in sufficient concentrations. Includes inorganic chemicals such as heavy metals and organic compounds such as pesticides.
- Priority 3 and 4 determinands
  Generally monitoring is not required from a public health perspective.

Refer to the Ministry of Health Drinking Water Standards for New Zealand 2000 for full details of the monitoring requirements. The NCC water-sampling programme covers the 10 supply wells and the 3 distribution zones Napier, Taradale, and Bay View. The distribution zones have been registered for bacteriological monitoring and sampling compliance since 1995, and this year complied in full on these points.

Sporadic indications of bacteriological contamination have been detected at Kaimata reservoir for some time. Most of the time the interval between events is longer than the minimum specified by the Drinking Water Standards, but the persistent nature of the problem points towards an issue that needs to be managed carefully. Contamination events are treated in accordance with the requirements of the Drinking Water Standards as such events present a risk to public health. All known usual potential contamination sources have been eliminated and efforts to overcome the problem are now focussed on two areas:

1.) The pipeline that connects the reservoir to the reticulation is very long and also serves as the supply to the reservoir. The turnover of water in Kaimata reservoir is therefore reduced. Water in the reservoir gets old if it is not replaced by some other means, and the reservoir is therefore flushed on a fortnightly basis.

2.) Bay View used to be supplied from shallow bores from the Esk River. The turbid water from the Esk River deposited a sediment layer on the inside of the pipes, with the greatest impact in the Kaimata area. Regular flushing of the reservoir appears to be insufficient to overcome the effect of

the sediment layer and a regular chlorination programme has therefore recently been added to the flushing program.

Additional chemical monitoring of the water supply is currently underway to confirm whether water from the Taradale distribution zone should be assigned as “aggressive”. Aggressiveness is not a determinant as such, but indicates that the drinking-water supply has a tendency to corrode household metal pipes, taps, and other plumbing. If these corrode, small amounts of metals are removed from their surface and either deposited in the pipe (such as rust), or remain dissolved in the water. It is the dissolved metals that are of concern here.

Corrosion is usually a slow process, but aggressive water held within the plumbing overnight can end up with high dissolved metal levels. When a tap is turned on, the first glass of water may contain these metals and should not be drunk or used for food preparation. Instead, the first two glasses of water should be used for some other purpose, if the tap has not been used for several hours or more.

The NCC supply is graded, as it is a supply for more than 500 people, and the Ministry of Health publicly reports the water results on a research institute drinking water website[11].

[11] www.drinkingwater.co.nz

Figure 10 – Water Supply System Overview

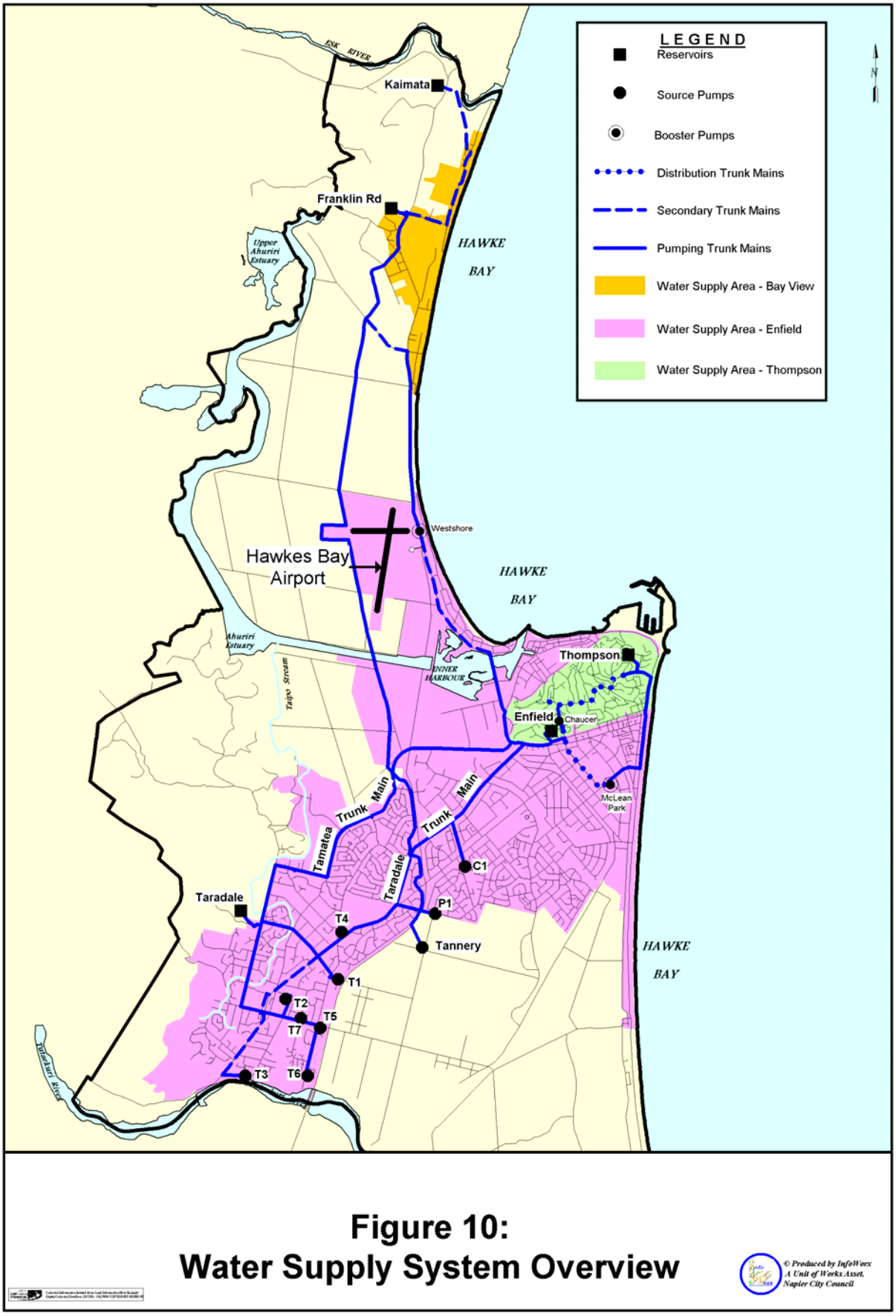


Figure 10:
Water Supply System Overview

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Napier City Council

4.3.1.4 Extent of water treatment

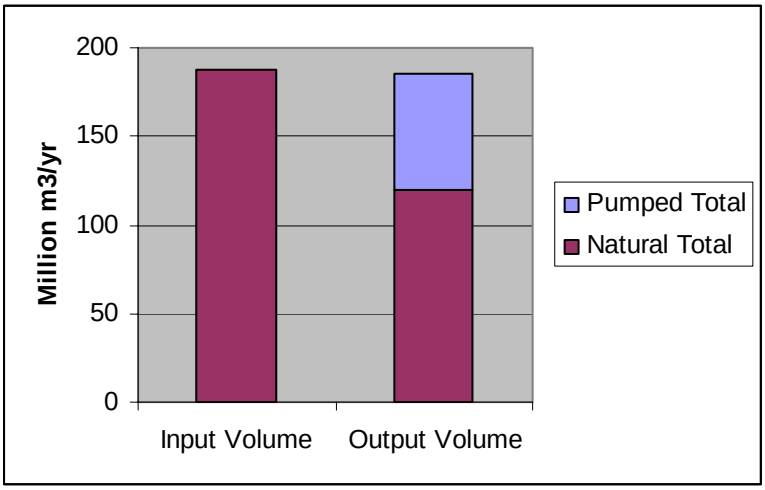
The water is neither treated nor disinfected as the supply is of good quality and free from bacterial, viral, and protozoan contamination. However, the absence of a residual disinfectant (chlorine) does increase the risk of contamination. Precautionary activities to maintain quality in the storage and distribution system include:

- Sampling regime 50% more than the Drinking Water standard requirements.
- Sampling is also carried out in the vicinity of maintenance works.
- All operations personnel qualified to work on the system for maintenance and repairs. The tailored training programme includes health issues of water systems.
- Turnover of water stored in the reservoirs. For example the Kaimata reservoir is currently on a fortnightly flushing programme

4.3.1.5 Drinking Water Quantity

On currently available information regarding long-term population growth and the water takes from the aquifer, it is concluded that the groundwater source is sufficient to satisfy the city's water needs in the foreseeable future. Water takes from the Heretaunga Plains aquifer is shown on the Table below:

Table 14 – Heretaunga Plains July 1994 to June 1995 Groundwater Balance



Data Source: Heretaunga Plains Groundwater Study, Volume 1:Findings. Institute of Geological & Nuclear Sciences, May 1997

4.3.1.6 Suitability of system to meet current demands

Water is available on demand in the 3 zones at all times. Based on water demand on the East Coast of New Zealand, the system is designed to meet peak domestic demand of 900 litres per person per day, plus a set amount of 8,000 m^3 for non-domestic purposes.

Table 15 – Water Supply Ten-Year Plan

Description	Budgets Approved prior to 05/06	05/06	06/07	07/08	08/09	09/10 ($000)	10/11	11/12	12/13	13/14	14/15	TOTAL
New Capital												
New Reservoir Taradale	350	-	-	-	-	803	-	-	-	-	-	1,153 *
	-	58	-	-	-	-	-	-	-	-	-	58
	-	114	-	-	-	-	-	-	-	-	-	114 *
New Reservoir - Bay View	-	172	-	-	-	-	-	-	-	-	-	172
Awatoto Trunk Main	-	-	84	-	-	1,715	-	-	-	-	-	1,799 *
New Well - Awatoto	-	-	-	-	267	-	-	-	-	-	-	267 *
Water Main - Tennyson St/Milton Rd Link	-	-	-	-	67	-	-	-	-	-	-	67
Upgrade Water Supply Control System	-	-	-	-	109	-	-	-	-	-	-	109
Sub-Total	**350**	**172**	**84**	**-**	**443**	**2,518**	**-**	**-**	**-**	**-**	**-**	**3,567**
Vested Assets												
Water Supply Vested Assets	N/A	162	162	162	162	162	162	162	162	162	162	1,620 *
Sub-Total	**N/A**	**162**	**162**	**162**	**162**	**162**	**162**	**162**	**162**	**162**	**162**	**1,620**
Renewals												
Infrastructural Asset Renewal - Pump Stations	N/A	52	58	63	68	70	70	70	70	70	70	661
Infrastructural Asset Renewal - Water Meters	N/A	16	16	16	16	16	16	16	16	16	16	160
Infrastructural Asset Renewal - Pipes	N/A	449	449	449	449	449	449	449	449	449	449	4,490
Capital Upgrade associated with Pipe Infrastructural Asset Renewal	N/A	90	90	90	90	90	90	90	90	90	90	900
Sub-Total	**N/A**	**607**	**613**	**618**	**623**	**625**	**625**	**625**	**625**	**625**	**625**	**6,211**
Water Management	**350**	**941**	**859**	**780**	**1,228**	**3,305**	**787**	**787**	**787**	**787**	**787**	**11,398**

*Item/part item addresses future growth

Based on the current served population of 51,237 in the water supply served area the daily demand is 54,113 m^3 (54.1 million litres) as shown in appendix 6.

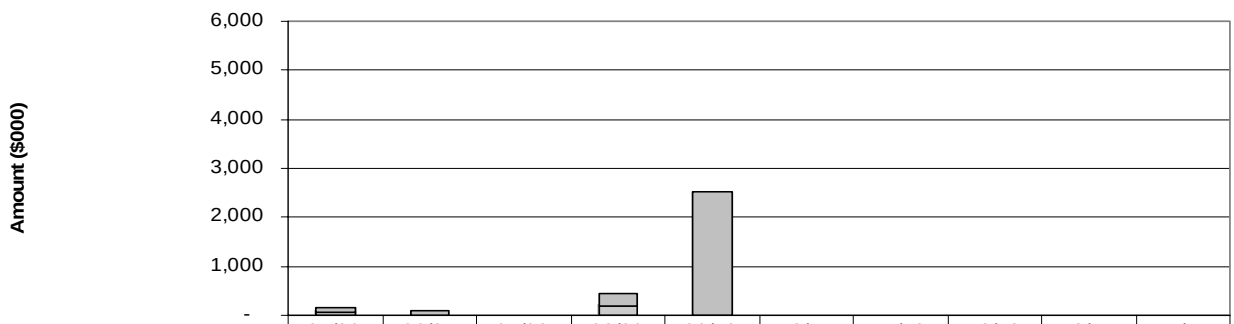
The capacity of a bulk water supply is its ability to meet demand. Current capacity of the water supply system is 55.6 million litres achieved by the recent additions and upgrades of:

- Increased capacity of two existing wells
- Construction of a new well
- New booster pump station

The only planned addition to address remaining current storage inadequacies is a new reservoir in Bay View (2005/06). These and other works are shown in the 2005-2014 capital plan in Table 15.

Note in many cases a new capital proposed work addresses both current system inadequacies and future growth as in Figure 11.

Figure 11 – Water Supply Ten year Plan



	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15
Future Growth	114	84	-	267	2,518	-	-	-	-	-
Current Improvements	58	-	-	176	-	-	-	-	-	-
Total	172	84	-	443	2,518	-	-	-	-	-

The additions to meet future demand in relation to increases in population are discussed further in section 4.3.2.

4.3.1.7 Demand management

Currently the system capacity is 103% of current demand. It is prudent for Council to employ a variety of methods to manage any increase in demand by current user and the anticipated future demand. As well as building new infrastructure, alternative demand management methods include:

- Conservation Education:

  Management methods are water restrictions for gardening and annual water conservation programme at dry times of year.

- Metering:

  An important point to note is the metering of water. Currently most commercial properties and all residential properties in Bay View are metered; this is done to encourage water conservation practices and reflects the cost and efforts of supply to meet demands. This practice helps preserve the ability of the system to meet average demands across all users.

4.3.2 Future Service Requirements

4.3.2.1 Effect of growth

The effect of population increase from infill in the reticulated area, and those greenfield development areas that connect to the reticulation, is an increase in required water supply capacity and storage. Local reticulation within each area will be able to supply the consumption requirements of residential infill. However, in some areas there may be pressure and trunk distribution problems affecting the ability to deliver the required capacity.

The history of growth suburbs as shown in appendix 7 indicates 9.7% (156 households) of projected 2004-2021 infill growth is expected outside the reticulated area, and 90.3% (1,459 households) of projected 2004-2021 infill growth is expected in the reticulated area. All the District Plan greenfield growth areas for 2004-2021 (1,615 households) are likely to connect to the reticulated area, as they are on the periphery of the reticulated system.

The reticulated system is in 3 supply zones: Bay View, Enfield, and Thompson shown in Figure 10.

4.3.2.2 System Capacity

The current design criteria for daily need is 900 litres per person domestic use and 8 million litres total non-domestic use, and storage is based on 500 litres per person per day. The required capacity and storage for future growth is in shown in Table 16 detailed in appendix 6.

Table 16 – Water Supply Current and Future Capacity and Storage

Water Supply Demand	**CURRENT 2004**				**FUTURE 2021**			
Distribution Zone	**Design (2004 basis)**		**Required (2001 pop)**		**Proposed (2021)**		**Required (2021 pop)**	
all in m^3	Capacity	Storage	Capacity	Storage	Capacity	Storage	Capacity	Storage
Enfield		20,240	39,803	22,113		29,440	43,477	24,154
Thompson	47,600	7,075	5,030	2,795	55,000	7,075	5,166	2,870
Bayview		635	1,281	712		1,035	1,297	721
plus industrial/fire needs	8,000	2,500	8,000	2,500	8,000	2,500	8,000	2,500
Total	**55,600**	**30,450**	**54,113**	**28,119**	**63,000**	**40,050**	**57,940**	**30,244**
% of population needs	103%	108%			109%	132%	*	

*Higher percentage is for technical purpose

The upgrade requirements of the reticulation and the New Capital items identified to address these future needs are shown in Table 17.

Table 17 – Water Supply Reticulation Additions Proposed for Infill and Greenfield Growth

Supply subsystem	Growth type	Additional households 2004-2021	2021 Requirement of reticulation system	New Capital Items*
Bay View	Infill	60	Increase storage to 1,035m^3 (144% of population needs)	New reservoir Bay View (2005/06)
Thompson	Infill	153	None	None
Enfield	Infill	1,245	Increase storage to 29,440 m^3 (total 2 reservoirs) (122% of population needs) Increase (total) supply to 63,000 m^3 (109% of population needs)	New Reservoir Taradale (2009/10) Awatoto trunk main (2009/10) New Well - Awatoto (2008/09)
	Greenfield	1,615		
			Distribution extension	Vested Assets
Reticulated Growth		**3,074**	(95% of total growth in period 2004-2021)	
Non-serviced Growth		156	No reticulation requirements	
Total growth 2004-2021		**3,230**	**Households**	

* See Table 15 for full details.

The additional capacities greater than 100% demand is for reasons of fire fighting need and design safety margin.

4.3.3 Options

4.3.3.1 Non-reticulated areas

Based on NUGS 1992 historical figures from 1992 to 1998, shown in Appendix 7, using the same proportions for community areas the projected Infill growth for 2004-2021 in the non-serviced area is 156 households with a likely spread:

- Awatoto 24
- Kaimata/Bay View Rural 21
- Eskdale 9
- Meeanee/Jervoistown/Loop 35
- Poraiti 67

Note these are proportional projections only and may change as infill growth patterns change. Any infill growth in these wider rural areas is not suitable for reticulation, as they are geographically removed from the existing system. The most suitable systems for infill in these areas are shown in Table 18. Greenfield areas already released for development, on the periphery of the urban area are likely to be reticulated.

Table 18 – Water Supply Options for Non-Serviced Infill Development

Community	Current Main Method	Best Option for Infill
Eskdale	Rainwater	Reticulated
Kaimata	Rainwater	Reticulated*
Bay View Rural	Rainwater/Reticulated	Rainwater
Landcorp farm	Bore	N/A
Bay View Village	Reticulated	Reticulated
Bay View Coastal	Reticulated	Reticulated
Poraiti	Rainwater/Bores	Rainwater/Bores
Redclyffe	Bores	Bores
Jervoistown	Individual/Shared Bores	Bores
Meeanee rural	Individual/Shared Bores	Bores
The Loop	Bores	Bores
Meeanee township	Individual/Shared Bores	Bores
Awatoto Residential	Bores	Bores
*Currently not cost effective		

4.3.3.2 Extension of reticulation

The beneficiaries meet the costs of extension to the reticulated system. Example extensions are:

- Kaimata:

  Where points of interest have cross boundary issues with Hastings District Council, services may be assessed by disregarding the territorial boundary. For example, the developers of the Esk Hills subdivision on Hill Road will provide water through collaboration with Hastings District Council, via a new pipeline and reservoir link to the Whirinaki system bores and treatment plant located near the Esk River on State Highway 2.

  Possible advantage of the system is the supply to dwellings immediately next to the pipeline in Eskdale; this may include the Eskdale school.

- Eskdale:

  Eskdale may also be able to connect to the Hastings District Council system. See section 6.3.3 for details.

- Meeanee Rural:

  The urban fringe latest greenfield development of Serpentine is located next to the reticulated system, which allows relatively easy extension to the system, subject to the costs of required improvements for supply, storage, and distribution. Other parts of this community area are geographically spaced and removed from the existing system thus are not suitable for reticulation.

4.4 Stormwater

4.4.1 Current Service Requirements

4.4.1.1 Extent of the reticulated system/drainage works

The stormwater areas are defined by catchments as shown in Figure 12 and Figure 13. The stormwater runoff from the southern part of the NCC area is pumped to the Ahuriri Estuary or over the Marine Parade shingle spit to the ocean.

In the northern part of NCC area (Bay View) stormwater drains to the southwest and is pumped over the stop bank into the upper Ahuriri Estuary channel. During flood conditions, excess floodwaters are stored in the DOC wetland area by the airport. The small part of Eskdale in NCC jurisdiction drains to the Esk river.

The following waterways in the NCC district are part of the Heretaunga Plains Flood Control Scheme, which is administered by HBRC:

- Purimu stream (NCC managed)
- County drain (NCC managed)
- Plantation drain (NCC managed)
- Kenny Road system
- Redclyffe system (small part of a cross border system)
- Brookfields/Awatoto system
- Taipo Stream
- Meeanee Rural Drainage
- Old Tutaekuri river bed (to Taradale road)

There are total of 19 pumping stations in the HPFCS, of which 7 are in the NCC district. On a day to day basis, 4 are maintained by HBRC, and 3 by NCC (County, Plantation and Purimu). The North side of the Ahuriri estuary is not part of the HPFCS. There are 2 private pumping stations on the Landcorp farm and one, Bay View, managed by NCC as described above.

From a public health perspective, it is the local effect on the community areas, at the local catchment level and individual property level that is of interest.

The NCC served area is primarily the urban areas with reticulated road drainage and the drainage channel network shown in Figure 12 and Figure 13. Note the community areas do not correlate with the catchment areas, and they are not expected to do so.

4.4.1.2 Method of Stormwater disposal

The purpose of the public constructed system is to convey stormwater runoff from the local offsite level though a network of reticulated pipes, open drainage channels, culverts and roadside ditches as shown in Figure 14, to the catchment drainage system. The predominantly flat topography of the area dictates the use of open channels and pumping to convey the stormwater runoff to the Estuary or the sea.

Figure 12 – Stormwater Catchments and Drainage in Southern Part of NCC Area

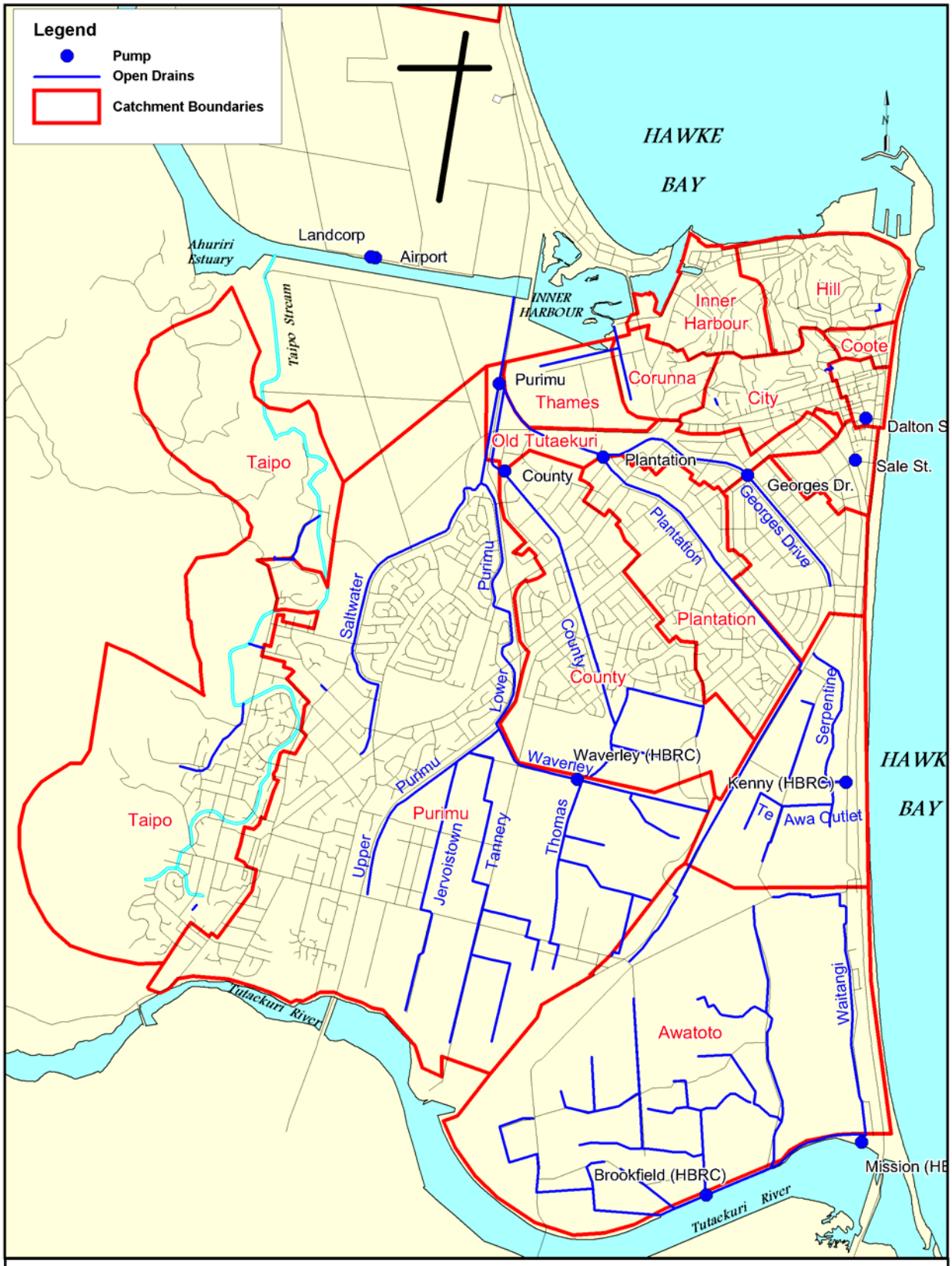


Figure 12:
Stormwater Catchments and Drainage in Southern Part of NCC Area

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Figure 13 – Stormwater Catchments and Drainage in Northern Part of NCC Area

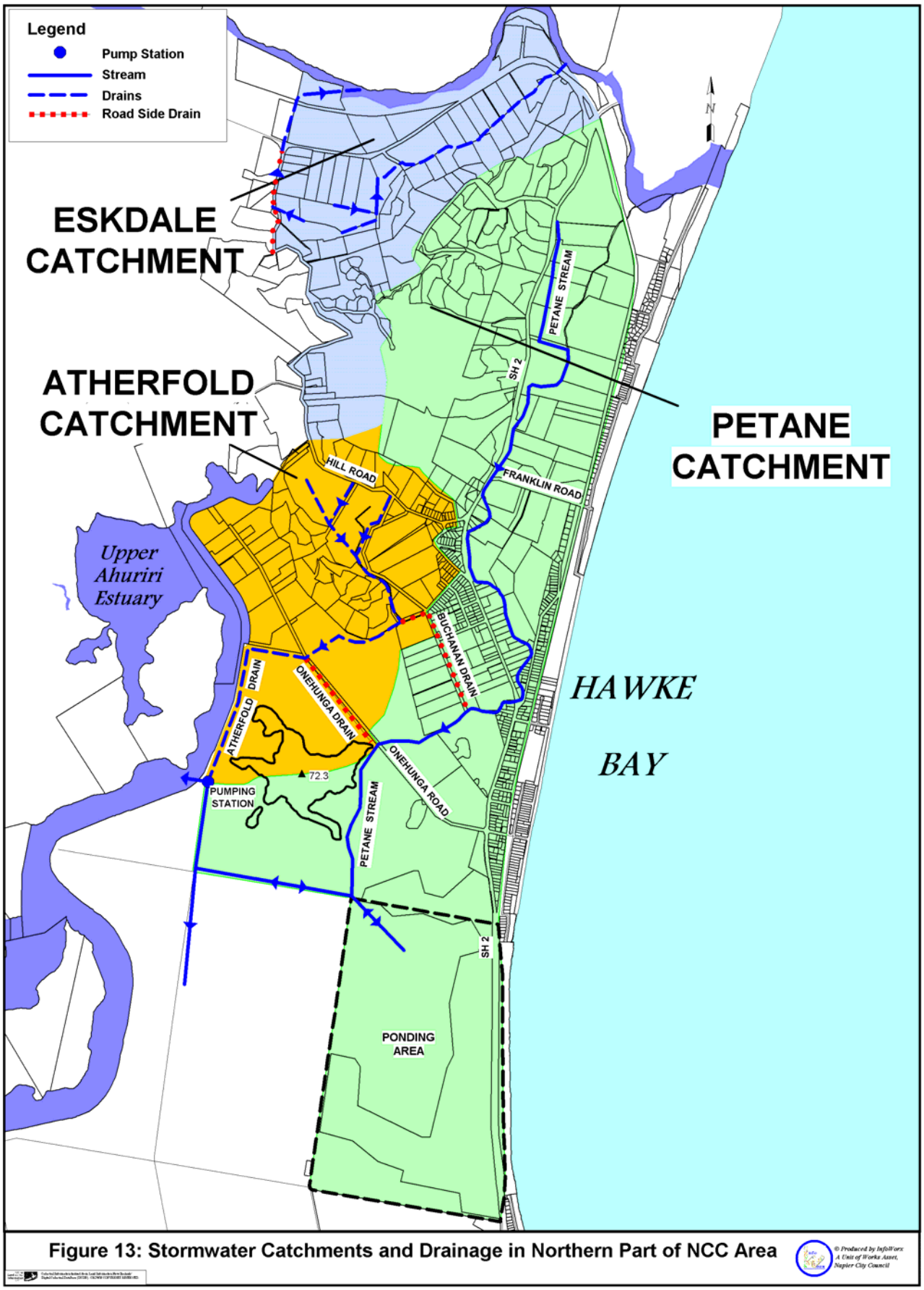


Figure 13: Stormwater Catchments and Drainage in Northern Part of NCC Area

Figure 14 – Roadside Drainage Ditch

Figure 15 – Reticulated Road Drain

Figure 16 – Natural Feature Drainage

The non-serviced areas are the privately managed areas such as Landcorp farm and the airport and private land where runoff is through natural features such as valleys, gullies, ditches, and ground soakage as in Figure 17 and Figure 18. These are the responsibility of the landowner.

Figure 17 – Natural Feature Catchment

Figure 18 – Private Drainage Ditch on Private Land

The stormwater management provision for the community areas are shown in Table 19.

Table 19 – Stormwater Service Provision by Community Area

Community for the purposes of this assessment	Area Description (see District Plan for zoning)	Service Provision
Eskdale	Rural Flat	Open drains
Kaimata	Rural hill	Open roadside drains/Reticulated collection
Bay View Village	Semi-Urban Flat	Open drains
Bay View Coastal	Semi-Urban Flat	Mixture reticulated collection, open drains and soakage
Bay View Rural	Rural flat	Open drains
Landcorp farm/ HB Airport	Rural Flat	Private land
Lagoon farm	Rural Flat	Open drains
Poraiti	Rural Hill	Open drains
Redclyffe	Rural Flat/Hills	Open drains
Napier Central	Urban Flat	Reticulated, generally pre 95 standard*
Taradale (EIT)	Urban Flat	Reticulated Private. Discharges to Tutaekuri
Napier Hill	Urban Hill	Reticulated and open/sealed roadside drains
Westshore	Urban Flat	Reticulated, generally pre 95 standard*
Napier industrial	Urban Flat	Reticulated
Jervoistown	Semi-Urban Flat	Open drains
Meeanee rural	Rural flat	Open drains
The Loop	Semi-urban Flat	Open drains
Meeanee township	Semi-urban Flat	Open drains
Awatoto Residential Awatoto Industrial	Semi-urban Flat	Mixture reticulated, open drains and soakage

*see section 4.4.1.3 for details

4.4.1.3 Quality and quantity

The HBRC Regional Resource Management Plan 2001 indicates pressures on natural waters from general non-point agricultural and rural industry sources in rural areas. Accordingly, there are established environmental guidelines for surface water quality, which are given in appendix 5.

The quality of the water going to the estuary is controlled by resource consent to discharge or dam surface water issued by the HBRC. NCC has 10 resource consents from HBRC comprising 2 damming of waterways, 3 discharges to streams/drains, and 2 discharges to the sea, and 3 discharges to land, which are detailed in appendix 3.

Refer to section 4.4.3.2 for information on treatment of stormwater. A full analysis of stormwater quality issues is contained in chapter 6 of the Essential Services Development Report 2000 – Stormwater Disposal.

Stormwater disposal needs are erratic as quantity and flow rate are subject to each storm's frequency and intensity. The system design capacity is the most meaningful parameter in the

context of this assessment. It dictates the quantity of water the system will be designed to handle.

Current design criteria, in accordance with the District Plan as in Table 20, are:

- No surface flooding or nuisance created from storm events with a 10 year return period (10% annual probability of exceedance).
- No residential buildings suffer flood damage with a return period of up to 50 years (2% annual probability of exceedance), note this can also be achieved by the setting of building floor levels.

Note: Prior to 1995, this standard was 2 years and 10 years respectively.

Table 20 – Stormwater Systems Design Criteria

Function	**Probability of Occurring Annually**
Primary Protection	
Rural and rural residential	10%
Residential	10%
Commercial and industrial	10%
All areas where no secondary flow path is available	2%
Secondary Protection	
Satisfied by appropriately designed large channels or pipes, provision of secondary flow paths, controlled flood plains and setting of appropriate building levels	2% (based on combined capacity of primary and secondary systems)

Some roadways, and recognised overland flow paths, such as the overflow from the Purimu to the northwest of the Lagoon Farm ponding area, provide secondary flow paths. Generally, the secondary flow paths are in the main Napier and Taradale urban areas. The remaining areas have no designed secondary flow path, due to poor drainage, inadequate local drains built to old standards, or rural roads without reticulated drainage, because it is currently cost prohibitive.

4.4.1.4 Adequacy of the existing facilities

Levels of service are set to safeguard property within the flood event design criteria. Flooding may pose a safety hazard through inundation of property in events exceeding the design criteria. Flooding may also create a health hazard through stormwater that is contaminated with human waste entering properties or waterways. However, for the purposes of this assessment, there is no direct public health level of service relating to risk of disease for stormwater disposal. Instead,

it is the protection of the environment, by reducing incidence of flooding and maintaining a minimum level of waterway quality, which indirectly achieves the protection of public health, by keeping water out of houses.

All new houses are required to have floor levels above the 50-year flood event. The floor level is specific to location, addressed on a case-by-case basis, where Council has the appropriate information, during the building or resource consent process.

It is important to note that the cost of designing systems to standards greater than for 50-year flood events can increase significantly with relation to the increase in protection from flooding. Therefore, to improve systems to design standards higher than this can be prohibitively expensive.

4.4.1.5 Suitability of system to meet current demands

The Napier City Council policies to achieve the required levels of quality and quantity of stormwater disposal are:

- Comply with all discharge consents and general authorisations from the HBRC
- Investigate all notified illegal discharges and mitigate any significant adverse effects.

Because these current storm event design criteria have only been in effect since 1995, the problem areas are where there are old design standard reticulations. The majority of the city is still the pre 1995 standard so the level of compliance with the NCC code 10-year flood requirement is low, particularly parts of Napier Central and Taradale.

Since 1995, a total of $2.3 million has been spent on stormwater upgrading of an initial estimate of $35 million for the whole of the NCC area.

Upgrading to this 10-year standard is an ongoing program. This and other capital items such as: renewals, which address the depreciation of the infrastructure, vested assets which is the additional local offsite infrastructure specifically for new developments, and new capital items, are shown in the 2005-14 capital plan in Table 21.

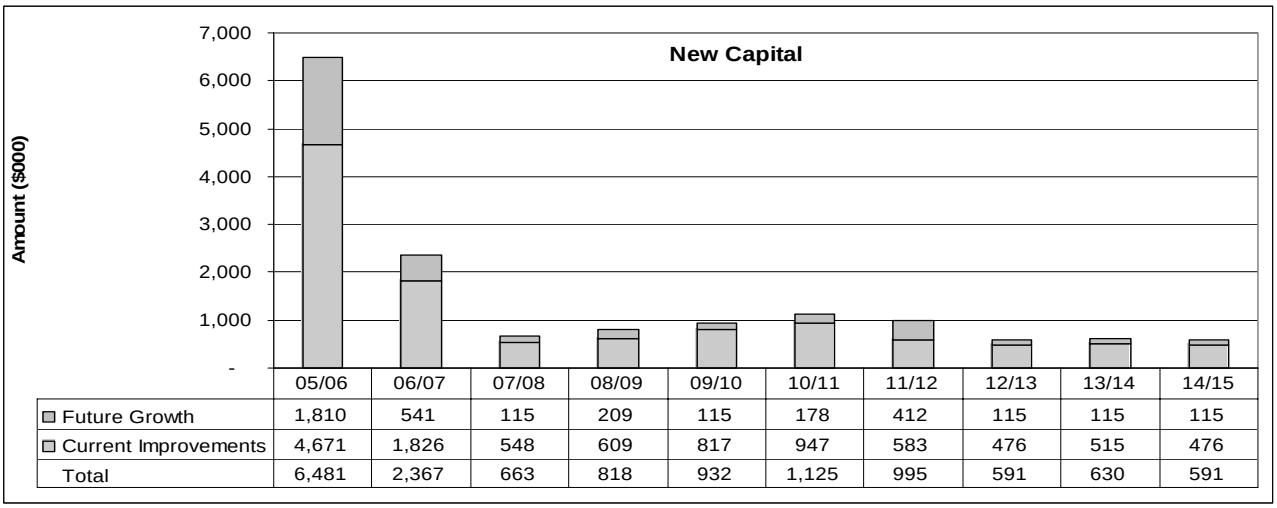
New capital in Figure 19 usually addresses future growth; however, in many cases a proposed work addresses both current system inadequacies and future growth.

Table 21 – Stormwater Ten Year Capital Plan

Description	Budgets Approved prior to 05/06	05/06	06/07	07/08	08/09	09/10 ($000)	10/11	11/12	12/13	13/14	14/15	TOTAL	
New Capital													
	3,848	3,861	1,254	-	-	-	-	-	-	-	-	8,963	
Urban Development -	1,064	1,544	426	-	-	-	-	-	-	-	-	3,034	*
- Overland Drain and Pumping Station	4,912	5,405	1,680	-	-	-	-	-	-	-	-	11,997	
Extend Outfalls - Marine Parade	-	-	-	-	-	39	-	-	-	39	-	78	
	119	150	-	-	-	-	-	-	-	-	-	269	
	34	151	-	-	-	-	-	-	-	-	-	185	*
Saltwater Creek Bank Improvements	153	301	-	-	-	-	-	-	-	-	-	454	
	-	-	-	-	-	-	83	-	-	-	-	83	
	-	-	-	-	-	-	63	-	-	-	-	63	*
Plantation Drain Widening	-	-	-	-	-	-	146	-	-	-	-	146	
	-	-	-	-	84	250	-	-	-	-	-	334	
	-	-	-	-	94	-	-	-	-	-	-	94	*
Upgrade Taipo Stream	-	-	-	-	178	250	-	-	-	-	-	428	
Bay View - Upgrade Stormwater	-	105	-	-	-	25	388	107	-	-	-	625	
Lagoon Farm Concrete Channel	-	-	-	-	-	-	-	297	-	-	-	297	*
Georges Drive Drain	N/A	10	10	10	10	10	10	10	10	10	10	100	
	-	545	562	538	515	493	466	466	466	466	466	4,983	
	-	115	115	115	115	115	115	115	115	115	115	1,150	*
Upgrading Stormwater Catchments	N/A	660	677	653	630	608	581	581	581	581	581	6,133	
Sub-Total	**5,065**	**6,481**	**2,367**	**663**	**818**	**932**	**1,125**	**995**	**591**	**630**	**591**	**20,258**	
Vested Assets													
Stormwater Vested Assets	N/A	332	332	332	332	332	332	332	332	332	332	3,320	*
Sub-Total	**N/A**	**332**	**332**	**332**	**332**	**332**	**332**	**332**	**332**	**332**	**332**	**3,320**	
Renewals													
Stormwater Infrastructural Asset Renewal	N/A	236	262	288	312	337	362	362	362	362	362	3,245	
Sub-Total	**N/A**	**236**	**262**	**288**	**312**	**337**	**362**	**362**	**362**	**362**	**362**	**3,245**	
Stormwater Management	**5,065**	**7,049**	**2,961**	**1,283**	**1,462**	**1,601**	**1,819**	**1,689**	**1,285**	**1,324**	**1,285**	**26,823**	

*items/part items to address future growth

Figure 19 – Projected Stormwater New Capital Expenditure



	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15
Future Growth	1,810	541	115	209	115	178	412	115	115	115
Current Improvements	4,671	1,826	548	609	817	947	583	476	515	476
Total	6,481	2,367	663	818	932	1,125	995	591	630	591

4.4.2 Future service requirements

4.4.2.1 Effect of growth

The effect of growth on stormwater is visible at the catchment level. Table 22 shows the infill and greenfield growth per catchment and the service requirements and capital items planned to address the additional demand.

Developers of greenfield sites provide stormwater disposal system (generally local), and contribute to upgrading disposal systems to current design criteria. These are vested assets, which will then be considered part of the public system.

4.4.2.2 System Capacity

The areas that may flood in storm conditions of 50-year event flood are shown in Figure 20.

That part of the serpentine catchment, in the north part of this area, which is low (along the length of the Serpentine drain) falls into the 50-year flood zone. The cross-country drain will reduce the flood levels in this area by reducing the contributing catchment area, as shown in Figure 21 on page 67.

The construction of the overflow channel north of, and parallel to, the new Prebensen Drive will conduct excess floodwaters from the Purimu Drain. This will reduce the flood level, particularly in Tamatea, and the duration. It will assist in protecting flooding in the new residential development proposed in Lagoon Farm and provide some additional protection against potential tsunami events with the creation of a very large ditch.

As the stormwater overall management is at the catchment level, most capital plan improvements are combined projects to address current inadequacies and meet future demand in relation to increases in population.

Table 22 – Stormwater Additions Proposed for Infill and Greenfield Growth

Projected households total 2004-2021					
Catchment	**INFILL**	**GREENFIELD estimates**		**Service Requirements**	**New Capital Item**
Awatoto	22	0		None	None
County	100	0		None	Cross Country drain
Serpentine	0	0		None	Cross Country drain
Georges Drive	126	0		None	None
Corunna/City/InnerHarbour	159	0		None	None
Eskdale	8	0		None	None
Hill	74	0		None	None
Landcorp	55	0		None	None
Petane/Atherfold	94	0		Increase capacity of Petane drain	Bay View Stormwater Upgrading - option (d*)
Plantation	139	0		Increase capacity of drain	Cross Country drain Plantation drain widening
Purimu	567	850	Lagoon Farm	Lagoon farm overflow channel	Lagoon Farm concrete channel
		220	Citrus Grove	Saltwater creek increased capacity	Saltwater creek bank improvements
		130	Park Island	Additional pumping capacity at Purimu pumping station.	Completed 03/04
		150	King/Guppy**	Increased catchment drainage	Cross Country drain
Taipo	272	120	Kent Terrace	Halliwell detention dam upgrade	Hawke's Bay Regional Council
				Increase capacity of Taipo catchment	Upgrade Taipo stream
TOTAL	**1615**	**1470**	growth until 2021		

Note: Mission Heights catchment (350) drains to HDC
**remaining of 320 original. Reticulation and local drainage upgrade complete

Figure 20 – NCC Area 50-Year Flood Locations

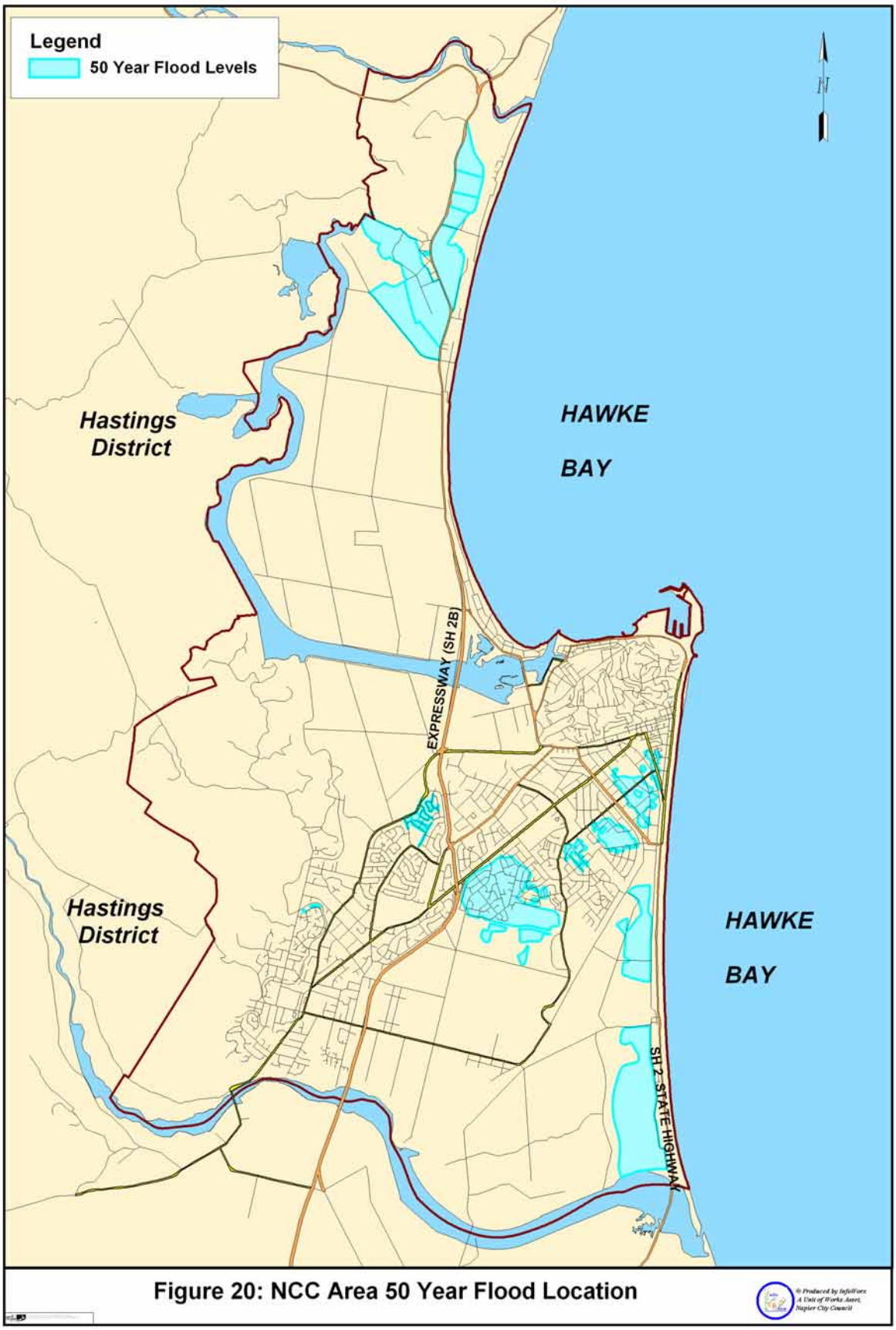


Figure 21 – Cross Country Drain 50-Year (2%) Event Flood Relief

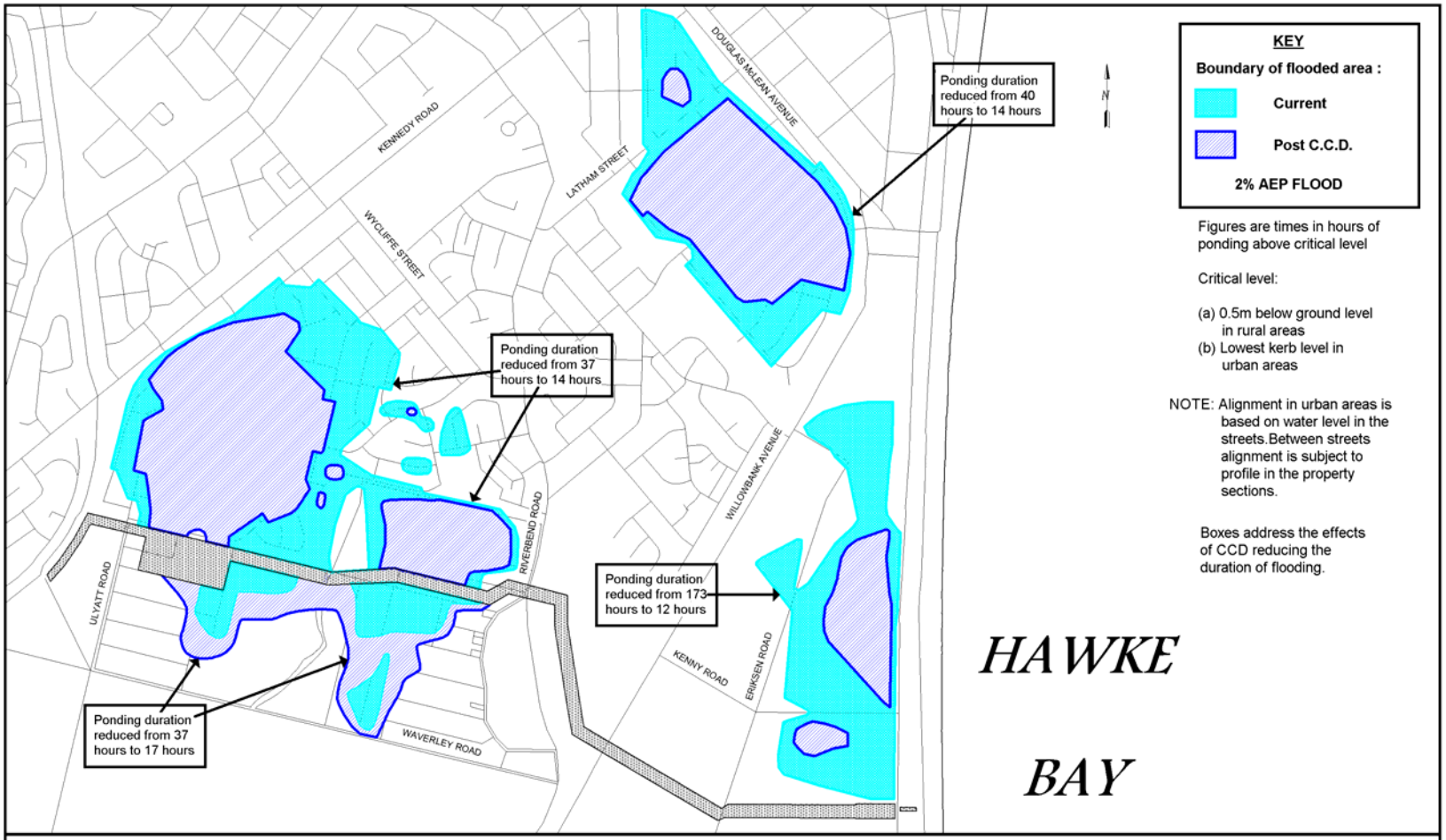


Figure 21:
Cross Country Drain 50 Year (2%) Event Flood Relief

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4.4.3 Options

4.4.3.1 Reduction of 50 year flood areas

For infill and Greenfield areas not yet released for development and not already covered by items in the 10-year capital plan, such as the cross-country drain, the developers primarily provide for the on-site and local off-site improvements. For the catchment level improvements, cost feasible options to reduce the 50-year flood levels are as follows:

- **Bay View**[12]

Upgrade Petane drain:

option (c) Upgrade the State Highway 2/Rogers road culvert, which restricts the passage of water. The effect would be to reduce the upstream peak but the down stream peak would increase. Further investigation required to determine the extent of this effect, and any required mitigation measures.

option (d) Widen channel downstream of State Highway 2, Rogers road culvert. This increases the capacity to convey water to the ponding area on Landcorp/DOC land to the south.

Upgrade Atherfold drain:

option (f) Channel widening and re-grading. This increases the capacity from the Buchanan drain to the Upper Ahuriri Estuary. Exact location and method of disposal requires further investigation

option (g) Construct linking channel to Petane drain along Onehunga road. This increases the capacity by diverting flow to Landcorp/DOC ponding area via Petane drain.

The most effective options are summarised in Table 23.

The first part, (d*), of the recommended option is included in the 10-year capital plan as shown as 'Bay View – Upgrade Stormwater' in Table 21 on page 63. This capital work will increase the capacity of the Petane Drain.

[12] Bay View Stormwater Report 2000 section 16-18

Table 23 – Bay View Stormwater Catchment Improvement Options – Petane/Atherfold Drains

Option Combination	Estimated Cost**	Advantages	Disadvantages	Comments
(d) and (f)	$680,000	Significant reduction of peak water levels at critical points	Cost $282,000 greater than option(d) alone	Consider as stage 1 project at a future date
(c), (d), (f) an (g)	$1,006,000	Provides reduction of peak water levels over most of the drainage system	Does not quite give the required reduction of peak water levels in the Petane drain at the Buchanan junction	
(c) and (d*) **Recommended**	$740,000	Reduction of peak water levels upstream of SH2 by 0.73m and downstream by 0.37 m		**Part (d*) is included in the 10-year capital plan.** (at current adjusted cost).

*option (d) but increased width
** at time of report (2000).

- **Jervoistown**

Existing local off-site service is a combination of shallow open drains and small size pipes. This discharges into the Jervoistown drain to the east, which is at full capacity.

For infill development, catchment wide improvements would be needed. There are currently no proposals for this work.

- **Awatoto industrial**

This area has a significant flooding problem as shown in Figure 20, and acts as a ponding area. For industrial development to proceed, catchment level improvements would be required including pumping capability to the sea. There is currently no proposal for this work.

4.4.3.2 Treatment

The long, narrow drainage channels throughout the City provide attenuation of the effects of volume and velocity during significant rainfall events. In addition, they are very effective at sediment removal before the stormwater is disposed to the Ahuriri Estuary. Roadside sumps and screens at pump stations remove bulk items.

4.4.3.3 Re-use

The current drinking water source is secure and abundant for the medium to long term, thus collection and re-use of treated stormwater for drinking water purposes is not a necessary consideration at this time. However, this option is likely to become more common worldwide, as water sources become scarce through overuse, in the long term.

4.5 Public Toilets

There are 42 Public toilets shown in Figure 22 serving mainly Napier City. They are situated on public land in streets, parks, reserves and sports grounds. There is 1 Council managed toilet on private land. The greatest concentration is understandably in the Central Business District (part of Napier Central) as the demand drivers of public congregation are directly influenced by retail and tourism, which are concentrated here. The city demography drives the demand for public toilets. In particular, the high visitor population creates high demand in the peak season. Public toilets provision is geared towards this need, with many located in business areas. There is no apparent shortage of public facilities.

All NCC public toilets are cleaned and inspected on a daily basis to minimise any public health hazard. There are 7 facilities identified as inadequate, however this is due to their poor physical condition rather than any health issue. While NCC recognises the public health protection benefits of providing a surfactant such as soap and hand drying facilities in public toilets , the history of chronic vandalism of NCC toilet facilities, and other public places in the City, presents a logistical and economic challenge to provide vandal proof fixtures and fittings. Therefore, at present the minimum requirements in accordance with the Government Department of Building and Housing, Acceptable Solutions G1/AS1 Personal Hygiene 2000 are provided, which is the provision of a hand basin and cold water.

Table 24 – Public Toilets 10-year Capital Plan

Description	Prior Budget	05/06	06/07	07/08	08/09	09/10 ($000)	10/11	11/12	12/13	13/14	14/15	TOTAL
Toilet Replacement Programme	N/A	27	-	27	27	-	27	27	-	27	27	189
Public Toilets Infrastructural Asset Renewal	N/A	56	67	77	87	98	108	118	128	139	139	1,017
Public Toilets	**-**	**83**	**67**	**104**	**114**	**98**	**135**	**145**	**128**	**166**	**166**	**1,206**

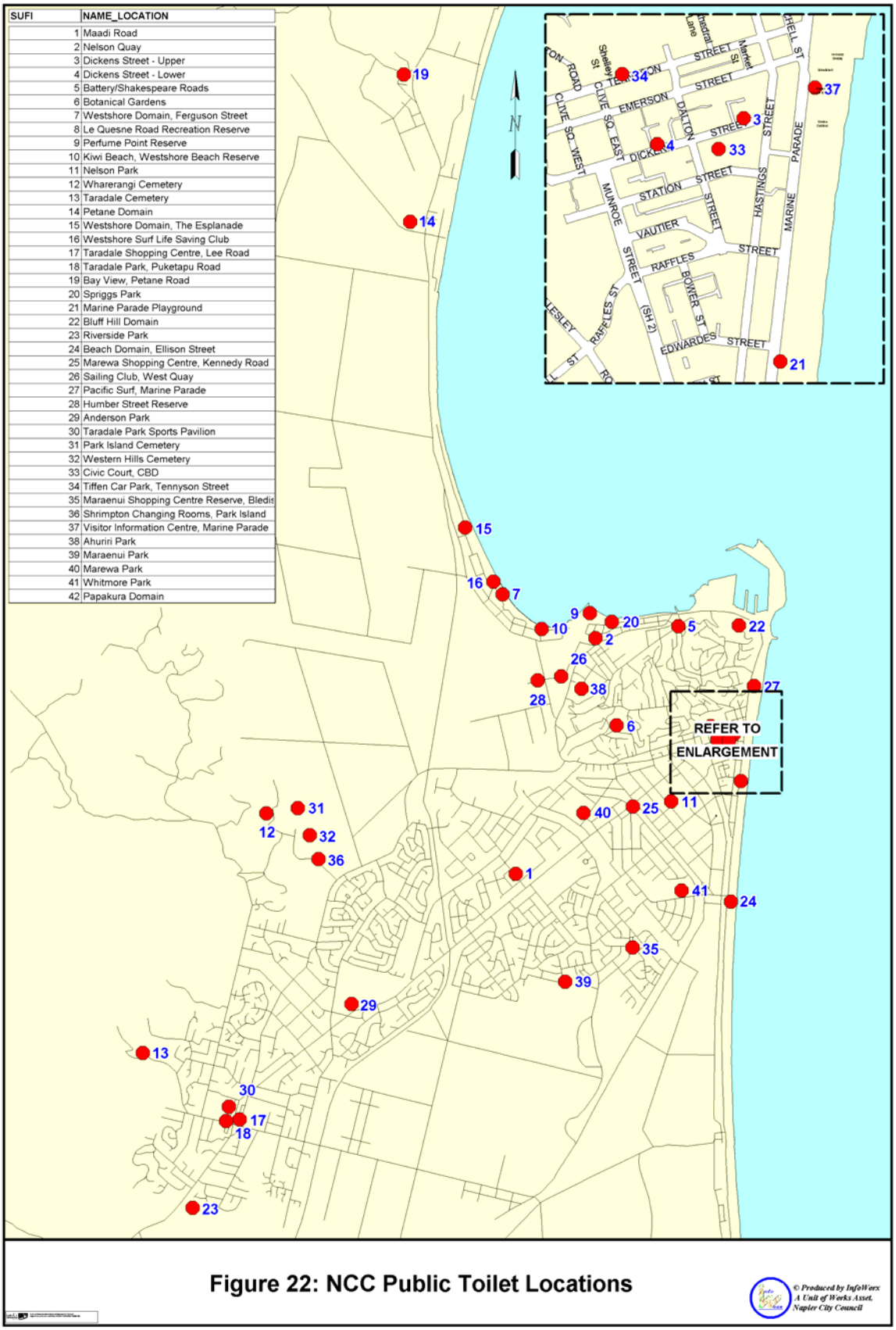
The standard of toilet facilities has improved dramatically since 1996, and full adequacy will be complete once the few remaining sub-standard facilities are targeted for upgrade or replacement in the near future. In recent years, a number of the public toilet facilities in Napier have won awards relating to various aspects such as design and standards.

Future demand for public toilets is driven by:

- Expected increase in number of tourists, as Napier is a tourist city.
- Change in resident habits, such as increasingly frequent shopping trips and leisure activities.

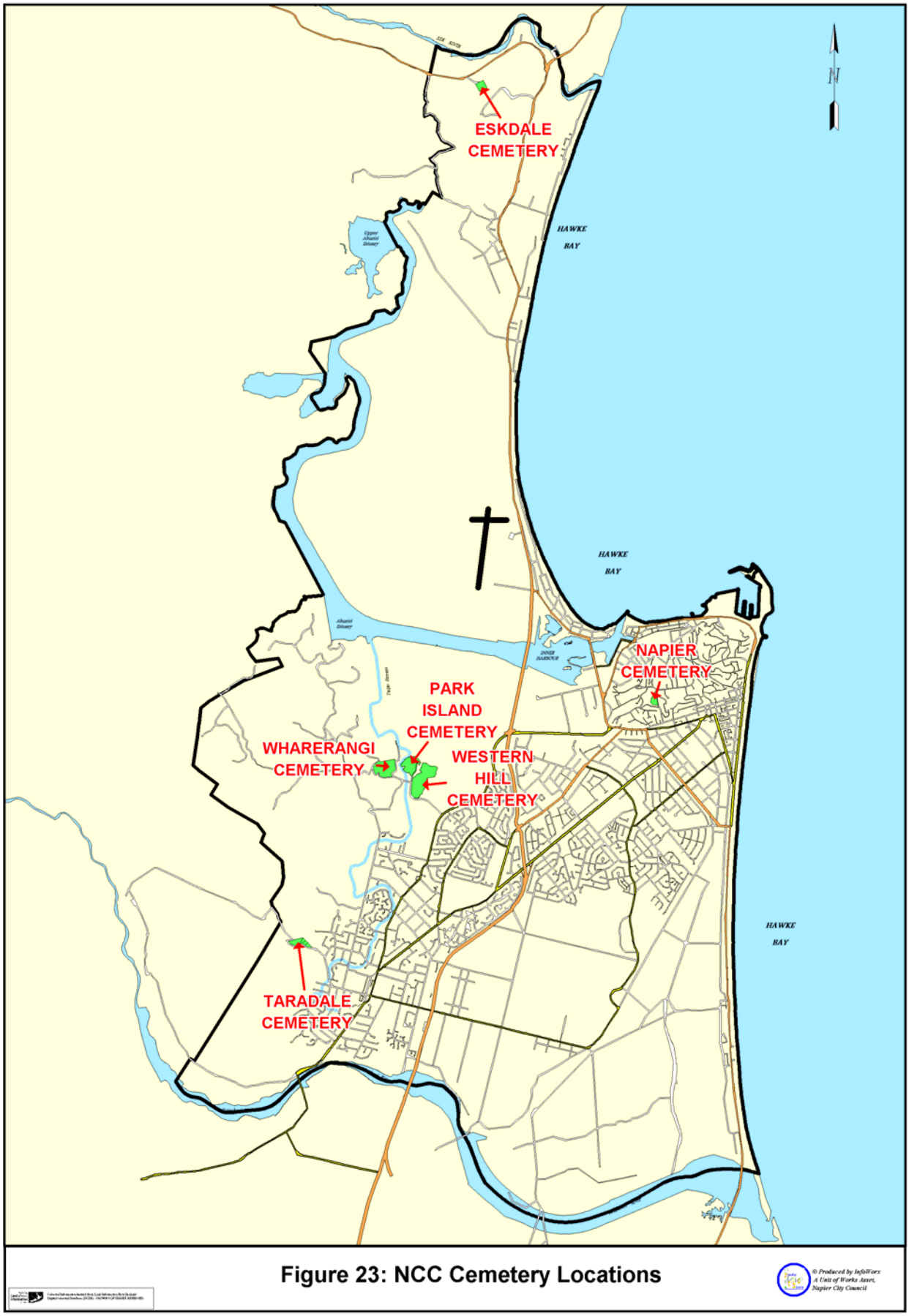
Current provision is adequate for the immediate future needs, and is reviewed on a regular basis. Additional services can be added at relatively short notice, to match changing demand.

Figure 22 – NCC public toilet locations



SUFI	NAME_LOCATION
1	Maadi Road
2	Nelson Quay
3	Dickens Street - Upper
4	Dickens Street - Lower
5	Battery/Shakespeare Roads
6	Botanical Gardens
7	Westshore Domain, Ferguson Street
8	Le Quesne Road Recreation Reserve
9	Perfume Point Reserve
10	Kiwi Beach, Westshore Beach Reserve
11	Nelson Park
12	Whareranga Cemetery
13	Taradale Cemetery
14	Petane Domain
15	Westshore Domain, The Esplanade
16	Westshore Surf Life Saving Club
17	Taradale Shopping Centre, Lee Road
18	Taradale Park, Puketapu Road
19	Bay View, Petane Road
20	Spriggs Park
21	Marine Parade Playground
22	Bluff Hill Domain
23	Riverside Park
24	Beach Domain, Ellison Street
25	Marewa Shopping Centre, Kennedy Road
26	Sailing Club, West Quay
27	Pacific Surf, Marine Parade
28	Humber Street Reserve
29	Anderson Park
30	Taradale Park Sports Pavilion
31	Park Island Cemetery
32	Western Hills Cemetery
33	Civic Court, CBD
34	Tiffen Car Park, Tennyson Street
35	Maraenui Shopping Centre Reserve, Bledis
36	Shrimpton Changing Rooms, Park Island
37	Visitor Information Centre, Marine Parade
38	Ahuriri Park
39	Maraenui Park
40	Marewa Park
41	Whitmore Park
42	Papakura Domain

Figure 23 – NCC cemetery locations

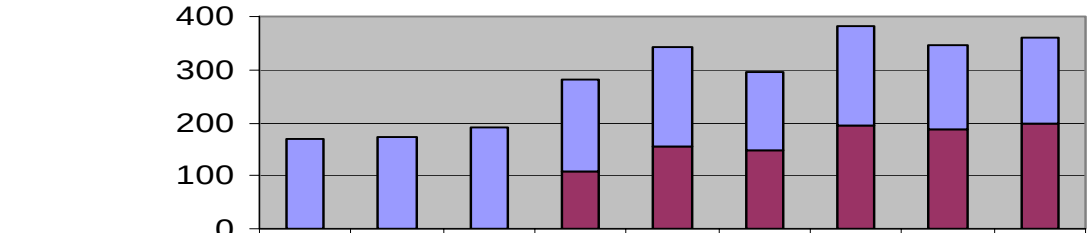


4.6 Public Cemeteries

4.6.1 Current Service Requirements

Napier has 6 public cemeteries as shown in Figure 23.

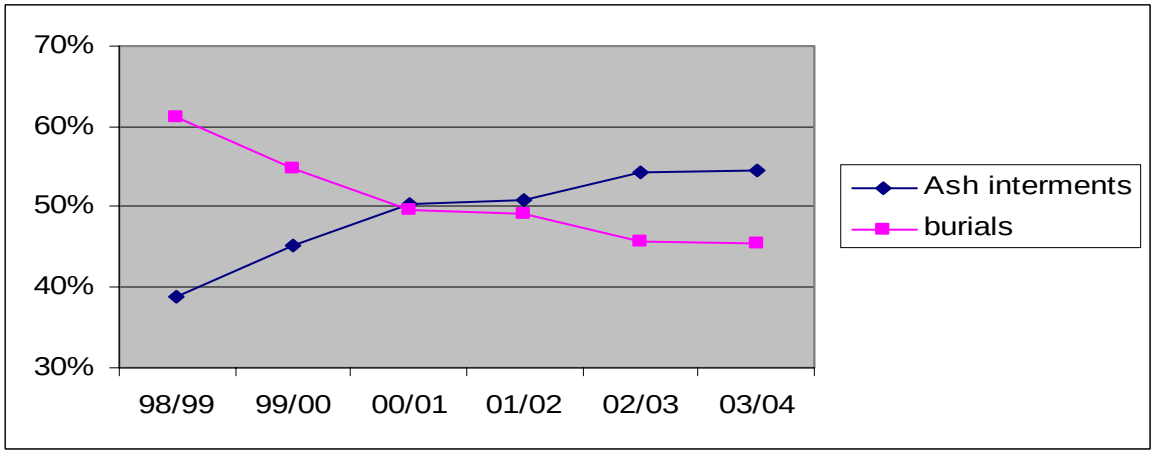
Figure 24 – Current Death Rates



	95/96	96/97	97/98	98/99	99/00	00/01	01/02	02/03	03/04
Total				281	342	294	381	346	362
Burials	169	172	191	172	187	146	187	158	165
Ash Interments				109	155	148	194	188	197

Figure 24 shows the current death rate is average 0.6% of the population (e.g. 362 deaths of 56,133 total population in 2004). Note the change in proportions of ash interments and burials shown in Figure 25.

Figure 25 – Current Proportion of Ash Interments and Burials



Current capacity at normal death rates, in the Wharerangi and Western Hills cemeteries, based on the experienced land usage rate, is suitable for more than the next 10 years for burials, and 30 years for ash interments. As burial proportions are decreasing and as ash interments require less space, there is a cumulative effect, which further reduces the land space required. Typically, a burial plot uses 20 times the space of an ash interment. Therefore, current provision is deemed suitable to meet current demands. Table 25 shows the capital plan for upgrade of water supply at the Eskdale cemetery, and development of infrastructure at Wharerangi cemetery.

Table 25 – Burial and Cremation Services 10-year Capital Plan

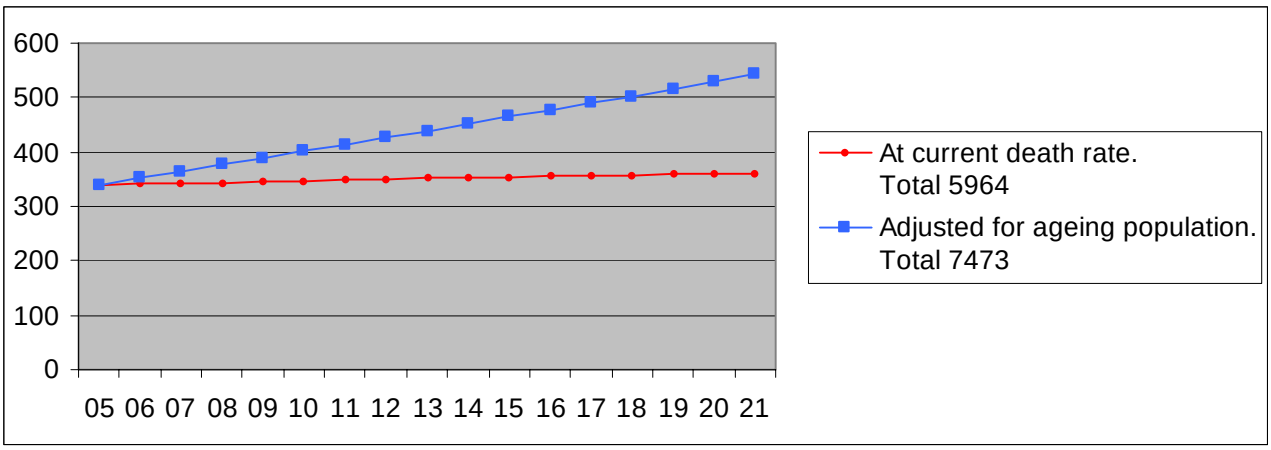
Description	Prior Budget	05/06	06/07	07/08	08/09	09/10 ($000)	10/11	11/12	12/13	13/14	14/15	TOTAL
Eskdale Cemetery Development	34	32	-	-	-	-	-	-	-	-	-	66
Cemeteries Infrastructure Asset Renewal	N/A	30	35	40	45	50	55	61	66	71	71	524
Burial and Cremation Services	**34**	**62**	**35**	**40**	**45**	**50**	**55**	**61**	**66**	**71**	**71**	**590**

4.6.2 Future Service Requirements

Based on recent figures, Napier is projected to grow in the medium to high category as shown in Figure 4. It should be noted that with the Medium projection, Napier's youth (under 15) population is expected to fall by 25% over the 2001-2021 period and the 15-64 population by 3%, whilst the 65+ population increases by 50%.

Based on the last 10 years there is currently no overall increase in death rate as shown in Figure 24. However, the ageing population will result in an increase in the death rate in the next 20 years. Assuming the worst case scenario of all deaths being in the 65+ age group, and that the death rate will rise the same as the rise in the total 65+ population (by 50% in 2021), from an average of 0.6% in 2004 to 0.9% by 2021, as shown in Figure 26. This will add an additional 1,509 deaths between 2004 and 2021, or 25% more than at current death numbers. (Between 2004 and 2021, the projected total is 5,964 deaths at current average death rate compared with 7,473 deaths at the adjusted death rate)

Figure 26 – Projected Deaths



The contingency for future increase is that land is held for the purposes of increasing cemetery space if required. For example, a large currently vacant portion of Western Hills cemetery is designated for future development and expansion.

Advance preparatory works, by 15 years, have already taken place. This was the removal of trees such that the land when required will be suitable for burials without land slippage, subsidence, or the unwanted present of tree roots. This future development and expansion will cater for the next 30-40 years at the projected future death rates, adjusted for the aging population, and longer if the proportion of ash burials continues to increase. Therefore, expectations are that future demand rates will not change significantly enough to require a review of the land area set aside for burial over the next 30-40 years.

4.7 Public Crematoria

The crematorium for the Hawke's Bay region is owned and operated by Hastings District Council. All matter relating to public health for crematoria are covered by the Water and Sanitary Services assessment 2005 for HDC.

5 PRIVATE WATER AND SANITARY SYSTEMS

5.1 Legislative control of activities

5.1.1 Resource Management Act and Building Regulations

The two main legislative controls of activities, which relate to individual dwellings, are:

- Resource Management Act 1991- Relates to activities undertaken on a site, such as discharge to land, air or water and the mitigation of the effects on the environment. It is mainly concerned with planning controls and tends to be subjective and reflective of public aspirations.
- Building Act 2004 – Relates to how permitted structures must be erected. This is more objective and based on physically measurable criteria, with regard to health and safety of building users.

Regarding public health issues of water and sanitary services, the Resource Management Act has some relevance as environmental effects sometimes have health consequences. The Building Act is more relevant, as it relates to the occupation of buildings.

The Building Act 2004 has superseded the previous 1991 Act, generally with process control and function changes. Most public health needs are covered by the specifications for the provision of water and sanitary services in the Building Regulations 1992, which remains in force. The parts from the First Schedule: The Building Code, relevant to this assessment which relate to personal hygiene, water supply, foul water, liquid industrial waste, solid waste and surface water are contained in appendix 1.

With regard to private provision and public health, it is how these controls are enforced and monitored that is of most significance to the Council.

5.1.2 Powers of the territorial authority

Historical notes in the Building Regulations 1992 (Page D3A-51: DB1.01) state that the powers of local territorial authorities in respect of in-sanitary buildings under the Building Act 1991 are largely identical to the powers previously available under the LGA 1974 and the Health Act 1956. Significantly, the Housing Improvement Regulations 1947 remains in force.

This important point regarding in-sanitary buildings (Page D1-21 D7.03) dictates that all building work shall comply with the building code to the extent required by this Act, whether or not a building consent is required in respect of that building work. Except as specifically provided to the contrary in any act, no person in undertaking any building work, shall be required to achieve performance criteria additional or more restrictive in relation to that building work than the performance criteria specified in the building code.

The building code is not retrospective thus, existing buildings are not required to upgrade. They can only be required to comply if captured in the building consent process because there are alterations or improvements proposed, or if there is a change of use of the building.

In-sanitary buildings, particularly owner-occupied buildings, can give rise to social problems rather than building problems. The owner-occupiers are frequently unable, or sometimes unwilling, to alter their buildings to prevent them remaining in-sanitary.

5.1.3 Health Act Requirements

Section 39 of the Health Act 1956 regarding the requirements of dwelling houses as to the supply of water and sanitary conveniences make direct reference to the provisions required under the Building Act 2004.

Private provisions at a dwelling outside the Council services areas are checked at the time of building or resource consents. However, after this check there is currently no legal requirement for direct involvement in the ongoing provision of the services thereafter. Only in the event of a reported in-sanitary incident would any follow up occur by the Environmental Health Officers in the first instance. Environmental Health Officers operate within the framework of the Health Act. As a last resort, a building may be declared in-sanitary to achieve closure where all other available procedures have proved unsuccessful.

5.1.4 HBRC Environmental Controls

Hawke's Bay Regional Council sets and administers the regulations controlling the effects on water, land, and air from activities including water and sanitary services, under the Regional Resource Management Plan 2001. It is these rules that dictate the permitted provisions (activities) for individual properties outside the Council serviced areas. The non-regulatory methods used by HBRC in support of these regulatory methods for avoiding adverse effects on groundwater quality are:

- *Liaison with Territorial Authorities - future development*

Advocating that any future urban residential or urban industrial development in areas of high groundwater contamination vulnerability (particularly within the Heretaunga Plains unconfined aquifer system as shown in Schedule Va) should include reticulated water, wastewater, and stormwater systems.

- *Liaison with Territorial Authorities -Existing on-site sewage problems*

Where existing on-site sewage treatment systems cause degradation of groundwater quality, advocating the introduction of community reticulation and treatment systems as the preferred means of addressing the problem.

- *Liaison with Territorial Authorities - provision of services*

Advocating that when considering water supply reticulation in small communities, the ability of existing wastewater disposal systems to cope with the increased loadings that will result be taken into account and the need for a reticulated sewerage system to be introduced to be considered.

- *Liaison with Territorial Authorities - connection to services:*

Advocating that where a reticulated wastewater system is readily available, to require future developments to connect.

- *Liaison with Territorial Authorities - contaminated sites*

Providing information to territorial authorities regarding sites within their respective area that have been confirmed as being contaminated and advocating that land use activities on such sites be managed appropriately for environmental and health reasons

- *Education and coordination*

Providing education and information regarding sound land use and waste management practices

- *Encouragement for self-regulation*

Promote and support self-regulation by resource users, including the preparation and adoption of guidelines and codes of practice by resource user groups.

NCC encourages households to support the provision of services for sanitary reasons and to spread the costs between more users. In areas where reticulated services are available, almost all properties are connected. Occasionally there are privately served dwellings in the reticulated area such as the few private bores in the Taradale urban area and properties in the Bay View Village that have not yet connected to the newly commissioned wastewater system. During the building consent process, these dwellings, as for any privately served dwelling, must demonstrate suitable design for service provision including a potable water supply.

5.2 Sources of information

The Council environmental health unit has begun a targeted data collection programme of individual property assessments specifically for the purposes of the water and sanitary services assessment. So far, the team have assessed approximately 30 properties outside the Council serviced areas, as a preliminary programme. The majority of these are in the Poraiti area, and a few in Meeanee, Awatoto and Kaimata. This has elicited some specific information about the locations of bores and on-site wastewater disposal, and has identified the existence of rainwater catchments.

The total number of privately served dwellings, depending on the service type, is estimated between 858 and 1,276, as shown in Table 6. Water supply currently has greater coverage than wastewater disposal. It is impossible and impractical for Council to know everything about the service provisions on private properties, and the water and sanitary practices in individual dwellings. It is primarily the responsibility of the property owner unless practices are causing a health hazard. The assessment so far represents only 2-3% of the dwellings, so the information is

far from complete. However, it will continue in the long term to include all other non-serviced areas of Meeanee and Bay View, and the remainder of those areas where the process has already begun. In the meantime, other sources of information have been used to gauge the state of private water and sanitary provisions. They are:

- NCC Property files

Historically, data at the individual property relating to wastewater, water supply, and stormwater is contained in hardcopy files, although this does not imply completeness. It is not collated into any electronic format, thus at present is only useful for individual property level on a case-by-case basis. To collate this data and present a comprehensive summary is too time consuming and draining on resources. This prevents the information being used for this assessment. However, it is a possibility for future assessments, for focussed areas.

- NCC GIS property mapping

Currently the Council GIS system does not capture on-site services. The information collected in the individual property assessments is incomplete. Also, the locations of specific structures on individual properties were visually identified at the time of the visit and hand marked on hardcopy aerial maps. This is not a suitable format to allow GIS/IT capture, which requires accurate surveyed positions. In the future, the locations may be identified using GPS, when suitable equipment is available.

- NCC Land Information Memorandum (LIM)

These are created on a case-by-case basis as required from all sources of Council information including those mentioned in this section. They are not pre-existing reports.

- HBRC information

A more efficient method of establishing information on service practices in non-Council served areas is through the restrictions designated in the HBRC regional plan. A picture is built on what is most likely happening in any given privately serviced area, by correlating the community area lot densities to permitted activities. HBRC maintains the data on the regions wells however only those for non-domestic use require a resource consent from the HBDC. Wells for domestic or stock watering do not require resource consent, thus the resource consents listings do not identify all existing wells. HBRC maintains a database of all bores which may be useful in the future. The NCC planning map system incorporates all known well locations built from HBRC data; however many of these are at unconfirmed positions.

- Ministry of Health/Crown Research Institutes

Limited water and sanitary services related information is available on MoH and ESR websites, such as water sampling programmes, status of registered supplies, and incidence of disease.

5.3 On-site Wastewater

5.3.1 Privately serviced areas

The community areas of Bay View Coastal, Kaimata, Eskdale, Poraiti, Redclyffe, Meeanee, and Awatoto have no reticulated system. Bay View Village is a mixture of reticulation and non-reticulation, as shown in Figure 6. Individual private arrangements service these areas, which represents 6.5% of the total population (3,487 individuals), or 1,359 dwellings.

5.3.2 Method of wastewater disposal

The NCC privately serviced areas rely on on-site disposal solutions such as septic tanks or in some instances aerobic secondary on-site wastewater treatment systems, as shown in Table 26.

Table 26 – Private Served Areas Wastewater Provision

Community	Disposal and treatment method
Eskdale	Septic tanks or SWTS*
Kaimata	Septic tanks or SWTS
Bay View Village	64% of residences use septic tanks or SWTS 36% of residences are connected to the public reticulated system available to this community
Bay View Coastal	Septic tanks or SWTS
Bay View Rural	Septic tanks or SWTS
Landcorp/DOC/ reserves	Septic tanks
Lagoon farm	Septic tanks
Poraiti	Septic tanks or SWTS
Redclyffe	Septic tanks or SWTS
Jervoistown	Septic tanks or SWTS
Meeanee rural	Septic tanks or SWTS
Meeanee township	Septic tanks or SWTS
The Loop	Septic tanks or SWTS
Awatoto Residential	Septic tanks or SWTS

*Secondary on-site wastewater treatment system

Note: The communities of Napier Central, Taradale, Napier Hill, Westshore/Ahuriri, Napier Industrial and Awatoto Industrial are served by the public reticulated system.

There are no known composting toilets in the region. There may be standalone grey-water disposal systems but none is specifically known.

5.3.3 Extent of effluent treatment

It is not practicable to assess the exact number of on-site systems in the NCC area. An estimate is possible based on the number of dwellings, on the reasonable assumption that each dwelling has one on-site facility. From the figures shown in Table 6, there are 1,276 dwellings thus inferring that the number of private on-site facilities is in the same realm.

Two SWTS manufacturers indicate they have installed around 92 systems in the NCC area. Recent research by HBRC indicates there are approximately 10 manufacturers of similar SWTS systems supplying the Hawke's Bay area and that these two manufacturers together represent approximately 36% of the systems. The conclusion is there are approximately 256 total systems, which accounts for up to 20% of the on-site systems.

5.3.4 Quality and quantity of the wastewater discharge

Regarding quantity, the Building Act 2004 ensures system design is suitable for the intended use of the building.

The quality requirements of the HBRC regional plan is that primary/advanced primary treated wastewater (i.e. Septic tanks with or without effluent filters) be discharged only to the land, by infiltrating the soil via a suitable soakage field, and not to waterways. This is because this primary treatment only removes the solid material. It does not treat the pathogens in the wastewater and make it safe for direct disposal to waterways.

Where a secondary on-site wastewater treatment system is used, the degree of biological treatment means SWTS treated water quality is usually higher than from a septic tank, if installed and maintained correctly. Therefore, the wastewater can be disposed of by irrigation as an alternative to soakage field soil infiltration. The HBRC is responsible for resource consent to discharge wastewater to land and should be the first point of enquiry about best practice for secondary on-site wastewater treatment systems.

The quality of the discharge is limited by the adequacy and effectiveness of the treatment system:

- Adequacy relates to whether the system was sized correctly for the application in the first place. Generally, this is ensured by the building regulations, which requires compliance with the relevant standard[13].
- Effectiveness is whether the system is being used correctly, which, for septic tanks and SWTS, is subject to how they are designed, operated and maintained.

On-site SWTS manufacturers want to protect the reputation of their products, so usually specify compulsory maintenance contracts. These contracts are specific to each manufacturer according to the technical requirements of their system. Potential health consequences of poorly designed systems, or lack of maintenance, is where treated wastewater, thought to be uncontaminated, is used for irrigation, or where children and animals, with their activities often at ground level, are exposed to contaminated soakage fields.

[13] AS/NZS 1547:2000 On-site domestic wastewater management

Prior to the Building Act 1991 and the RMA 1991 there were no requirements for maintenance of on-site wastewater systems, and it is possible that in the district there are some septic tank systems in excess of 20 years old that may never have been emptied.

The accepted period for cleaning out a septic tank is 4 yearly. Thus, the implication is that there may be a significant number of ineffective septic tank systems in the area. More information about incidence of septage leak and system performance is in risk assessment chapter 6.

5.3.5 Suitability of system to meet current demands

The suitability of individual wastewater treatment systems depends on the effectiveness of the chosen method for the local conditions and the cumulative effect on neighbouring properties. The activities for on-site wastewater disposal systems are regulated by the HBRC Regional Plan as shown in Appendix 4.

All dwellings built since 2001 must comply with rule 37 and dwellings existing prior to 2001 must comply with rule 35. A comparison of the permitted activity for new dwellings and the current method used for each community is shown in Table 27

Existing dwellings, prior to 2001, are not required to upgrade to meet these newer requirements, unless they undergo building consent application where water services provisions are included or where an existing system is no longer functioning properly, for example trench failure or an old tank needing replacement, and is found to be non-complying with the HBRC rules. However, it is these existing dwellings and those that are under-serviced by current methods compared to the permitted minimum, that are of interest for the purposes of assessing potentially inadequate current services.

Table 27 – Wastewater Disposal Community Permitted Activity and Current Method

Community	Sanitation provision	Area Description	Minimum HBRC Permitted method (new installs)	Current Disposal method	
Eskdale	Private	Rural Flat	Comply with rule 37	Septic tanks or SWTS*	
Kaimata	Private	Rural Hill	Comply with rule 37	Septic tanks or SWTS	
Bay View Rural	Private	Rural Flat	Comply with rule 37	Septic tanks or SWTS	
Landcorp farm	Private	Rural Flat	Comply with rule 37	Septic tanks	
Bay View Village	Public Private	Semi-Urban Flat	Reticulation connection Comply with rule 37	Reticulated Septic tanks/SWTS	#
Bay View Coastal	Private	Semi-Urban Flat	Comply with rule 37	Septic tanks or SWTS	#
Lagoon farm	Private	Rural Flat	Comply with rule 37	Septic tanks	
Poraiti	Private	Rural Hill	Comply with rule 37	Septic tanks or SWTS	
Redclyffe	Private	Rural Flat/Hills	Comply with rule 37	Septic tanks or SWTS	
Jervoistown	Private	Semi-Urban Flat	Comply with rule 37	Septic tanks or SWTS	#
Meeanee rural	Private	Rural Flat	Comply with rule 37	Septic tanks or SWTS	
The Loop	Private	Semi-Urban Flat	Comply with rule 37	Septic tanks or SWTS	#
Meeanee township	Private	Semi-Urban Flat	Comply with rule 37	Septic tanks or SWTS	#
Awatoto Residential	Private	Semi-Urban Flat	Comply with rule 37	Septic tanks or SWTS	

*Secondary on-site wastewater treatment system
lot sizes less than 2500m^2
Note that Napier Central, Taradale, Napier Hill, Westshore/Ahuriri, Napier, and Awatoto industrial are not highlighted as they are all served by the reticulated public system.

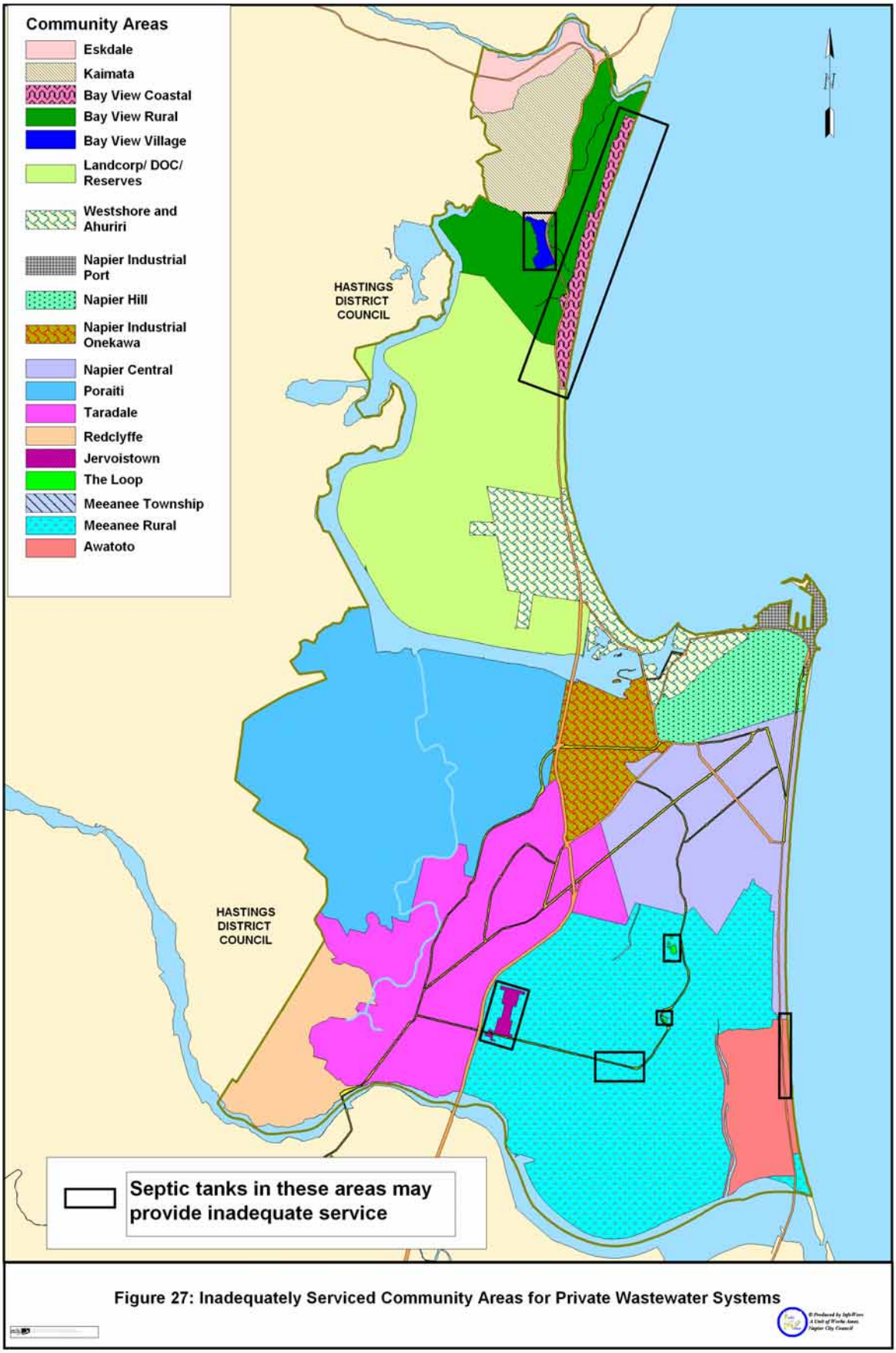
5.3.6 Health Risk Areas

There is potential for health risk in areas where septic tanks perform poorly and/or lot size is inadequate for effluent disposal. The cumulative effect of multiple non-complying discharges from existing systems presents a greater risk to public health, especially in more densely populated areas. The HBRC Regional Plan 2001 specifies *where the wastewater receives no more than primary treatment, or advanced primary treatment, that discharge shall be onto or into a property with a land area of no less than 2500 m^2*. The communities where all lot sizes are less than 2500 m^2 and where septic tanks were installed before 2001, and may still exist, are shown in Figure 27. These areas are:

- Bay View Settlements
- Jervoistown
- Loop residential
- Meeanee township

Not all of the properties smaller than 2500m^2 within these areas are serviced by septic tanks, but as a whole, the cumulative risk to public health in these areas is higher than elsewhere. It is noted that there is not any indication that the level of risk is unacceptable. For details on the health implications for these areas, see risk assessment chapter 6.

Figure 27 – Inadequately Serviced Community Areas for Private Wastewater Systems



5.4 On-site Water supply

5.4.1 Privately serviced areas

Residents outside the Council reticulated service areas make their own provisions for obtaining drinking water using bores and rainwater collection.

The areas served by these privately installed, owned, and operated systems are Kaimata, Eskdale, Poraiti, Redclyffe, Meeanee, Awatoto, and parts of Bay View as shown in Figure 6. The non-reticulated systems represent about 4.5% of the population (2,414 individuals or 941 dwellings).

5.4.2 Method of water supply

The majority of private supplies are either individual or shared bores, generally serving about 3.5% of the total population (about 80% of the non-reticulated population) in Meeanee rural, Meeanee township, Loop residential, Awatoto industrial and residential, Redclyffe and Jervoistown.

These bores, except Redclyffe, use the same source as the public supply; a good quality abundant groundwater with no treatment required. Delivery methods are very simple.

Including the public supply, the total population served by bores is 99%.

Figure 28 – Private System Water Tanks

Around 1% of the non-reticulated population use rainwater, particularly in the areas north of the main urban centres. These areas of Poraiti, Kaimata, Eskdale, and Bay View Rural are where there is sometimes groundwater shortage during dry spells. The collection systems catch rainwater on the roofs of dwellings and supplies water through a small, purpose built reservoir and reticulation system.

Figure 29 – Rainwater Roof Collection

There are no large privately run reticulated water supply systems, for multiple industries, or other agency operated supplies, in the Napier City Council area. There are no known small communities connected to private industrial supplies that need consideration.

The known details of the private water supplies are summarised in Table 28.

5.4.3 Quality and quantity of on site water supplies

5.4.3.1 Groundwater

The community areas of Meeanee rural, Meeanee Township, Loop residential, Awatoto industrial and Jervoistown all use the same source as the public reticulated system. The expectation is that these serviced areas have the same good quality and abundant quantity water.

In Poraiti, according to a 1995 report[14] which investigated the quality of the source, the water is hard (high calcium levels), and nitrate levels are elevated. Nitrates in water occur from fertilizer seepage, organic pollution, and septic tank effluent contamination of groundwater. However, these levels are within New Zealand Drinking Water Standard recommendations, and the water quality considered satisfactory.

Parts of Bay View rural nearer the coast may suffer from saltwater intrusion.

Little is known about Kaimata bore water quality, however it is the high number of old bores nearing or past the end of their useful life, which is of more importance. It is suggested the aesthetic quality is less than satisfactory.

[14] Investigation of the groundwater supply beneath the Western Hills-Poraiti Area – Hawke Bay Regional Council 1995

Table 28 – Private Water Supply Provision Summary

Community	Source	Use	Quality	Quantity	Notes
Eskdale	Individual bores	Stock/garden	Iron/hard/brackish	Limited	Possible saltwater intrusion
	Rain catchment	Drinking	Reduced	Inadequate during dry spells	Possible bacteriological contamination
	Tankered	Drinking supplement	No control*	Limited by high cost	Dry spells
Kaimata	Individual bores	Stock/garden	Anecdotally poor	Limited	None
	Shared bores	Domestic	Anecdotally poor	Limited	
	Reticulated system supplied from a private bore	Domestic	Anecdotally poor	Limited	Martha's Vineyard
	Rain catchment	Drinking	Reduced	Inadequate during dry spells	Possible bacteriological contamination
Bay View Rural	Individual bores	Stock/garden	Reduced	Limited	Saltwater intrusion nearer coast
	Rain catchment	Drinking	Reduced	Inadequate during dry spells	Possible bacteriological contamination
	Tankered	Drinking backup	No control*	Limited by high cost	dry spells
	Reticulated system supplied from public water supply	Domestic	Good	Sufficient	Ballantyne subdivision
	Rain catchment	Drinking supplement	Reduced	Inadequate during dry spells	Possible bacteriological contamination
Landcorp	Shared bores	Domestic	Aesthetically less than satisfactory	Unknown	Assume private well- managed supply
Poraiti	Individual bores	Stock/Garden Domestic	Iron/Hard/Odour Discolouration	Shortages during dry spells	Deeper wells better quality
	Shared bores and reticulated systems	Stock/Garden Domestic	Iron/Hard/Odour/ Discolouration	Shortages during dry spells	Up to 13 houses; shared maintenance/costs
	Rain catchment	Drinking	Reduced	Inadequate during dry spells	Possible bacteriological contamination
	Tankered	Drinking supplement	No control#	Limited by high cost	
Redclyffe	Unknown	Drinking	Unknown	Abundant	
Jervoistown	Shared bores	Drinking	Good*	Abundant	
Meeanee rural	Shared bores	Drinking	Good*	Abundant	
The Loop	Shared bores	Drinking	Good*	Abundant	
Meeanee township	Shared bores	Drinking	Good*	Abundant	
Awatoto Residential	Shared bores	Drinking	Good*	Abundant	
Awatoto Industrial	Individual bores	Drinking and industrial	Good*	Abundant	

*From same groundwater source as public supply.
#Good if from reticulated public supply

Little is known about the Landcorp Farm water quality or supply methods. In the past, this system supplied properties on Onehunga Road; however, these are now all served by the public reticulated system. Anecdotal evidence suggests the aesthetic quality of the water is less than satisfactory. Because the Landcorp farm is a well-established entity is it assumed the facilities are well managed and funded thus delivery methods are likely to be satisfactory.

5.4.3.2 Rainwater

The individual property assessments where rainwater collection systems feature, showed that half of the 8 rainwater samples taken indicated positive for E. coli bacteria. These areas are Kaimata, Poraiti, Bay View rural, and Eskdale. See the risk assessment chapter 6 for details.

5.4.3.3 Tankering

Tankered water is occasionally used as a backup option during dry spells, in the water short areas of Poraiti, Eskdale, Kaimata, and Bay View Rural. Commercial tankering operations can obtain the water from any legitimate source. Where water is taken from the reticulated supply, which should be through a commercially metered connection, quality is not an issue as water is from the public reticulated supply, which is covered by the drinking water standards requirements. However, where it is taken from another source the quality is subject to the same restrictions and limitations of any other private supply and quality is not guaranteed. There are currently no Council licensing requirements or legislative regulations for tankering operations. The biggest issue is the risk of contamination of the water from contact with the tanker. The New Zealand Water and Wastes Association has recognised this potential problem and a code of practice is under development.

5.4.3.4 Registered supplies

The exact quality of non-reticulated public supplies may be determined only where the supply is a private registered community supply. This applies to all schools and systems supplying over 25 people for more than 60 days of the year, such as cafes, golf courses, hotels, and other commercial establishments. There are 4 registered supplies in the Hawke's Bay Health District that fall in the Napier City Council area as summarised in Table 29.

These supplies are not graded, as are public supplies, as they are under the minimum number of people supplied (500) where a grading is applied. The only additional information from the Environmental Health individual property assessment is that the Eskdale school supply is from rainwater and that UV treatment is applied. Note that these supplies do not comply with the sampling requirements of the Drinking Water Standards, which implies there is potential risk to health. The fact that the supplies are not tested for E. coli is noteworthy, as this is a significant factor in risk to health. More about the health implication of this in risk assessment chapter 6.

Table 29 – Private Registered Supplies Drinking Water Quality Review 2003 (MoH)

Zone Name	Population*	Water supplier	Compliance	Performance
Eskdale School**	170	School BoT	Inadequate sampling by: number of samples, too few days of the week and exceeding maximum days between samples	Same as last year
Hohepa Homes School	62	Hohepa Homes Trust	Some E.coli monitoring undertaken during 2003, however copies of lab analytical reports were not forwarded in a timely enough manner to be included in the national report	Worse than last year
Meeanee School	106	School BoT	Some E.coli monitoring undertaken during 2003, however copies of lab analytical reports were not forwarded in a timely enough manner to be included in the national report	Worse than last year
Maraenui golf club	110	Maraenui Golf Club (Inc)	No information	Newly registered

*Ministry of Health registered supply records, may differ slightly to census data given in this document
** Note Eskdale school is planning to connect to reticulated supply (HDC) in the near future which will eliminate any potential public health issues associated with the current on-site water supply

5.4.4 Extent of water treatment

The types of treatment to consider for small private systems are in-system and point-of-use. Anecdotal evidence suggests there is little treatment used for drinking water supplies from private bores and rainwater in the Napier District. However, some in-system treatment methods are known to be used such as filtering, UV treatment, and softeners, particularly in Poraiti due to the poor perception of the water, which is hard and aesthetically less than satisfactory.

Because of lack of in-system treatment in many areas users may possibly employ the other option of point of use treatment such as an off the shelf filter. This type of treatment is unnecessary and may actual be detrimental to water quality as consumer studies suggest the filter medium, e.g. charcoal, can support bacterial growth if the device is not maintained regularly, especially in non-chlorinated supplies as is the case here. Likely, the basis of its use is on perceived effect and a feel good factor in the user. More about this in health risk chapter 6.

5.4.5 Suitability of system to meet current demands

The Napier City Council population is permanent and stable; there are no large holiday encampment type places in the privately served areas to create a large fluctuation in demand. Peak holiday populations are not a significant factor in health risk, as the high proportion of motel accommodation in the publicly served areas, ensures visitors are subject to the same quality water as the resident serviced population. Also, there are no Marae, where visitor numbers can be high for short periods, outside of the reticulated area. The areas of Eskdale, Bay View Rural, Kaimata, and Poraiti on occasion experience water shortage, and resort to tankered water for supplementary drinking needs. Tankering may present a minor health issue as detailed in chapter 6, but the tankering standards referred to previously should be useful in addressing this issue.

5.5 Private Stormwater Provisions

5.5.1 Private serviced areas

The stormwater catchment areas are defined in Figure 12 and Figure 13. Note the community areas in Figure 1 do not correlate with the catchments areas, and we would not expect them to do so.

The privately served areas do not allow for easy definition, as stormwater behaviour is catchment based and has little regard for property boundaries and the distinction between public and private areas. For ease of this assessment, consider the catchment and its management as the public served area and the on-site provision the privately served areas.

For private property, it is the on-site collection of stormwater, at individual dwellings, that has greatest importance to the community areas from a public health perspective. In order for stormwater systems to work effectively at the local level, the on-site disposal must be suitable for stormwater to reach the public reticulation system or drainage channels of the catchment so that it can be disposed of safely and effectively.

5.5.2 Method of Stormwater disposal

The higher density populated areas with smaller lot sizes generally need fully constructed reticulated systems, as there is little leeway for where the stormwater can drain from the large amount of impervious surfaces typical of urban areas.

However, the rural less densely populated areas are likely adequately served by natural on-site features and ditches. The larger lot sizes and less-developed land provides better soakage and holding capacity for stormwater runoff. The current local collection provision for the NCC community areas are shown in Table 30.

5.5.3 Quality and quantity

The quality and quantity of localised runoff is variable, it can contain nutrients, litter, debris, bacteria, and chemicals under normal circumstances, and it has the potential for pollution resulting from industrial chemical spills. The most common sources of urban stormwater pollution are discharges from motor vehicles and from the businesses that service them. The Napier District generally experiences oil and heavy metals from road runoff, nitrates in Poraiti, septage in flat areas and the presence of agricultural chemicals. The long, narrow drainage channels throughout the City provide attenuation of the effects of volume and velocity during significant rainfall events. Open drains are very effective at sediment removal before the stormwater is disposed to natural waters. Roadside sumps and screens at pump stations remove bulk items.

The Heretaunga Plains Groundwater Study[15] concludes there are no particular concerns for the NCC area. Also, a Hawke's Bay Regional Council quality report[16] concludes there has been no apparent change in the micro fauna of the lower Ahuriri Estuary over the last 15 years.

For quality, issues and management at the broader catchments level see chapter 4.

Table 30 – Stormwater Provisions

Community for the purposes of this assessment	Area Description (see District Plan for Zoning)	Service Provision
Eskdale	Rural Flat	Open drains and private land
Kaimata	Rural hill	Open roadside drains, reticulated collection and private land
Bay View Village	Semi-Urban Flat	Open drains
Bay View Coastal	Semi-Urban Flat	Mixture reticulated collection, open drains and soakage
Bay View Rural	Rural flat	Open drains and private land
Landcorp farm/ HB Airport	Rural Flat	Private land
Lagoon farm	Rural Flat	Open drain
Poraiti	Rural Hill	Open drains and private land
Redclyffe	Rural Flat/Hills	Open drain and Private land
Napier Central	Urban Flat	Reticulated, generally pre 95 standard
Taradale	Urban Flat	Reticulated
(EIT)	Urban Flat	Private. Discharges to Tutaekuri
Napier Hill	Urban Hill	Reticulated, and open/sealed roadside drains
Westshore	Urban Flat	Reticulated, generally pre 95 standard
Napier industrial	Urban Flat	Reticulated
Jervoistown	Semi-urban Flat	Private land and Open drains
Meeanee rural	Rural flat	Private land and Open drains
The Loop	Semi-urban Flat	Open drains
Meeanee township	Semi-urban Flat	Open drains
Awatoto Residential Awatoto Industrial	Semi-urban Flat	Mixture reticulated/open drains and soakage

5.5.4 Adequacy of the existing facilities

The quality of stormwater discharges have been set to protect the environment, which inherently achieves the protection of the local inhabited environment such as beaches and recreational waterways, which in turn protects public health.

At the catchments level, NCC policies are to comply with all discharge consents and general authorisations from the HBRC, and to investigate all notified illegal discharges and mitigate any significant adverse effects.

[15] Heretaunga Plains Groundwater Study, Volume 1:Findings. Institute of Geological & Nuclear Sciences, May 1997
[16] Ahuriri Water Quality Report EMT 97/2, HBRC, May 1997

At the local level, the requirements of the district plan for full servicing ensure generally well-serviced urban areas by reticulated pipe drains designed to provide adequate local stormwater disposal.

Stormwater disposal in the rural area is less clear-cut, achieved through a network of open drains along property boundaries and roadsides, natural feature runoff, ponding, and ground soakage.

The runoff eventually drains to the constructed and managed public system operated by NCC and HBRC, as shown in Figure 12 and Figure 13.

The NCC rules on stormwater management at the local property level refer to the inundation effect on neighbouring properties. Specifically the diversion and discharge of stormwater into or onto land from roofs or impervious surfaces shall not cause flooding on adjacent property.

Specifically the Building Act 2004 requires that new residential buildings since 1991 (when the previous version came into effect) must be designed such that all on site stormwater disposal provision is to specified standard. All surface water from a 1 in 10-year (10% return) storm event must be fully disposed to the local offsite reticulated system or drainage ditches, whichever is provided for in the specific location. The residential building itself must also be constructed to a height above the level of a 1 in 50 year (2% return) storm event. The requirement not to inundate other properties is overridden during storm events greater than 1 in 10 years.

New houses are generally not a problem, as they are required to meet the current design criteria or storm events. The surface water shown in Figure 30 will be disposed of by an onsite constructed drainage system, in accordance with the requirements of the district plan.

However, the floor levels of residential buildings constructed before 1991 are not required to be raised to meet these standards, although extensions may need to comply. Thus, the conclusion is that residential buildings constructed before 1991 that are located in 1 in 50-year event flood areas may be at risk. The 1 in 50 year flood areas are shown in Figure 20.

See health risk assessment details in chapter 6.

5.5.5 Suitability of system to meet current demands

Areas where private properties require some upgrade work is out of Council control unless stormwater runoff from a property is causing a nuisance on a neighbouring property. These are dealt with on a case-by-case basis.

Solutions to address inadequacies at the private property level are the pre-1995 stormwater reticulation standard upgrading programme including upgrading of rural road standards in urban areas.

Figure 30 – High Density Lot Awaiting On-site Stormwater Drainage Provision

5.6 Public toilets on private property

For the purposes of this assessment, public toilets on private property are considered those facilities available to the public at commercial premises.

It does not include private residential, communal residential such as boarding houses, shops that do not serve food, and private offices, where toilets are only provided for residents and staff use.

Privately owned and operated public toilets that are of interest from a public health perspective are those in:

- Churches, clubs rooms, assembly halls.
- Stadiums, sports venues, grandstands
- Museums, art galleries, theatres, cinemas
- Places of active recreation, swimming pools, squash courts, gymnasiums
- Early childhood centres, schools, universities
- Amusement parks, shopping plazas, libraries, transport terminals
- Coffee bars, tea rooms, restaurants, bars, nightclubs

Demand for toilet facilities in private buildings is directly linked to the number of visitors the building receives, based on the intended use of the building in the consent process. The Building Act 2004 requires suitable personal hygiene and sanitation facilities to be provided.

Regarding the quality of facilities, the Health Act 1956, and Health and Safety in Employment Act 1992 do not state anything specific regarding the provision of public toilet facilities. However, a building owner or occupier is generally required to protect public health and ensure the health and safety of visitors and staff in the work place. An operator must ensure cleanliness of the facility through a regular cleaning regime, including the provision of consumables.

Even where businesses make voluntary additional provisions above the number of facilities required by the building regulations, the same responsibilities of public health protection still apply.

If NCC receives a complaint, the private facility undergoes inspection. Environmental Health officers will respond to any complaint and ensure the owner or occupier, within the framework of the Health Act, rectifies problems. A building can be declared in-sanitary to achieve closure where all other available procedures have proved unsuccessful.

5.7 Private Cemeteries (not applicable)

This section is not applicable. There are no private cemeteries in the NCC area. The Burials and Cremations Act 1964 permit home burials where a dwelling is more than 32 kilometres from an existing open cemetery. However due to the small geographic area this does not apply anywhere in NCC area of responsibility. All existing cemetery provisions are covered by the NCC public system.

5.8 Private owned and operated Crematoria

Privately owned and operated crematoria are becoming increasingly common in New Zealand, as an alternative to Council operated facilities. There is one private facility in Onekawa industrial area.

This crematorium has been operating since September 1992. Public health is protected from air pollution by HBRC resource consent requirements. This facility has held a resource consent[17] to discharge contaminants into air from a natural gas fired cremator, since 2004.

The facility is a small operation catering only for the cremation process itself. The facility does not have other funeral services facilities, therefore, the other sanitary needs relating to body preparation are taken care of by the funeral director at other locations and there are no health related issues to consider on the site.

An important point is that the service offered is not due to any inadequacies of Council services, the HDC/NCC joint facility is adequate for the current needs of the population. It is simply offering the general public commercial choice. Therefore, current private services are more than suitable to meet demands.

[17] HBRC resource consent: Discharge to Air: DP040288A

6 HEALTH RISK OF LACK OF SERVICE

6.1 Health Impact of services

The health implications of services divide into direct health impacts such as waterborne illnesses and exposure to refuse, and indirect health impacts from the environment such as in-sanitary habitations after stormwater flooding, or from polluted waterways.

Water and sanitary services link in a cyclical way. Wastewater disposal can affect the groundwater or waterways, which in turn affect the water supply. Adverse health effects from the water and sanitation cycle can be from chemical or biological contaminants entering the water cycle or, an unhygienic environment allowing faecal-oral route of disease transmission, from:

- stormwater runoff
- wastewater discharged directly or indirectly to waterways
- wastewater soakage
- soil or storm water drains contaminated with human waste
- contaminated drinking water
- contaminated storm water entering houses during flood conditions

Public perception of water and sanitation needs is often in contrast to the reality of the health risk. Generally, demand for water supply often prioritises ahead of sanitation and tolerance of sanitation inadequacies is usually longer than for water supply, especially where there is economic pressure.

International water and sanitation research has shown that sanitation improvements are the greatest factor in improving people's health. Refer to appendix 8 for details on waterborne and sanitation related illnesses.

For evidence of disease or illness due to inadequate services, the following have been considered for all the water and sanitary services:

- Failure of collection or delivery systems
- Failure of treatment processes
- Failure of disposal systems
- Failure of system management
- Contamination of surrounding environment
- Effect on the community

The public and private systems analyses in chapters 4 and 5 have concluded the following problems.

6.2 Wastewater

6.2.1 Health Risk Areas

Specific identified potential health risks relating to the absence of reticulated wastewater systems are:

Point 1. Failure of biological treatment in SWTS where treated wastewater is used for sub-soil drip irrigation.

Most secondary on-site wastewater treatment systems use treated wastewater for amenity garden sub-soil drip irrigation purposes. Generally, all irrigation methods are sub-soil. Seek expert advice before using wastewater from a secondary on-site wastewater treatment system for irrigation purposes.

Point 2. Old, un-serviced, septic tanks systems

Individual tanks are the responsibility of the owner. HBRC has the regulatory responsibility for the discharge to land to ensure that discharges from septic tanks meet performance standards. The risk to public health in the event of septage leakage from un-serviced septic tanks is higher in areas where these events are concentrated and the effect is cumulative.

Point 3. Nitrate contamination from septic tanks

Point sources of nitrate contamination, which occurs from farm runoff and septic tank effluent, have been identified in Poraiti[18]. Groundwater may become contaminated, however, the aquifer that serves this area is semi-confined, and thus the risk is less.

Point 4. Poor soakage and/or surface ponding of effluent soakage fields and leaking to stormwater drains, in high ground water areas

The pathogens in domestic effluent can cause disease from an unhygienic environment or soil-transmitted diseases, such as intestinal worms and mild diarrhoea, and in some instances more severe diseases. Recorded incidence, by NCC, of effluent leaking to storm drains in the area is inconclusive because it is the responsibility of the HBRC. Individual cases of waterway pollution do not have a big effect, because dispersal happens at this stage, thus it does not present a significant risk to public health. Also, the flat expansive geographical nature of the area means that potential contamination sites are separate from the main waterways. The cumulative effect of multiple events presents a greater risk to public health, especially in more densely populated areas

[18] Investigation of the groundwater supply beneath the Western Hills-Poraiti Area – Hawke Bay Regional Council 1995

of the rural settlement district plan zoned areas Bay View village, Bay View coastal, Jervoistown, and Meeanee Township. Cumulative effect problems may also manifest themselves differently. A case-by-case judgement suits the various community areas:

- **Jervoistown and Meeanee Township**

  The low-lying area has heavy soils that does not allow effective disposal of septic tank effluent. Septic tanks are used by the majority of dwellings in these areas. Based on manufacturer's data an estimate of only 12 of the 140 dwellings (8%) use advanced on-site wastewater treatment systems. There is potential for contamination of the Jervoistown drains from domestic effluent. A HBRC sampling regime of the stormwater drains in the Jervoistown area, "indicates that the bacteriological surface water quality of the Jervoistown drains does pose a health risk to people making contact with the drain water". However, there is no reported incidence of disease to suggest the risk to public health is anything other than low. There is no current proposal to install wastewater reticulation in Jervoistown or Meeanee Township. The cost of a Council coordinated scheme would be shared by all the beneficiaries.

- **Bay View**

  Bay View has two problems. Firstly, in Bay View Village, the high water table in winter prevents infiltration and secondly Bay View Coastal comprises gravels that allow high infiltration rates, which potentially contribute to groundwater contamination. However, as the village area is low lying, the risk of effluent leaking to drains is highest in Bay View Village. The normal route for service provisions is approval only through the HBRC. Further information is given in the options below.

6.2.2 Options

The suitability of the various treatment and disposal methods, as shown in appendix 2, based on geography, water table, lot size, available space, and proximity to the existing system, are shown in Table 31.

For example, in rural hills such as Poraiti and Kaimata the dwellings are geographically dispersed so installing a reticulated system is not a cost effective or practical solution.

Bay View Village has been reticulated but is not yet fully connected.

Bay View Coastal (stages 2 and 3 of the Bay View scheme), Jervoistown and Awatoto are the only other areas, which can realistically be serviced by reticulated system. However, due to Jervoistown and Awatoto being relatively sparsely developed, and Bay View Coastal's ribbon-like nature and remoteness from urbanised areas, reticulation is expensive.

Table 31 – Suitability of Wastewater Disposal Methods for Non-Reticulated Communities

Community	Reticulation	Septic Tanks**	SWTS**
Eskdale	×	Case-by-case basis	✓
Kaimata	×	Case-by-case basis	✓
Bayview Rural	×	Case-by-case basis	✓
Landcorp farm	×	Case-by-case basis	✓
Bayview Village	✓	×	✓
Bayview Coastal	✓	×	✓
Lagoon farm	✓	Case-by-case basis	✓
Poraiti	×	Case-by-case basis	✓
Redcliffe	×	Case-by-case basis	✓
Jervoistown	✓	×	✓
Meeanee rural	×	Case-by-case basis	✓
The Loop	×	×	✓
Meeanee township	×	×	✓
Awatoto Residential	✓	Case-by-case basis	✓
Awatoto Industrial	✓	Case-by-case basis	✓
**Subject to HBRC consent			
Note: Case-by-case basis is based on factors including groundwater separation distance and soil constraints in accordance with rule 35 and 37 of HBRC Regional Resources Management Plan 2001			

6.2.3 Solutions

Feasible options for Bay View, Jervoistown and Meeanee Township are; all dwellings progressively convert to SWTS, or to install community reticulation schemes.

These areas would benefit most from a reticulated wastewater disposal system. However, the cost of providing services in these areas will be high because the cost will be shared by a relatively small number of properties. Therefore, despite the advantages of installing reticulated wastewater systems in these areas there is little support for self-funded community schemes. Current proposals to meet inadequacies of existing services for existing demand, for the specific community areas identified in 6.2.1, are detailed below;

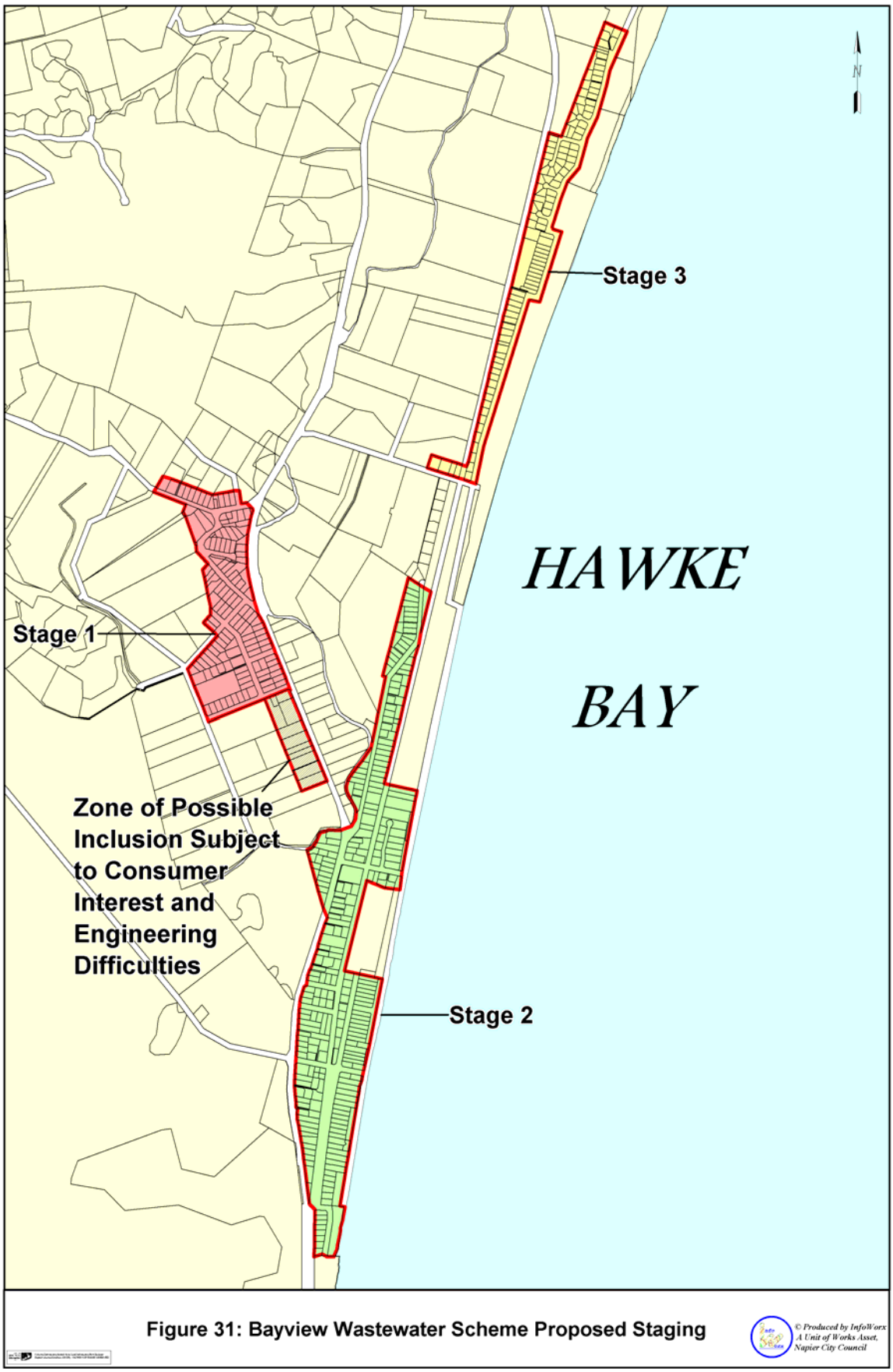
- **Jervoistown and Meeanee Township**

  The installation of a reticulated system for existing dwellings in Jervoistown and Meeanee Township is dependent on the properties that will be serviced by the system, meeting the cost. At present there seems to be little community support.

- **Bay View Wastewater scheme**

  The Bay View wastewater scheme is already underway as shown in Figure 31. The cost of providing wastewater reticulation and disposal to the existing residential properties at Bay View is being recovered by connection charges and Council contribution. Council has completed stage 1 of the Bay View extension to the reticulated system which services the Bay View Village, but is not proceeding with stages 2 and 3, to serve Bay View Coastal, due to lack of support for the scheme by the homeowners. Implementation of stages 2 and 3 will be reviewed over time as circumstances change.

Figure 31 – Bay View Wastewater Scheme Proposed Staging



6.3 Water Supply

6.3.1 Health Risk Areas

Specific identified potential health risks relating to the absence of reticulated water supply systems are:

Point 1. Rainwater systems containing E. coli bacteria

Some of the individual property assessments in the communities of Kaimata, Bay View rural, Poraiti, and Eskdale indicated the presence of E. coli in the rainwater. There may be a public misconception that roof water is generally safer than bore waters, which is not the case for NCC area. World Health Organisation advised risk and control measures for roof water are shown in Table 32. A public education campaign to promote collection management, such as the diversion of first flush, should be considered.

Point 2. Tanker contamination

The lack of water at dry times of the year in Poraiti, Kaimata, Eskdale, and Bay View Rural puts the public at risk, when supplementary water is obtained by tanker, from contamination by the tanker. Residents should protect themselves by choosing a supplier carefully and asking pertinent questions about the source of water and whether the tanker has been used for other purposes. The NZ Water and Wastes Association is developing a standard for tankered water supplies.

Point 3. Point of use treatment

The lack of in-system treatment in many areas may prompt users to employ point of use treatment such as an off-the-shelf filter. This type of treatment is unnecessary and may actually be detrimental to water quality. Consumer studies about off-the-shelf filters suggests the filter medium, e.g. charcoal, can support bacterial growth if the device is not maintained regularly, which often happens with limited lifetime household goods such as this. Its use is probably based only on perceived effect and a feel good factor in the user. However, this simply imparts a false sense of security. This is considered a health risk but cannot be measured directly.

Point 4. Registered supply no E. Coli testing

The private registered supplies testing program information reported does not allow for further interpretation. For example E coli, the most commonly used indicator bacteria, is not tested so the results do not indicate much about the potability of the water supply.

It is the owner's responsibility to ensure the quality of a registered private supply. These operators are obliged to formally test their source and supply in accordance with the NZ drinking water standards and submit results to the Ministry of Health, which consolidates the results in an annual review of Drinking-Water Quality in New Zealand.

Table 32 – Risk and Control Measures for Rainwater Collection

"Model" water safety plan for rainwater collection no disinfection as standard

Hazard Event	Cause	Risk	Control Measure	Critical Limits		Monitoring			Corrective Action	Verification
				Target	Action	What	When	Who		
Bird and animal droppings found on roof or in guttering	Roof is not cleaned properly or regularly, allows build-up of faecal material	Likely/ Minor	Cleaning of roof and gutters	Roof is clean before rainfall	Roof dirty as rainfall collection starts	Sanitary inspection	Before rains	Owner/ Operator	Clean roof regulary	Sanitary inspection E.coli Faecal streptococci
Trees overhang the collection tank	Overhanging branches allow birds and animals to gain access to roof	Likely/ Minor	Tree surgery	Tree branches do not overhang roof	Branches encroach on roof	Sanitary inspection	Annual	Owner/ Operator	Trim branches	Sanitary inspection
Animals and birds can enter the tank	Inspection covers and vents open or improperly sealed	Likely/ Major	Ensure all openings on tank are bird and animal proof	Inspection covers fitted and locked, vents have mesh	Inspection cover damaged, not in place, mesh damaged or not in place	Sanitary inspection	Annual	Owner/ Operator	Install or repair inspection covers and vents mesh	Sanitary inspection E.coli Faecal streptococci
Tank dirty or sediment accumulates	Poor cleaning of tank	Unlikely/ Moderate	Cleaning of tank	Tank cleaned regularly and disinfected annually	Dirt seen inside tank Water appears turbid	Sanitary inspection Appearance	Annual	Owner/ Operator	Cleaning of tank, removal of sediment, disinfection	Sanitary inspection Turbidity E.coli Faecal streptococci
First flush of water can enter tank	First flush of water from roof is not diverted and so enters tank	Moderate / Major	Foul-flush diversion unit	Foul-flush system in place and used correctly	Lack of foul-flush system Poor operation of foul-flush system	Sanitary inspection Colour Odour	On installati on, then annual	Owner/ Operator	Install foul-flush system and train users	Sanitary inspection Turbidity E.coli Faecal streptococci
Unhygienic withdrawal of water allows contamination to enter	Water withdrawn using buckets which introduce contamination	Almost certain/ Minor	Install tap of other sanitary means of withdrawal	Tap in place to allow easy withdrawal of water	Lack of tap	Sanitary inspection	On installati on	Owner/ Operator	Install tap with intake at least 5cm from base of tank	Sanitary inspection Turbidity E.coli Faecal streptococci
Tank is damaged or allows contaminated surface water or groundwater to enter	Tank has cracks and other damage	Likely/ Minor	Structural integrity of tank	Tank set above ground and in good condition	Cracks in tank structure	Sanitary inspection	Annual	Owner/ Operator	Effect repairs	Sanitary inspection

Source: World Health Organisation: http://www.who.int/water_sanitation_health/dwq/en/wsh0306tab11.pdf. 30/12/04.

A potential issue is whether there is adequately trained staff for operating and managing private supplies to meet the drinking water standard requirements. NCC assists the testing programme by offering for sale water testing kits and the use of the NCC registered testing laboratory.

Point 5. Transient populations

The Napier City Council population is permanent and stable; there are no large holiday encampment type places in the privately served areas to create a large fluctuation in demand. Peak holiday populations are not a significant factor in health risk, as the high proportion of motel accommodation in the publicly served areas, ensures visitors are subject to the same quality water as the resident serviced population.

Also, there are no Marae, where visitor numbers can be high for short periods, outside of the reticulated area.

Point 6. Lack of treatment

Generally, for drinking water supplies, no treatment is used for bores in Kaimata, Poraiti, Bay View rural, Redclyffe, Jervoistown, Meeanee rural, The Loop, Meeanee township, Awatoto residential, and Awatoto industrial. Thus, health risk is directly impacted by the quality of the source. The lack of treatment for bores is not a health risk where the groundwater source quality is demonstrated to be good.

No comprehensive sampling programme exists for private bores. However, Napier District bores are bacteriologically sampled as part of the building consent process for all new houses. For communities sourcing water from unconfined or semi-unconfined aquifers, treatment should be considered on a case-by-case basis. This applies to Kaimata, Eskdale, Bay View Rural, Poraiti, Landcorp farm and Redclyffe.

The aesthetic quality of the aquifer in the southern part of the city is very good, but is poorer in the northern areas.

Rainwater is the biggest risk, as it is generally not treated. The lack of treatment of rainwater is a potential problem as described in point 1 of this section.

Point 7. Salty groundwater

The groundwater in Eskdale and Bay View rural can be salty. However, these areas use rainwater as a supplemental source of water, so bore water is not the only source.

Point 8. Water shortage

Sometimes water shortages occur in Kaimata, Poraiti, Eskdale, and Bay View Rural. The shortage is not a case of inadequate quantity for human health needs, but rather reduced quantity for the

desired lifestyle and home occupation of the users, including garden and livestock watering and swimming pool use. Therefore, the lack of water is not considered a health issue but rather a logistical and cost issue.

These areas are in higher socioeconomic categories so tankering supplemental drinking water, although it is considered uneconomic compared to other sources, is an option for these communities.

A potential risk is that bores not normally used for drinking may be used, and there is no control measure to prevent this happening. However, there is currently no indication that this is the case.

6.3.2 Incidence of water borne disease

Environmental Health Officers recorded one recent incidence of unsuitable bore water in Poraiti, due to nitrate levels, in 2000. It was due to stormwater runoff containing fertilizer, organic debris, and animal excrement, or from septic tank outflow contaminating the bore. This was an isolated case of localised contamination, where the water source was not the cause. These isolated cases are not significant on their own.

The conclusion is that treatment should be considered on a case-by-case basis for communities sourcing water from unconfined or semi-unconfined aquifers. This applies to Kaimata, Eskdale, Bay View Rural, Poraiti, Landcorp farm and Redclyffe. Also improvement of maintenance and operation of rainwater collection systems should be considered, in particular installing first flush diversion equipment.

There are also preventative measures available to improve supply methods, such as replacing old bore equipment, and treatment methods for improving the aesthetic quality of the water.

6.3.3 Options

Options to consider, based on geography, aquifer, water table, lot size, and available space, are:

- **Increase bore water**

Opportunities to increase water takes from bores in Eskdale, Kaimata, Bay View Rural, Landcorp Farm, and Poraiti are limited because the aquifers in these areas are not as abundant as in Meeanee, Jervoistown, and Awatoto.

- **Surface water**

Surface water takes are generally not an option, as for any of the NCC areas, as it is either unavailable in large enough quantities or is not an easy or cheap option compared with groundwater takes.

- **Demand reduction**

In the same way that reticulated public systems employ demand reduction strategies, private system owners can employ similar methods to reduce their needs and costs of water systems, at no risk to health.

The NCC water conservation programme is currently not targeted at private supplies, as the reduction methods employed are not applicable or controlled by Council. Unlike the reticulated system, excessive use of private supplies at the individual property level only affects the private owner. However, the same conservation principles apply.

- **Extension to reticulation**

There are limited options for reticulation to these areas.

- Poraiti

  The dwellings in Poraiti are geographically separated and the terrain is technically challenging, which equates to very high costs even if feasible.

- Kaimata

  In Kaimata, at the request of residents, a potential reticulated supply via extension to the new Kanuka Cliffs subdivision on Hill road, which is supplied and operated by Hastings District Council, has been suggested. The installation of a reticulated system for existing dwellings is dependent on the properties that will be serviced by the system, meeting the cost. The cost of such a system is high because of the length of pipework and possible pumps required due to the rural characteristic and elevations of the area.

  At present, there is little community support; the results of a survey that was conducted in 2004 suggested that only 25% were interested in connecting at the indicated cost, which is not a high enough percentage for a reticulated water supply to be viable.

- Eskdale

  The supply line for the Kanuka Cliffs subdivision runs from over the Esk River Bridge at SH2 (from the HDC Whirinaki system) through Eskdale and up Hill Road. In theory the same principle of extending the system as for the Kaimata option above applies to Eskdale, however at present there has not been any indication that residents are dissatisfied with their current private arrangement.

The conclusion is that reticulation extensions are currently only appropriate for future Greenfield growth areas, which are on the periphery of the urban area.

6.3.4 Solutions

Those areas using bores or rainfall as their primary means of drinking water may be better served to consider system improvements. For example, some of the Kaimata bores and equipment may be nearing their useful life. The same may be the case for some residences in Poraiti as in Figure 32. Deeper bores or new and improved rainwater collection equipment may improve the quantity of supply. It is private owner responsibility to consult on the best systems for their needs. HBRC has some useful information on their website about bores. Rainwater catchment manufacturers and consultants may advise on system improvements. In some cases, increased treatment methods may be advisable.

Figure 32 – Older On-site Water Supply System Equipment

6.4 Stormwater

6.4.1 Health Risk Areas

The health risks of not providing stormwater services are not as severe as for wastewater or water supply services. It is more of an environmental issue with health risk side effects such as land erosion or flooding issues.

The risk attributable to the absence of a reticulated supply for stormwater is that flooding occurs where the rainfall event exceeds the design capacity of the flood management system.

Stormwater can cause a health issue when water enters properties, in particular if the water is contaminated with human waste, which can happen in extreme events. There is a direct health issue as people are exposed to this contamination and are required to cleanup their home environment. There is also the indirect health issue of people being unable to live in their usual habitation for a temporary period.

6.4.2 Solutions

- **Taradale and Greenmeadows**

Some roads in Taradale and Greenmeadows are still the old rural high crown standard inherited from the former Taradale Borough and County Council as in Figure 33, note the lack of drainage channel at the roadside. These roads do not provide adequate local stormwater drainage, storage and secondary flow path needs.

Figure 33 – Avenue Road Before Road Upgrade

Figure 34 – Avenue Road After Road Upgrade

To rectify this problem there is an 8-year road programme in place, which includes stormwater constructions to complete the necessary upgrades. A typical example is shown in Figure 34 note the constructed drains leading to the reticulation system.

- **Bay View**

Many properties in Bay View have trouble with control of storm water. Council is investigating a number of options relating to the control of stormwater and its funding in the area. In several parts of Bay View, the land is low lying and soil drainage characteristics are such that flooding can occur in adverse weather conditions and the control of stormwater can be difficult. Property owners or potential purchasers can approach Council for advice if they are concerned about the possible flooding and inundation of sites.

6.5 Crematoria and Cemeteries Health Risk

The Burials and Cremations Act 1964 specifies an appropriate manner for burials, which ensures the health risks are minimised. Cemetery sites are also carefully chosen with health risk management in mind such as:

- Suitable topography away from waterways
- Less permeable geological structure to avoid high drainage
- Suitable soil type to prevent leaching

Ashes are not considered to be human remains in law, and may be scattered at any reasonable location, such as a private garden, reserve, or ocean. The burning process, which produces the ashes, renders them sterile; therefore, they do not pose a health hazard.

7 SUMMARY

7.1 Overview

Council water services are already well described in Asset Management Plans, Essential Services Development Reports, and the Long Term Council Community Plan. This assessment summarises Council services, elaborates on private services, and concentrates on specific public health related matters. The assessment presents a high-level consolidated view of the services in each community area. The description of services in each community area, or group of communities where the services and issues are the same, is not intended as a statement of service provision for an individual property, therefore should not be used in this way.

NCC operates within the framework of health related legislation. The standards applicable to water and sanitary services are:

- Health Act 1956
- Burials and Cremations Act 1964
- Building Act 2004 and 1991 - sanitation provisions
- NZ Drinking Water Standards 2000

The Medical Officer of Health monitors incidence of disease in the region and liaises with NCC officers and asset managers on potential health risks or incidence relating to health. The environmental health unit monitors and reports on public health issues on a case-by-case basis.

The three main legislative controls of private service activities relating to individual dwellings, are:

- Health Act 1956
- Resource Management Act 1991
- Building Act 2004

Hawke's Bay Regional Council sets and administers the regulations controlling the environmental impact of water and sanitary services under the Resource Management Act 1991.

Napier City Council exercises powers pursuant to the Resource Management Act, Building Act, and Health Act to regulate the provision of private water and sanitary services.

Napier City Council Environmental Health officers operate within the framework of the Health Act. In the event of a reported in-sanitary incident in a private building, the environmental health officers follow up in the first instance. As a last resort, a building may be declared in-sanitary to achieve closure where all other available procedures have proved unsuccessful.

7.2 Water Services

Water services are wastewater, water supply, and stormwater. The public health issue to consider for wastewater services is inappropriate wastewater discharge, and for water supply, the main issue is contamination of drinking water. In particular, all supplies such as schools, cafes, golf courses, hotels, and other commercial establishments supplying over 25 people for more than 60 days of the year, should be a Registered Community Water Supply with the Ministry of Health.

The health risks of not providing stormwater services are not as severe as for wastewater or water supply services. It is more of an environmental issue with health side effects such as land erosion or flooding issues, where contaminated floodwater enters properties and renders them uninhabitable. Buildings constructed before 1991 that are located in 1 in 50-year event flood areas may be at risk, as they were constructed to lower standards relevant at the time, and are not required by law to upgrade to current standards.

It is important to note that even with compliance with the 1 in 50 year (2%) flood design standards, there are areas that still may flood in storm conditions of a 50 year flood event or greater, as shown in Figure 20.

The cost of designing systems to standards greater than for 50-year flood events can increase significantly with relation to the increase in protection from flooding. Therefore, to improve systems to design standards higher than the 50-year event can be prohibitively expensive

Council wastewater and water supply serviced areas are clearly defined; either a property is served or it is not as shown in Figure 6 and Figure 9. However, stormwater does not divide easily into public and private designations. It is defined by catchments as shown in Figure 12 and Figure 13, and, for the purposes of this assessment, the catchment and its management is considered to be the public served area and the on-site provision the privately served areas.

A summary of the community areas, defined for the purposes of this assessment is shown in Figure 1. The population and the water services provision status is shown in Table 33.

The community areas are loosely defined boundaries solely for the purposes of this assessment to group service provisions and for addressing the health status generally as a whole community. In some areas , such as Bay View, there is a mix of reticulated and un-reticulated wastewater systems and stormwater systems which give rise to different considerations. Notwithstanding this, the areas lie within the same catchments for stormwater and groundwater purposes and must be considered as an integrated whole. These communities are not intended for planning purposes, which is done strictly by the District Plan. The areas are not intended as a definition of the limits of service provision for individual properties, or clusters of properties, therefore should not be used

in this way. The status of public and private water services by community area are detailed in groups below as shown in Figure 35:

- Taradale/Napier Hill/Westshore & Ahuriri/Napier Industrial/Bay View Village/Napier Central
- Bay View Settlement
- Jervoistown/Meeanee Township /The Loop
- Awatoto
- Meeanee Rural
- Kaimata/Eskdale/Bay View Rural/Landcorp Farm/Poraiti/Redclyffe

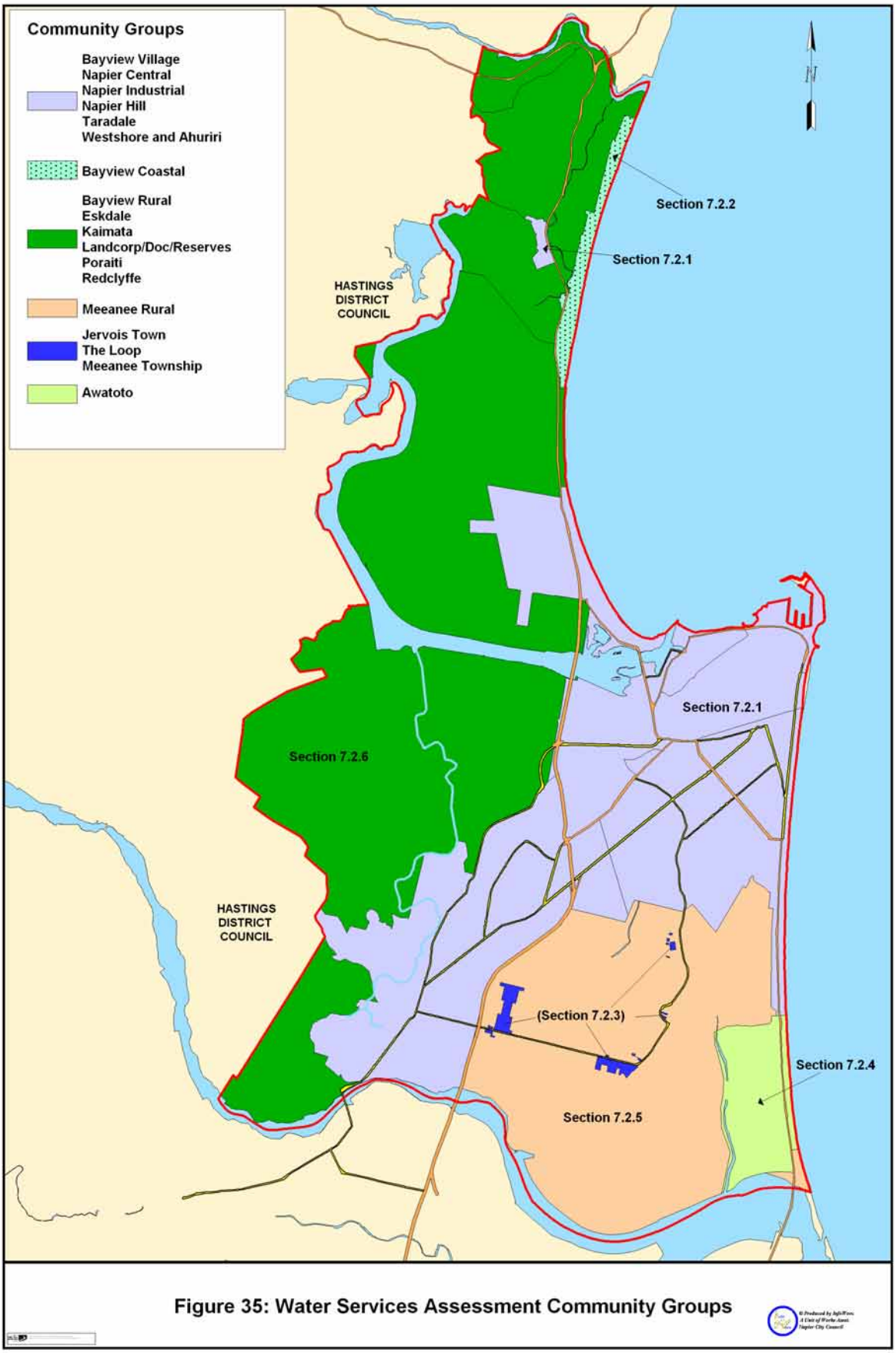
There is potential for extending the Council wastewater and water supply reticulation for existing dwellings and infill in some areas that are currently not reticulated, given the right circumstance and funding. However, as there is less than 10% (161 dwellings) of infill scattered in the non-serviced areas, the only realistic option for reticulation extension is where these dwellings are concentrated in one location and property owners are prepared to meet the cost.

Table 33 – Water Service Provision Summary

Community	Area Description	District Plan Zoning	Population		Served by public system		
For the purposes of this assessment					Wastewater	Water Supply	Stormwater
Eskdale	Rural Flat	Main Rural	21	0.04%	×	×	Part
Kaimata	Rural Hill	Rural residential	186	0.3%	×	15%	Part
Bayview Rural	Rural Flat/hill	Main Rural Rural Residential	189	0.4%	×	35%	Part
Landcorp farm	Rural Flat	Rural conservation	29	0.1%	×	×	×
Bayview Village	Semi-urban Flat	Rural Settlement	324	0.6%	36%	✓	✓
Bayview Coastal	Semi-urban Flat	Rural Settlement	1,005	2%	×	✓	Part
Lagoon farm	Rural Flat	Rural Conservation Main residential	6	0.01%	×	×	✓
Poraiti	Rural Hill	Rural residential	588	1%	×	×	Part
Redclyffe	Rural Flat/Hills	Main Rural	25	0.05%	×	×	Part
Napier Central	Urban Flat	Various Zones. Residential, Commercial and Industrial Environment	18,072	34%	✓	✓	✓
Taradale	Urban Flat		24,188	45%	✓	✓	✓
Napier Hill	Urban Hill		5,589	10%	✓	✓	✓
Westshore & Ahuriri	Urban Flat		1,842	3%	✓	✓	✓
Napier industrial	Urban Flat		123	0.2%	✓	✓	✓
Jervoistown	Semi-urban Flat	Rural Settlement	386	1%	×	×	Part
Meeanee rural	Rural flat	Main Rural	620	1%	×	×	Part
The Loop	Rural flat	Rural Settlement	43	0.1%	×	×	✓
Meeanee township	Semi-urban Flat	Rural Settlement	118	0.2%	×	×	✓
Awatoto Residential	Semi-urban Flat	Main residential	297	1%	×	×	Part
Awatoto Industrial	Semi-urban Flat	Main Industrial			✓	×	
TOTAL			**53,652**	**100%**	**49,931**	**51,237**	**51,815**
				population %	93.1%	95.5%	96.6%
				dwellings	19,556	20,047	20,280

See District Plan for full zoning description
Data Source: Statistics New Zealand 2001 except;
*TM 1:Bay View Reticulation – Options Evaluation – March 2002
**Aerial View MapIT estimate count of dwellings and population based on average per dwelling of Statistics NZ data

Figure 35 – Water Services Assessment Community Groups



7.2.1 Taradale/Napier Hill/Westshore & Ahuriri/Napier Industrial/Bay View Village/Napier Central

7.2.1.1 Wastewater

All these areas are flat urban, except Napier Hill and a small part of Taradale, served by the Council wastewater reticulated system. However, in Bay View Village only 36% (44 of 122) of the properties have connected to the available system to date. NCC has resolved that connecting to the Bay View reticulated sewerage scheme is voluntary. For this area, on-site systems are still in use on properties that have not yet connected to the reticulated wastewater system, and the same health risks identified for Bay View settlement below therefore currently apply.

Based on the 2001 census, 49,931 people or 19,556 dwellings are served by the reticulation and milliscreen pre-treatment system. This represents 93.5% of the population.

A current capacity limitation of the wastewater system exists due to excessive infiltration of groundwater to the reticulation and pumping stations during peak wet weather conditions. Some remedial works to address this inadequacy in the short term are already complete such as upgrades to pumping stations. Ongoing collection pipe maintenance and replacement will improve the situation, and allow some additional capacity for the infill growth. However, worldwide experience suggests that infiltration problems are difficult to solve and may never be solved completely.

The District Plan provides for greenfield development areas in the north-west sufficient to meet anticipated demand until 2021. These areas will be serviced by the public system, through one or more new pumping stations and a pressure main to the milliscreen, and secondary pumping stations and trunk collection mains, as provided for by the 2005-2014 capital plan. Additional capacity requirements for further greenfield growth beyond 2021 (2,330 households) have not yet been considered at a detailed level.

The additional load due to this greenfield growth and the 93% of infill that falls in the reticulated area also has consequential additional load on the treatment plant.

Construction of a new advanced primary treatment plant is already underway to cater for current public demand for increased treatment quality. The new treatment plant will produce dewatered primary sludge, which, in the short-term will be taken to landfill, while more suitable long-term options are explored, including beneficial re-use.

7.2.1.2 Water Supply

Water Quantity

These communities are 100% supplied by the Council water supply reticulated system, which is from a secure, high quality source and does not require any treatment. Monitoring of water quality is carried out in accordance with the requirements specified in the Drinking-Water Standards for New Zealand 2000. The source is adequate to satisfy the needs in the foreseeable future. Based on the 2001 census, 51,237 people or 20,047 dwellings are served by the reticulated system. This represents 95.5% of the population.

Currently the system capacity is 103% of design demand. Based on the 2001 population in the water supply served areas, the daily demand is 54,113 m^3 (54.1 million litres). Current capacity of the water supply system is 55.6 million litres achieved by the following additions and upgrades:

- The capacity of two existing wells has been increased
- A new well has been constructed
- A new booster pump station has been constructed to transfer water from the wells in Taradale to reservoirs on Napier Hill.

Some planned additions to address remaining current storage inadequacies and some future growth needs are to increase Bay View and Taradale reservoir capacities; and reticulation upgrades.

As well as building new infrastructure, alternative demand management methods employed include metering commercial properties and residential properties in technically sensitive areas of the system, and an ongoing conservation education programme.

Major upgrades in the capital plan to meet future needs are;

- A new reservoir at Bay View (2005/06)
- A new Well at Awatoto (2008/09)
- A new Reservoir at Taradale (2009/10)
- The Awatoto trunk main (2009/10)

Water Quality

Water from the reticulated water supply system must be kept and maintained in a manner such that the water is safe for human consumption. The Drinking Water Standards for New Zealand 2000 (DWSNZ 2000), released by the Ministry of Health, details how to assess the quality and safety of drinking water. The DWSNZ 2000 lists the maximum concentrations of chemical, radiological, and microbiological contaminants acceptable for public health in drinking water.

The compliance criteria for monitoring are classified according to the health risk posed by non-compliance. In order of importance they are:

- Priority 1 determinands

  Microorganisms of public health significance, specifically the bacteria Escherichia coli (E. coli), which indicate the presence of faecal matter, and the protozoa Giardia and Cryptosporidium.

- Priority 2 determinands

  Chemical and radiological contaminants that may have adverse effects of public health in sufficient concentrations. Includes inorganic chemicals such as heavy metals and organic compounds such as pesticides.

- Priority 3 and 4 determinands

  Generally monitoring is not required from a public health perspective.

Refer to the Ministry of Health Drinking Water Standards for New Zealand 2000 for full details of the monitoring requirements. The NCC water-sampling programme covers the 10 supply wells and the 3 distribution zones of Napier, Taradale, and Bay View. The distribution zones have been registered for bacteriological monitoring and sampling compliance since 1995. This year the supply complied in full on these points.

For community drinking-water supplies (defined as water supplies that serve more than 25 people for at least 60 days a year) the DWSNZ 2000 also specify the sampling protocols than must be observed to demonstrate that drinking-water complies with the Standards.

The supply is not chlorinated, because Napier's water is sourced from an aquifer that is free from surface or climatic influences at the points where water is abstracted, as detailed in a report by the Institute for Geological and Nuclear Sciences dated May 2002. There is a slight but real possibility of contamination of unchlorinated water supply systems, and the water supply network is therefore monitored at a level 50% higher than required by the Standards.

Additional chemical monitoring is currently underway to confirm whether water from the Taradale distribution zone should be assigned as "aggressive". Aggressiveness is not a determinant as such, but indicates that the drinking-water supply has a tendency to corrode household metal pipes, taps, and other plumbing. If these corrode, small amounts of metals are removed from their surface and either deposited in the pipe (such as rust), or remain dissolved in the water. It is the dissolved metals that are of concern here.

Corrosion is usually a slow process, but aggressive water held within the plumbing overnight can end up with high dissolved metal levels. When a tap is turned on, the first glass of water may contain these metals and should not be drunk or used for food preparation. Instead, the first two glasses of water should be used for some other purpose.

Sporadic indications of bacteriological contamination have been detected at Kaimata reservoir for some time. Most of the time the interval between events is longer than the minimum specified by the Drinking Water Standards, but the persistent nature of the problem points towards an issue that needs to be managed carefully. Contamination events are treated in accordance with the requirements of the Drinking Water Standards as such events present a risk to public health. All known potential contamination sources have been eliminated and efforts to overcome the problem are now focussed on two areas:

- The pipeline that connects the reservoir to the reticulation is very long and also serves as the supply to the reservoir. The turnover of water in Kaimata reservoir is therefore reduced. Water in the reservoir gets old if it is not replaced by some other means, and the reservoir is therefore flushed on a fortnightly basis.
- Bay View used to be supplied from shallow bores from the Esk River. The turbid water from the Esk River deposited a sediment layer on the inside of the pipes, with the greatest impact in the Kaimata area. Regular flushing of the reservoir appears to be insufficient to overcome the effect of bacteria that may be present inside the sediment layer and a regular chlorination programme has therefore recently been added to the flushing program.

The Ministry of Health grading for the NCC water supply is Bb, which means low level of risk of contamination. The Ministry of Health publicly reports the water results on a research institute drinking water website.

The reticulated water supply is neither treated nor disinfected as the supply is of good quality and free from bacterial, viral, and protozoal contamination. However, the absence of a residual disinfectant (chlorine) does increase the risk of contamination. Precautionary activities to maintain quality in the storage and distribution system include:

- Sampling regime 50% more than the Drinking Water standard requirements.
- Sampling is also carried out in the vicinity of maintenance works.
- All operations personnel qualified to work on the system for maintenance and repairs. The tailored training programme includes health issues of water systems.
- Turnover of water stored in the reservoirs. For example the Kaimata reservoir is currently on a fortnightly flushing programme

The aesthetic quality of water in Napier South, Central Business District, and Napier Hill has been improved dramatically during the last decade as a result of the decommissioning of wells in Napier South, Maraenui, and Onekawa. New wells that produce water of a very high aesthetic quality have been developed in the Taradale area to replace the capacity that was lost. The iron/manganese deposit that was formed on the inside of pipes before the wells in Napier South, Maraenui, and Onekawa were decommissioned still exists, but the problems of odour and

discolouration that used to occur is now almost something of the past. Mains flushing and cleaning programmes ensure that the frequency of these events stays low.

7.2.1.3 Stormwater

The majority of these communities are served by reticulated stormwater drains, except Bay View, refer below, which is served by a mixture of limited reticulation, open drains and soakage.

Because the current storm event design criteria (10-year event no surface flooding and 50-year event floor levels) have only been in effect since 1995, the problem areas are where there is old design standard reticulation. The majority of the city is still the pre 1995 standard so the level of compliance with the 10-year flood requirement is low, particularly part of Napier Central and Taradale. Since 1995, a total of $2.3 million has been spent on stormwater upgrading. Upgrading to this 10- year standard is an ongoing program.

Known 50-year flood locations are shown in Figure 20 on page 66.

Items in the 10-year capital plan for catchment wide improvements and/or to meet growth needs are;

- Saltwater creek bank improvements completed 03/04.
- Plantation drain widening.
- Lagoon Farm concrete channel.
- Cross Country drain.
- Saltwater creek bank improvements
- Bay View upgrade (see following)
- Taradale and Greenmeadows rural road standard upgrades (see following)

Bay View Stormwater Upgrade Options[19]

Bay View, although serviced by a combination of open roadside ditches and two major open drains, has suffered from significant flooding events. The combination of lack of reticulation, low lying land and flooding events has initiated Council to regulate development through planning controls.

Although Council has provided for some upgrading of one of the major drains (Petane) in the 10-year capital plan, the balance of works to cater for residential development is significant.

[19] Bay View Stormwater Report 2000 section 16-18

The most effective options (c) and (d) identified in Bay View are to upgrade the Petane drain at a cost of $740,000. detailed as follows;

Option (c) Upgrade the State Highway 2/Rogers road culvert, which restricts the passage of water. The effect would be to reduce the upstream peak but the down stream peak would increase. Further investigation required to determine the extent of this effect, and any required mitigation measures.

Option (d) Widen channel downstream of State Highway 2, Rogers road culvert. This increases the capacity to convey water to the ponding area on Landcorp/DOC land to the south.

The result is a reduction of peak water levels upstream of SH2 by 0.73m and downstream by 0.37 m.

Taradale and Greenmeadows

Some roads in Taradale and Greenmeadows are still the old rural high crown standard inherited from the former Taradale Borough and County Council. These roads do not provide adequate local stormwater drainage, storage and secondary flow path needs. There is a road upgrade programme in place in Taradale, which includes the necessary upgrades to construct drains leading to the reticulation system.

7.2.2 Bay View Settlement

7.2.2.1 Wastewater

Bay view settlement is a semi-urban area comprising, in the majority, lots less than 2500 m^2. With the exception of the village area, it is currently served by on-site wastewater systems, the majority septic tanks, and the remainder secondary wastewater treatment systems.

Within the village area, 44 of 122 properties are currently connected to the reticulated system. The potential health issues of on-site wastewater systems are (1) un-serviced septic tanks; and (2) surface ponding of effluent soakage fields leaking to stormwater drains, in high ground water areas, or infiltrating the gravels, which potentially contribute to groundwater contamination. The pathogens in domestic effluent can cause disease such as intestinal worms and mild diarrhoeas and in some instances more severe infections.

There is potential for a health risk to occur where discharge leaks from septic tanks. The cumulative effect of multiple events presents a greater risk to public health, especially in more densely populated areas such as this area. The HBRC Regional Plan 2001 specifies *where the wastewater receives no more than primary treatment, or advanced primary treatment, that discharge shall be onto or into a property with a land area of no less than 2500 m^2*. The communities where all lot sizes are less than 2500 m^2 and where septic tanks (advanced primary/primary treatment) were installed before 2001, and may still exist, are shown in Figure 27.

Not all of the properties smaller than 2500m^2 within these areas are serviced by septic tanks, but as a whole, the cumulative risk to public health in these areas is higher than elsewhere. It is noted that there is no indication that the level of risk is unacceptable at this time.

Individual septic tanks are the responsibility of the owner. Advice on on-site system maintenance can be obtained from NCC and HBRC. Ideally, septic tanks should be replaced with on-site wastewater treatment systems or properties should be connected to the reticulated system where available.

Current proposals to meet inadequacies of this nature for existing dwellings and infill are the Bay View reticulated wastewater scheme as shown in Figure 31, which is already underway in the village. The cost of providing wastewater reticulation and disposal to the existing residential properties at Bay View will be recovered by connection charges and a Council contribution. Council has completed stage 1 of the Bay View extension to the reticulated system which services the village settlement, but is not proceeding with stages 2 and 3, to serve the coastal settlement, due to lack of support for the scheme by the homeowners. Implementation of stages 2 and 3 will be reviewed over time as circumstances change.

7.2.2.2 Water Supply

Bay View settlement is fully served by the reticulated water supply system, as described in the section Taradale/Napier Hill/Westshore & Ahuriri/Napier Industrial/Bay View Village/Napier Central above.

Based on the 2001 census, 1,329 people or 500 dwellings are served by the water supply reticulated system. This represents 2.5% of the population.

7.2.2.3 Stormwater

Bay View settlement stormwater systems are a mixture of limited reticulated collection, open drains and soakage. Bay View in general falls in the 50-year flooding area, as shown in Figure 20. However, elevated sites on the coastal gravel barrier are not subject to inundation.

Council is investigating a number of options in Bay View relating to the control of stormwater and its funding in the area. In the Village, the land is low lying and inundation can occur in adverse weather conditions thus the control of stormwater can be difficult. Property owners or potential purchasers can approach Council for advice if they are concerned about inundation of sites.

7.2.3 Jervoistown / Meeanee Township / The Loop

7.2.3.1 Wastewater

These communities are served by on-site wastewater systems, the majority septic tanks, and the remainder secondary wastewater treatment systems. In these areas, the number of people served is 547, or 190 dwellings, from the 2001 census. This represents 1% of the population.

The area is low-lying with heavy soils that do not allow effective disposal of septic tank effluent. Septic tanks are used by the majority of dwellings in these areas. The minimum HBRC permitted method for this area since 2001 has been Secondary On-site Wastewater Treatment System.

There is potential for a health risk to occur in these communities where septic tanks perform poorly and/or lot size is inadequate for effluent disposal. The cumulative effect of multiple events presents a greater risk to public health, especially in more densely populated areas. The HBRC Regional Plan 2001 specifies *where the wastewater receives no more than primary treatment, or advanced primary treatment, that discharge shall be onto or into a property with a land area of no less than 2500 m^2*. The communities where all lot sizes are less than 2500 m^2 and where septic tanks (advanced primary/primary treatment) were installed before 2001, and may still exist, are shown in Figure 27. Not all of the properties smaller than 2500m^2 within these areas are served by septic tanks, but as a whole, the cumulative risk to public health in these areas is higher than elsewhere. There is potential for contamination of the Jervoistown drains from domestic effluent. Data from a HBRC sampling regime of the stormwater drains in the Jervoistown area, “indicates

that the bacteriological surface water quality of the Jervoistown drains does pose a health risk to people making contact with the drain water". However, there is no reported incidence of disease to suggest the public health risk is anything other than low..

There is no current proposal to install wastewater reticulation in Jervoistown, Meeanee Township or The Loop . The cost of a Council coordinated scheme would be shared by all the beneficiaries.

Jervoistown like Bay View has the potential to be reticulated. Should a decision be reached to install a wastewater reticulation in Jervoistown, and the scheme could be funded, a complete wastewater reticulation system would be required. The cost of such a system would have to be met by properties that connect to it and would be high. At present, there is no economically justifiable proposal for a reticulated wastewater scheme in Jervoistown.

The cost of providing services to The Loop is high, because the cost will be shared by a small number of properties, and in Meeanee Township, because it is geographically removed from the existing reticulated system. Therefore, a reticulated wastewater system is not economically viable.

7.2.3.2 Water Supply

These areas are served by private water supply systems; the majority either individual or shared bores. These areas obtain water from the same good quality abundant source as the Napier City Council public supply, which ensures an uncontaminated supply, provided on-site systems are properly maintained, and the protection of public health.

However, as there is little in-system treatment used for drinking water supplies from private bores, this may prompt users to employ point of use treatment such as an off-the-shelf filter. This type of treatment is unnecessary and may actually be detrimental to water quality. Consumer studies about off-the-shelf filters suggests the filter medium, e.g. charcoal, can support bacterial growth if the device is not maintained regularly, which often happens with limited lifetime household goods such as this. Its use is probably based only on perceived effect and a feel good factor in the user. However, this simply imparts a false sense of security. This is considered a health risk but cannot be measured directly.

This area has one MoH Registered Community Supply, Meeanee School. Some E.coli monitoring was undertaken in 2003, however copies of laboratory analytical reports were not forwarded in a timely enough manner to be included in the national report. It is the owner's responsibility to ensure the quality of a registered private supply. These operators are obliged to formally test their source and supply in accordance with the NZ drinking water standards and submit results to the Ministry of Health, which consolidates the results in the "Annual review of Drinking-Water Quality in New Zealand".

7.2.3.3 Stormwater

Stormwater provisions in these communities are a mixture of private land and open roadside drains for which there are no current inadequacies or health risks identified. However, for infill development, catchment level improvements would be needed. There are currently no proposals for this work.

7.2.4 Awatoto

7.2.4.1 Wastewater

This community is served by on-site wastewater systems. Based on the 2001 census, 297 people or 123 dwellings are served by the reticulated system. This represents 0.6% of the total population.

Awatoto industrial is connected to the public wastewater system. The two larger industries have direct pumped connection whilst the others are reticulated to a local pumping station. There is sufficient capacity to permit future wet industry growth.

There is potential for a health risk to occur where septic tanks perform poorly and/or lot size is inadequate for effluent disposal. The cumulative effect of multiple events presents a greater risk to public health, especially in more densely populated areas. The HBRC Regional Plan 2001 specifies *where the wastewater receives no more than primary treatment, or advanced primary treatment, that discharge shall be onto or into a property with a land area of no less than 2500 m^2*. The communities where all lot sizes are less than 2500 m^2 and where septic tanks (advanced primary/primary treatment) were installed before 2001, and may still exist, are shown in Figure 27. Most of the properties smaller than 2500m^2 within these areas are serviced by septic tanks, so as a whole the cumulative risk to public health in this area is higher than elsewhere. It is noted that there is no indication that the level of risk is unacceptable.

It is possible to connect to the nearby existing system subject to a suitable funding proposal. There are currently no proposals for this work.

7.2.4.2 Water Supply

This area is served by private water supplies, either individual or shared bores. These areas obtain water from the same good quality abundant source as the Napier City Council public supply. This ensures an uncontaminated supply, provided that on-site systems are properly maintained, and the protection of public health.

However, there is little in-system treatment used for drinking water supplies from the private bores, and this may prompt users to employ point of use treatment such as an off-the-shelf filter. This type of treatment is unnecessary and may actually be detrimental to water quality. Consumer

studies about off-the-shelf filters suggests the filter medium, e.g. charcoal, can support bacterial growth if the device is not maintained regularly, which often happens with limited lifetime household goods such as this. Its use is probably based only on perceived effect and a feel good factor in the user. However, this simply imparts a false sense of security. This is considered a health risk but cannot be measured directly.

This area has one MoH Registered Community Supply, Maraenui Golf Club. However the testing program information reported by MoH does not allow for further interpretation and information from the owner is unavailable at present.

It is the owner's responsibility to ensure the quality of a registered private supply. These operators are obliged to formally test their source and supply in accordance with the NZ drinking water standards and submit results to the Ministry of Health, which consolidates the results in the "Annual review of Drinking-Water Quality in New Zealand".

7.2.4.3 Stormwater

Stormwater provisions are a mixture of reticulation, open roadside drains, and soakage for which there are no current inadequacies or health risk identified.

The 50-year flood areas include an industrial development area in Awatoto. For industrial development to proceed, catchment level improvements would be required including pumping capability to the sea. There are currently no proposals for this work.

7.2.5 Meeanee Rural

7.2.5.1 Wastewater

These communities are served by on-site wastewater systems, the majority septic tanks and the remainder secondary wastewater treatment systems. Based on the 2001 census, 620 people or 215 dwellings are served by the reticulated system, which represents 1% of the population.

The area is low-lying with heavy soils that may not allow effective disposal of septic tank effluent. There is potential for a health risk to occur in these communities where septic tanks perform poorly and/or lot size is inadequate for effluent disposal. The cumulative effect of multiple events presents a greater risk to public health. The HBRC Regional Plan 2001 specifies *where the wastewater receives no more than primary treatment, or advanced primary treatment, that discharge shall be onto or into a property with a land area of no less than 2500 m^2*.

However, the population density in this area is low (there are only 4 properties under 2500 m^2), and it is therefore appropriate that the area be served with on-site systems because there is no risk to public health. A high water table may force secondary wastewater treatment systems on some properties.

7.2.5.2 Water Supply

These areas are 100% served by private water supply systems, the majority either individual or shared bores. These areas obtain water from the same good quality abundant source as the Napier City Council public supply, which ensures an uncontaminated supply, and the protection of public health, provided that on-site systems are properly maintained.

However, as there is little in-system treatment used for drinking water supplies from private bores, this may prompt users to employ point of use treatment such as an off-the-shelf filter. This type of treatment is unnecessary and may actually be detrimental to water quality. Consumer studies about off-the-shelf filters suggests the filter medium, e.g. charcoal, can support bacterial growth if the device is not maintained regularly, which often happens with limited lifetime household goods such as this. Its use is probably based on perceived effect and a feel good factor in the user. However, this simply imparts a false sense of security. It is considered a health risk but cannot be measured directly.

7.2.5.3 Stormwater

Open stormwater drains serve this area. That part of the Serpentine catchment, in the north part of this area, which is low lying (along the length of the Serpentine drain) falls into the 50-year flood zone. The cross-country drain will reduce the flood levels in this area by reducing the contributing catchment area.

7.2.6 Kaimata/Eskdale/Bay View Rural/Landcorp Farm/Poraiti/Redclyffe

7.2.6.1 Wastewater

These communities are 100% served by private systems, both septic tanks and secondary on-site wastewater treatment systems. Based on the 2001 census, this is 425 people, or 160 dwellings, which represents 0.3% of the population. There are no identified health issues and public health is protected.

7.2.6.2 Water Supply

In these communities, 78% of the population use bores or rainwater for water supply, the remainder are reticulated. Based on the 2001 census, 331 people or 125 dwellings are served by the reticulated system. This represents 0.2% of the population.

The bore water used comes from a limestone aquifer and is hard. It sometimes has an appreciable iron content also. These are generally aesthetic problems. No comprehensive sampling programme exists for private bores. However, Napier District bores are bacteriologically sampled as part of the building consent process for all new houses. Treatment should be considered for these communities on a case-by-case basis as they source their water from unconfined or semi-confined aquifers where the risk of contamination is higher. The bore water supply is adequate in quantity for domestic needs.

Around 20% of the non-reticulated population use rainwater and, on occasion, they experience water shortage, and resort to tankered water for supplementary drinking needs. Commercial tankering operations can obtain the water from any legitimate source. Where water is taken from the reticulated supply, which should be through a commercially metered connection, quality is not an issue as water is from the public reticulated supply, which is covered by the drinking water standards requirements. However, where it is taken from another source the quality is subject to the same restrictions and limitations of any other private supply and quality is not guaranteed.

There are currently no Council licensing requirements or legislative regulations for tankering operations and practices. The biggest issue is the risk of contamination of the water from contact with the tanker. The New Zealand Water and Wastes Association has recognised this potential problem and a code of practice is under development.

A potential health risk of rainwater systems is the lack of treatment. Some of the individual property assessments in these communities indicated the presence of E. coli in the rainwater. There may be a public misconception that roof water is generally safer than bore waters, which is not the case. World Health Organisation advised risk and control measures for roof water are shown in Table 32. A public education campaign to promote collection management, such as the diversion of first flush, should be considered.

Where in-system treatment is not used, as is the majority case for the private systems, residents may employ point of use treatment as an alternative method, which may pose a health risk. Point of use treatment; such as an off-the-shelf filter, is unnecessary, and may actual be detrimental to water quality. Consumer studies about off-the-shelf filters suggests the filter medium, e.g. charcoal, can support bacterial growth if the device is not maintained regularly, which often happens with a limited lifetime household goods such as this. Probably, the basis of use is on perceived effect and a feel good factor in the user. However, this simply imparts a false sense of security. This is considered a health risk but cannot be measured directly.

Extension to the reticulated system is only suitable for multiple housing developments where the costs of extending the system to the required location can be shared among the beneficiaries. Technically feasible options to service areas such as Kaimata and Eskdale with reticulated systems have been identified but the cost is currently unacceptable to the community.

The most desirable option for overcoming these water shortage issues is extension to reticulation, however, the cost of technically feasible solutions such as for Kaimata and Eskdale is currently unacceptable to property owners. In the interim, or for areas where reticulation is not possible, property owners can make improvements to current systems. Deeper bores or new and improved rainwater collection equipment may improve the quantity of supply. Rainwater catchment manufacturers and consultants may be able to advise on system improvements.

These communities have two MoH Registered Community Supply, Eskdale School, and Hohepa Homes Trust. Some E.coli monitoring was undertaken in 2003. However either sampling regimes were not met or copies of laboratory analytical reports were not forwarded in a timely enough manner to be included in the national report. Eskdale school is planning to connect to a reticulated supply (HDC) in the near future which will eliminate any potential public health issues associated with the current on-site water supply. It is the owner's responsibility to ensure the quality of a registered private supply. These operators are obliged to formally test their source and supply in accordance with the NZ Drinking Water Standards and submit results to the Ministry of Health, which consolidates the results in the "Annual review of Drinking-Water Quality in New Zealand".

7.2.6.3 Stormwater

The majority of these communities are served by open stormwater drains. The majority of Bay View Rural community falls into the 50-year flood area. Council is investigating a number of options in Bay View Rural relating to the control of stormwater and its funding in the area. In Bay View Rural and Village, the land is low lying and inundation can occur in adverse weather conditions thus the control of stormwater can be difficult. Property owners or potential purchasers can approach Council for advice if they are concerned about inundation of sites.

7.3 Sanitary Services

7.3.1 Public toilets

For the purposes of this assessment, public toilets on private property are considered those facilities available to the public at commercial premises.

There are 42 public toilets, shown in Figure 22, a demand requirement driven by the high number of visitors. There is no shortage of public facilities, but 7 facilities are identified as inadequate. However, this is due to their poor physical condition rather than any health issue. The number of notified cases of inadequate facility is minimal and they are dealt with on a case-by-case basis as the need arises.

Current provision is adequate for the immediate future needs, and is reviewed on a regular basis. Additional services can be added at relatively short notice, as changing demand becomes apparent.

7.3.2 Cemeteries

There are six public cemeteries, as shown in Figure 23. Only the Eskdale cemetery water supply and the Wharerangi cemetery car park are targeted for upgrade work, which are included in the 10-year capital plan. There is no requirement for any additional land to be designated for current or future demand. There are no identified health risks, therefore, current provision is deemed suitable to meet current demands.

There are no private cemeteries in the NCC area. All existing cemetery provisions are covered by the NCC public system.

7.3.3 Crematoria

The crematorium for the Hawke's Bay region is owned and operated by Hastings District Council. All matters relating to public health for crematoria are covered by the Water and Sanitary Services assessment 2005 for Hastings District.

Privately owned and operated crematoria are becoming increasingly common in New Zealand, as an alternative to Council operated facilities. There is one private facility in the Onekawa industrial area that has been operating since September 1992. The facility does not have other funeral services facilities therefore the other sanitary needs relating to cremation are taken care of by the funeral director at other locations and there are no health related issues to consider.

7.3.4 Refuse

Refuse is covered separately by the Solid Waste Management Plan 2000, and it is therefore not included in this assessment, as provided for by Local Government Act 2002.

7.4 Medical Officer of Health Consideration of Comments

The Medical Officer of Health has comprehensively reviewed the Draft Water and Sanitary Services Assessment. Points of public health significance raised by the Medical Officer of Health have been considered and are reflected in the assessment, as summarised below;

- Some areas of Napier District abstract water from unconfined or semi-unconfined aquifers. These areas are Redclyffe, Poraiti, Landcorp Farm, Bay View Rural, Kaimata, and Eskdale. Water from unconfined or semi-confined aquifers is at greater risk of contamination therefore treatment should be considered for these communities on a case-by-case basis.
- Secondary on-site Wastewater Treatment Systems (SWTS) may not be as effective in treating sewage as they are believed to be. These systems generally perform better than septic tanks, but only if designed, installed, operated, and maintained correctly. Users should contact HBRC where SWTS are likely to be used.
- The sporadic but ongoing problem of contamination found in or near the Kaimata reservoir is interpreted as a public health risk at those times. As all known usual potential contamination sources have been eliminated, efforts to overcome the problem are now focussed on two areas:
    - The reservoir is flushed on a fortnightly basis to increase turnover of the water in the reservoir, as it tends to be low because the pipeline that connects to the reticulation is long and tends to acts like storage.
    - A regular chlorination programme has recently been started, as the regular flushing programme has not proved effective in preventing biofilm build up that may be present.

  The situation is under continuous monitoring. Most of the time, the interval between events is longer than the minimum specified by the Drinking Water Standards.
- In public toilets the supply of a surfactant such as soap and hand drying facility would be a relevant improvement from a public health perspective. This service is currently not provided in most public toilets in Napier City due to a history of chronic vandalism of facilities and the economic challenge this presents.
- A potential health risk has been identified in areas where septic tanks perform poorly and/or lot size is inadequate for effluent disposal. For example, a HBRC sampling regime of the stormwater drains in the Jervoistown area, “indicates that the bacteriological surface water

quality of the Jervoistown drains does pose a health risk to people making contact with the drain water". However, there is no reported incidence of disease to suggest the risk to public health is anything other than low. The suitability of individual wastewater treatment systems depends on the effectiveness of the chosen method for the local conditions and the cumulative effect on neighbouring properties. The activities for on-site wastewater disposal systems are regulated by the HBRC.

- There may be a public misconception that roof water is generally safer than bore waters, which is not the case. Improvements to the operation and maintenance of these systems are needed, and a public education campaign to promote collection management, such as the diversion of first flush, should be considered.

There is ongoing coordination between Medical Officer of Health and Napier City Council to address some of these issues further.

7.5 Community solutions

The main issue facing communities in providing private service is affordability. Household income impacts the ability to purchase expensive off the shelf products or invest in turnkey projects. Many problems relate to technical management where there is pressure for additions, because large rural areas tend to have more problems and/or less adequate systems.

Private systems operate best where there are community-based systems with grass roots involvement. However, there are some inherent difficulties for those involved in community-based systems such as:

- Ability
- Motivation
- Access to information
- Understanding of need
- Requirements for self assessment
- Pressures of additional visitors
- Community size and/or isolation

There are some assistance schemes available to communities such as the sanitary works subsidy scheme.

7.6 Management facilitation

Council provides management facilitation for private owners, including the knowledge base, educational material, minor services, such as laboratory facilities, and professional advice on a limited case-by-case basis. Some of the services offered by Council that can facilitate this process and further protect public health are:

- Practical services such as water sampling test kits
- Education material such as disease information leaflets

Other available information includes advice from the Regional Council on a variety of matters, and information from the Ministry of Health such as, "The sewage and wastewater integrated management handbook".

Some suggested improvements are promoting the community planning process and consultation between groups and instilling the management responsibility to prevent system failure.

7.7 Limitation of the Assessment

Limitations due to the cost and difficulty involved and the availability of resources, which may have impacted on the completeness of the assessment, are:

- Limited individual property information for private services
- Time consuming, expensive
- Limited time to go into detail about the link between sanitation provisions, personal hygiene and health impact
- Limited time to make better links with Ministry of Health data

The Council has made as full and balanced assessment as is possible within these limitations.

8 CONCLUSION

The assessment concludes that the level of water and sanitary services that are provided to the Napier community by council and private owners is generally sufficient for the protection of public health. However, some areas raised in the report identified as a potential for public health risk are;

- **On-site wastewater disposal**

There is potential for health risk in areas where septic tanks perform poorly and/or lot size is inadequate for effluent disposal. The cumulative effect of multiple non-complying discharges from existing systems presents a greater risk to public health, especially in more densely populated areas. The HBRC Regional Plan 2001 specifies *where the wastewater receives no more than primary treatment, or advanced primary treatment, that discharge shall be onto or into a property with a land area of no less than 2500 m^2*. The communities where all lot sizes are less than 2500 m^2 and where septic tanks were installed before 2001, and may still exist, are:

- Bay View village
- Bay View Coastal
- Jervoistown
- The Loop
- Meeanee township

Not all of the properties smaller than 2500m^2 within these areas are serviced by septic tanks, but as a whole, the cumulative risk to public health in these areas is higher than elsewhere. However, there is no reported incidence of disease to suggest the risk to public health is anything other than low.

- **Rainwater collection systems**

The assessment indicated the presence of E. coli in some rainwater systems. There may be a public misconception that roof water is generally safer than bore waters, which is not the case for NCC area. Improvements to the operation and maintenance of these systems are recommended, . A public education campaign to promote collection management, such as the diversion of first flush, should be considered.

- **Bore water from unconfined or semi-unconfined aquifers**

No comprehensive sampling programme exists for private bores. However, Napier District bores are bacteriologically sampled as part of the building consent process for all new houses. For communities sourcing water from unconfined or semi-unconfined aquifers, treatment should be considered on a case-by-case basis. This applies to Kaimata, Eskdale, Bay View Rural, Poraiti,

Landcorp farm and Redclyffe. The lack of treatment for these bores is not a health risk where the source quality is demonstrated to be good.

The assessment presents a general overview of the services in each community area. The description of services in each community area, or group of communities where the services and issues are the same, is not intended as a statement of service provision for an individual property therefore should not be used in this way.

The service provision for communities; whether public health is protected; how current and future demand is addressed; and the Council's role in meeting these need are summarised in Table 34, Table 35 and Table 36.

Table 34 – Wastewater Services Summary

	Wastewater				
Community	Served by Public system	Current demand met by	Community Health Protected in general (May not apply to an individual property)	Future demand met by	Council Intended Role
Eskdale	×	Private on-site systems*	Yes	Private on-site systems*	Planning Controls and Private system management facilitation
Kaimata	×	Private on-site systems*	Yes	Private on-site systems*	Planning Controls and Private system management facilitation
Bay View Rural	×	Private on-site systems*	Yes	Private on-site systems*	Planning Controls and Private system management facilitation
Landcorp farm	×	Private on-site systems*	Yes	Private on-site systems*	Planning Controls and Private system management facilitation
Bay View Village	36%	36% Council Reticulation scheme / 64% Private on-site systems*	Potential for adverse cumulative effect***	Council Reticulation Connection available	Advocate Connection
Bay View Coastal	×	Private on-site systems*	Potential for adverse cumulative effect	Private on-site systems*	Planning Controls/Private system management facilitation
Lagoon farm	×	Private on-site systems*	Yes	Private on-site systems*	Planning Controls and Private system management facilitation
Poraiti	×	Private on-site systems*	Yes	Private on-site systems*	Planning Controls and Private system management facilitation
Redcliffe	×	Private on-site systems*	Yes	Private on-site systems*	Planning Controls and Private system management facilitation
Napier Central	100%	Existing system and items in Council Capital Plan	Yes	Items in Council Capital Plan	O, M and R of existing system
Taradale	100%		Yes		
Napier Hill	100%		Yes		
Westshore & Ahuriri	100%		Yes		
Napier industrial	100%		Yes		
Jervoistown	×	Private on-site systems*	Potential for adverse cumulative effect	Private on-site systems*	Planning Controls and Private system management facilitation
Meeanee rural	×	Private on-site systems*	Yes	Private on-site systems*	Planning Controls and Private system management facilitation
The Loop	×	Private on-site systems*	Yes	Private on-site systems**	Planning Controls and Private system management facilitation
Meeanee township	×	Private on-site systems*	Potential for adverse cumulative effect	Private on-site systems**	Planning Controls and Private system management facilitation
Awatoto Residential	×	Private on-site systems*	Yes	Private on-site systems*	Planning Controls and Private system management facilitation
Awatoto Industrial	Industrial only	Fully met by Council	Yes	Capacity for expansion exists	O, M and R of existing system
		*Septic Tank/Secondary Wastewater treatment system **Secondary Wastewater Treatment System ***until all existing dwellings connected		O, M and R = Operation , Maintenance and Renewal	

Table 35 – Water Supply Services Summary

Water Supply					
Community	Served by Public system	Current demand met by	Community Health Protected in general (May not apply to an individual property)	Future demand met by	Council Intended Role
Eskdale	×	Private on-site systems**	Potential Risk - Contamination in rainwater systems	Potential for reticulation by Council	Promote scheme if appropriate
Kaimata	15%	Public system/Private on-site systems**	Potential Risk - Contamination in rainwater systems	Potential for reticulation by Council	Promote scheme if appropriate
Bay View Rural	35%	Public system/Private on-site systems**	Potential Risk - Contamination in rainwater systems	Private on-site systems**	Private system management facilitation
Landcorp farm	×	Private on-site systems**	Yes	Private on-site systems**	Private system management facilitation
Bay View Village	100%	Existing system / item in Council Capital Plan	Yes	Council Capital Plan	O, M and R of existing system
Bay View Coastal	100%	Existing system / item in Council Capital Plan	Yes	Council Capital Plan	O, M and R of existing system
Lagoon farm	×	Private on-site systems*	Yes	Potential for reticulation by Council	Promote scheme if appropriate
Poraiti	×	Private on-site systems**	Potential Risk - Contamination in rainwater systems	Private on-site systems**	Private system management facilitation
Redcliffe	×	Private on-site systems*	Yes	Private on-site systems*	Private system management facilitation
Napier Central	100%	Existing system	Yes	Items in Council Capital Plan	O, M and R of existing system
Taradale	100%		Yes		
Napier Hill	100%		Yes		
Westshore & Ahuriri	100%		Yes		
Napier industrial	100%		Yes		
Jervoistown	×	Private on-site systems*	Yes	Potential for reticulation by Council	Promote scheme if appropriate
Meeanee rural	×	Private on-site systems*	Yes	Private on-site systems*	Private system management facilitation
The Loop	×	Private on-site systems*	Yes	Potential for reticulation by Council	Promote scheme if appropriate
Meeanee township	×	Private on-site systems*	Yes	Private on-site systems*	Private system management facilitation
Awatoto Residential	×	Private on-site systems*	Yes	Potential for reticulation by Council	Promote scheme if appropriate
Awatoto Industrial	×	Private on-site systems*	Yes	Potential for reticulation by Council	Promote scheme if appropriate
		*Individual or Shared bores **Bores or rainwater		O, M and R = Operation , Maintenance and Renewal	

Table 36 – Stormwater Services Summary

Stormwater					
Community	Served by Public system	current demand met by	Community Health Protected in general (May not apply to an individual property)	future demand met by	Council Intended Role
Eskdale	Part	Open roadside drains	Yes	Private systems	Private system management facilitation
Kaimata	Part	Open roadside drains/reticulated collection	Yes	Private systems	Private system management facilitation
Bay View Rural	Part	Open roadside drains	Potential Risk - Majority in 50-year flood area*	Bay View upgrade options	Promote upgrade if appropriate
Landcorp farm	×	Private land	Yes	Private systems	Private system management facilitation
Bay View Village	100%	Open roadside drains	Potential Risk - All in 50-year flood area*	Bay View upgrade options	Promote upgrade if appropriate
Bay View Coastal	Part	Mixture reticulated collection and soakage	Yes	No requirement	Regulate development**
Lagoon farm	100%	Open roadside drains	Yes	Council Capital Plan	O, M and R of existing system
Poraiti	Part	Open roadside drains	Yes	Private systems	Private system management facilitation
Redcliffe	Part	Open roadside drains	Yes	Private systems	Private system management facilitation
Napier Central	100%	Reticulated, generally pre 95 standard	Potential Risk***	Items in Council Capital Plan	O, M and R of existing system
Taradale	100%	Reticulated	Potential Risk***	Items in Council Capital Plan	O, M and R of existing system
Napier Hill	100%	Reticulated and open/sealed roadside drains	Yes	Items in Council Capital Plan	O, M and R of existing system
Westshore & Ahuriri	100%	Reticulated, generally pre 95 standard	Yes	Items in Council Capital Plan	O, M and R of existing system
Napier industrial	100%	Reticulated	Yes	Items in Council Capital Plan	O, M and R of existing system
Jervoistown	Part	Open roadside drains	Yes	Upgrade required to proceed with development	Regulate development**
Meeanee rural	Part	Open roadside drains	Potential Risk - Serpentine in 50-year flood area*. Meeanee Rural generally no risk	No requirement	Planning controls
The Loop	100%	Open roadside drains	Yes	No requirement	Regulate development**
Meeanee township	100%	Open roadside drains	Yes	No requirement	Regulate development**
Awatoto Residential	Part	Mixture reticulated and open roadside drains- and soakage	Yes	No requirement	Regulate development**
Awatoto Industrial			Potential Risk - Development area in 50-year flood area	Upgrade required to proceed with development	Promote upgrade if appropriate
		*houses under 50 year flood floor levels at risk *** Pirimai, Napier South and Marewa (to a lesser extent)- not all houses above the 50 year flood levels		O, M and R = Operation , Maintenance and Renewal ** through the District Plan	

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Appendix 1 Building Code Water and Sanitary Services

Table 37 summarises some of the Building Code requirements that are relevant to Public Health and Water and Sanitary Services in the context of this assessment. This is not a full copy of the building code. It is for information only in the context of this assessment and should not be used for any other purpose.

Table 37 – Water and Sanitary Services Building Code Summary

Aspect	Details
G1:	**Personal Hygiene**
Objectives	Safeguard people from illness caused by infection or contamination, Safeguard people from loss of amenity arising from the absence of appropriate personal hygiene facilities Ensure people with disabilities are able to carry out normal activities and processes within buildings
Functional requirements	Building shall be provided with appropriate spaces and facilities for personal hygiene
Performance	Sanitary fixtures shall be provided in sufficient number and be appropriate for the people who are intended to use them. Sanitary fixtures shall be located, constructed and installed to; (a) Facilitate sanitation (b) Avoid risk of food contamination (c) Avoid harbouring dirt and germs (d) Provide appropriate privacy (e) Avoid affecting occupants of adjacent spaces from the presence of unpleasant odours, accumulation of offensive matter, or other source of annoyance (f) Allow effective cleaning (g) Discharge to a plumbing and drainage system as required by clause G13" Foul water" when water-borne disposal is used, and (h) Provide a healthy safe disposal system when non-water–borne disposal is used. Facilities for personal hygiene shall be provided in convenient locations Personal hygiene facilities provided for people with disabilities shall be accessible
G12:	**Water supply**
Objectives	(a) Safeguard people from illness or injury caused by contaminated water. (b) Safeguard people from injury caused by hot water system explosion, or from contact with excessively hot water: (c) Safeguard people from loss of amenity arising from- (i) a lack of hot water for personal hygiene (ii) water for human consumption that is offensive in appearance, odour, or taste. (d) Ensure that people with disabilities are able to carry out normal activities and functions within the buildings.
Functional requirements	Buildings provided with water outlets, sanitary fixtures, or sanitary appliances must have safe and adequate water supplies.
Performance	Water Intended fro human consumption, food preparation, utensil washing, or oral hygiene must be potable A potable water supply system must be- (a) protected from contamination (b) installed in a manner that avoids the likelihood of contamination within the system ad the water main

	(c) installed using components that will not contaminate the water A non-potable water supply system used for personal hygiene must be installed in a manner that avoids the likelihood of illness or injury being caused y the system Water pipes and outlets provided with non-potable water must be clearly identified Sanitary fixtures and sanitary appliances must be provided with hot water when intended to be used for- (i) utensil washing (ii) personal washing, showering, or bathing. If hot water is provided to sanitary fixtures and sanitary appliances used for personal hygiene, it must be delivered at a temperature that avoids the likelihood of scalding. Water supply system must be installed in a manner that- (a) pipes water to sanitary fixtures and sanitary appliances at flow rates that are adequate for the correct functioning of those fixtures and appliances under normal conditions, and (b) avoids the likelihood of leakage; and (c) allows reasonable to components likely to need maintenance; and (d) allows the system and any backflow preventions devices to be isolated for testing and maintenance Vessels used for producing or storing hot water must be provided with safety features that- (a) relieve excessive pressure during both normal and abnormal conditions; and (b) limit temperatures to avoid the likelihood of flash steam production in the event of a rupture. A hot water system must be capable of being controlled to prevent the growth of Legionella bacteria Water supply taps must be accessible and useable for people with disabilities.
NCC Notes	Meaning a non-potable supply must be clearly identifiable as such so it is not used for drinking.
G13	**Foul water**
Objectives	(a) Safeguard people from illness due to infection or contamination resulting from personal hygiene activities, and (b) Safeguard people from loss of amenity due to the presence of unpleasant odours or the accumulation of offensive
Functional Requirements	Buildings in which sanitary fixtures and sanitary appliances using water-borne waste disposal are installed, shall be provided with an adequate plumbing and drainage system to carry foul water to appropriate outfalls.
Performance	The plumbing system shall be constructed to: (a) Convey foul water from buildings to a drainage system (b) Avoid the likelihood of blockage and leakage, (c) Avoid the likelihood of foul air and gases entering buildings, and (d) Provide reasonable access for maintenance and clearing blockages. The drainage system shall: (a) Convey foul water to an appropriate outfall (b) Be constructed to avoid the likelihood of blockage (c) Be supported, jointed and protected in a way that will avoid the likelihood of penetration of roots or the entry of ground water, (d) Be provided with reasonable access for maintenance and clearing blockages. (e) Be ventilated to avoid the likelihood of foul air and gases accumulating in the drainage system and sewer, and (f) Be constructed to avoid the likelihood of damage from superimposed loads or normal ground movement.

	Where a sewer connection is available, the drainage system shall be connected to the sewer, and the connection shall be made in a manner that avoids damage to the sewer and is to the approval of the network utility operator Where no sewer is available an adequate on-site disposal system shall be provided for foul water in the same manner as detailed inc clause G14: industrial Liquid Waste
NCC Notes	This ensures that dwelling are connected to the reticulated public service where it is available, or, in un-serviced areas a suitable on-site water-borne disposal drainage system (e.g. Septic tank or reticulated) or a healthy safe disposal system when non-water-borne disposal (e.g. Composting toilet) is used.
G14:	**Industrial liquid waste**
Objectives	To safeguard people from injury or illness caused by infection or contamination from industrial liquid waste
Functional Requirements	Buildings, in which industrial liquid waste is generated, shall be provided with adequate spaces and facilities for the safe and hygienic collection, holding, treatment, and disposal of the waste.
Performance	Industrial liquid waste shall be conveyed to storage containers and within disposal systems in a way which will: (a) Transfer wastes from buildings safely and hygienically, (b) Avoid the likelihood of blockage and leakage, (c) Avoid the likelihood of foul air and gases entering buildings, and (d) Provide reasonable access for the clearing of blockages. Facilities for the storage treatment and disposal of industrial liquid waste shall be constructed: (a) with adequate capacity for the volume of waste and the frequency of disposal, (b) with adequate vehicle access for collection if required, (c) to avoid the likelihood of contamination of any potable water supplies in compliance with clause G12 “Water Supplies” (d) to avoid the likelihood of contamination of solid, groundwater and waterways except as permitted ...under the Resource Management Act 1991. (e) From materials which are impervious both to the waste for which disposal is required, and to water, (f) To avoid the likelihood of foul air and gases accumulating within or entering buildings, (g) To avoid the likelihood of unauthorised access by people, and (h) To permit easy cleaning and maintenance
G15	**Solid Waste**
Objectives	To safeguard people from injury or illness caused by infection or contamination from solid waste
Functional Requirements	Buildings shall be provided with space and facilities for the collection, and safe hygienic holding proper to disposal, of solid waste arising from the intended use of the buildings
Performance	Where provision is made within buildings for the collection and temporary holding of solid waste, the spaces provided shall be: (a) Of sufficient size for the volume of waste and frequency of disposal, (b) Provided with reasonable access for the depositing and collection of the waste (c) Capable of maintaining sanitary conditions having regard to the types of waste and storage containers, and (d) Capable of maintaining the appropriate temperature for the type if waste stored. Where a rubbish chute is provided , it shall be located and constructed to: (a) Convey the solid waste to an appropriate storage container, (b) Avoid the likelihood of blockage or leakage, (c) Permit easy cleaning and maintenance (d) Avoid the likelihood of foul air or gases accumulating or entering the building

	(e)Avoid the likelihood of the spread of fire beyond the refuse chute (f) Have openings that allow waste to be [safely] deposited in the chute, and (g) Restrict access by children., animals and vermin Where it is acceptable to the network utility operator, solid waste which has been suitable treated for disposal to a sewer may be discharged via a foul water drain complying with the clause G13 "Foul Water"
NCC Notes	The NCC solid waste management plan covers sanitary issues relating to solid waste
E1	**Surface Water**
Objectives	To safeguard people from injury or illness, and other property from damage, caused by surface water. and Protect the outfalls of drainage systems
Functional Requirements	Buildings and sitework shall be constructed in a way that protects people and other property from the adverse effects of surface water
Performance	[Except as otherwise required under the Resource Management Act 1991 for the propetction of other property, surface water], resulting from and event having a 10 percent (1 in 10 years) probability of occurring annually and which is collected or concentrated by buildings or sitework, shall be disposed of in a way that that avoids the likelihood of damage or nuisance to other property. Surface water resulting from an event having a 2 percent (1 in 50 years) probability of occurring annually, shall not enter buildings. Drainage systems for the disposal of surface water shall be constructed to (a) Convey surface water to an appropriate outfall using gravity flow where possible (b) Avoid the likelihood of blockage (c) Avoid the likelihood of leakage penetration by roots or the entry of ground water where pipes or lined channels are used. (d) Provide reasonable access for maintenance and clearing blockages (e) Avoid the likelihood of damage to any outfall, in a manner acceptable to the network utility operator (f) Avoid the likelihood of damage from superimposed loads or normal, ground movements
NCC Notes	New buildings since 1991 must be designed such that all on site stormwater disposal provision are to a certain specified standard and that all surface water from a 1 in 10 year storm event is fully disposed to the local offsite reticulated system or drainage ditches, whichever is provided for the specific location. The building itself must also be constructed to a height above the level of a 1 in 50 year storm event. The requirement to not inundate other properties is overridden during storm events greater than 1 in 10 years. District and regional plans can impose stricter requirements under the RMA if required. Buildings constructed before 1991 are not required to upgrade to these standards.

Important note: These extracts from the Building Act 1991 are a summary only to provide background in the context of this Water and Sanitary services assessment. It is not a full copy and neither is it word for word extract and is not intended as a legal or binding definition of these aspects. It should not be used for any other purpose than for guidelines for this assessment.

Appendix 2 Water and Sanitation Technologies

Wastewater

Wastewater systems can be two types;

- Conventional sanitation systems

Such systems collect wastewater through a sewer network (mains reticulation). It is then treated by a conventional method (activated sludge, trickling filters etc) or an extensive and/or specifically rural method (natural lagooning, land treatment).

- On-site systems

On-site systems collect and treat toilet and greywater waste on an individual household or small community group basis.

The summary in Table 38 gives the advantages and disadvantages of the various reticulated arrangements and corresponding treatment options and the localised on-site methods. All the treatment methods required some degree of sludge removal, except for land treatment where the treatment method is also the disposal method and composting toilet which does not produce sludge.

The minimum level service that is permitted by the building regulations is;

- **BASIC** - composting toilet, with a grey water disposal system
- **PRIMARY** - septic tanks with or without filter
- **SECONDARY**– advanced on-site wastewater treatment system

- Pit latrines (long drops)

Note: Under the HBRC regional plan the long drop (pit latrine) is not permitted for any permanently occupied dwelling. The pit latrine does not provide formal treatment process for wastewater. The pathogens will eventually be destroyed by a long-term holding time through anaerobic digestion, however this can take up to two years with the pit not in use to digest the solid matter to a sufficiently reduced volume so that removal is not required. If removal is proposed the situation must be formally managed to ensure a safe end product. In either case a second pit is usually necessary. The type of place where this method is most likely used often does not lend it self to the level of management required for this to be a safe sanitary option.

Table 38 – Options for Urban and Rural Wastewater Collection and Treatment

	Collection	Treatment	Advantages	Disadvantages	
Reticulated	Public Urban Mains	Conventional plant	Well maintained	Does not promote water conservation	Discharge to waterways (with resource consent)
	Small scale community mains (a.k.a. small bore sewers) Community piggyback connections to private industrial systems	Natural Lagooning	Suited to temperate climates Suited to rural areas	Space and flat terrain required Process sensitive to cold climate	
		Small package treatment plant		Expensive (No economy of scale)	
		Pond/reedbed filtration	Low maintenance	Specific plants required Requires lots of space Requires flat land	
		Private conventional plant			
		Peat Beds		Primary treatment required Rapid silting Regular maintenance/replacement	Soil infiltration
		Land treatment (surface or subsurface Irrigation)		Not suited to less permeable terrain May need sand filter in soil	
On-site	Individual properties Small localised groups of properties	Septic tanks * or **		Not suited to high water use Not suited to high water table Regular de-sludging	
		Advanced Aerobic systems***		Not suited to high water use	
		Composting Toilet + separate Greywaste disposal system/ land treatment	No sludge Compost by-product	Requires large quantities of organic matter Pre treatment advisable to remove some bacteria, fats, oils and detergents	

Compiled from: Appropriate technology for the treatment of wastewaters for small rural communities. World Health Organisation, EURO reports and studies 90, 1982

<u>HBRC Regional Plan Treatment definitions</u>

*Primary Treatment – the settlement or separation of sludge, scum and other settleable solids, e.g. a single or double chamber septic tank

** Advanced Primary treatment – primary treatment with the addition of an effluent filter screen

*** Secondary treatment – treatment of settled overflow from primary treatment, or advanced primary treatment, by aerobic biological or physical biological processes.

- Secondary wastewater treatment systems (SWTS)

These systems generally perform better than septic tanks, but only if designed, installed and maintained correctly. The various manufacturers each provide a unique self contained secondary treatment method which in theory produces a better treated water quality than a septic tank.

Contact HBRC where SWTS are likely to be required. HBRC approved methods of effluent disposal are infiltration to soil on a case-by case basis. For system maintenance of secondary on-site wastewater treatment systems some manufacturers insist on mandatory maintenance contracts, however, it is minimal; typically 6 months or annually, for the first 2 or 3 years, then the sole responsibility reverts to the owner.

- Septic tanks

Septic tanks only remove the solid material and do not treat the pathogens in the wastewater. Therefore it is not safe for direct disposal to water ways, thus the only approved disposal methods of treated water by HBRC is by infiltration to soil. System maintenance of septic tanks is recommended at a minimum of 4 years.

- Composting toilets

Composting toilets are a dry disposal system where organic material high in carbon and nitrogen is added to decompose the waste material. Urine streams should be diverted separately and disposed of by soil infiltration. Urine alone, is generally free of harmful pathogens, so does not pose a health risk. The end-product of the composting toilet can safely be applied to land. However, use of this method requires a separate method for the household grey-waste. These systems do not require any direct maintenance, however proper management of the addition of required material and removal of the end product is necessary for efficient operation.

- Grey-water systems

Grey-water systems dispose of water from washing, food preparation and wasted tap water. It does not contain human waste thus the pathogen loading is much less. It usually contains more oils, grease, and detergents thus pre-treatment, e.g a grease trap, is often advisable else the infiltration field becomes clogged with solid material too rapidly. Disposal of the treated wastewater by irrigation is an option here as the harmful human waste is not present. The pre treatment also removes some bacteria which can contaminate crops.

All the wastewater disposal methods, except composting toilets, that discharge into soil, require a soakage field, which are site specific depending on the terrain, water table and soil type. Suitable methods are shown in Table 39

Table 39 – Treated Water Soil Infiltration Disposal Advantages and Disadvantages

Infiltration	Advantages	Disadvantages
Subsurface irrigation	Inexpensive Better suited to smaller areas	Less easy to construct
Covered irrigation Trenches	Good for less permeable terrain Easy to construct Inexpensive No sludge removal	
Sand filters	Compact	Not good for less permeable areas

The frequency of removing sludge from the soakage field varies with method and options for these solids disposal include;

- Incineration
- Land application (off-site from the point of production)
- Land Fill

Re-use of treated wastewater can be considered for re-use as drinking water only if from an advanced reticulated treatment plant where the treatment methods used are suitable to produce drinking quality water and a testing regime is in place to monitor the output. Treated water from on-site systems is not suitable as re-use for drinking, however it can be considered for re-use for crop irrigation if the quality is sufficiently good for the particular application. Treated wastewater can come from three sources, and the options for re-use are different in each case;

- Primary on-site systems

Primary method (septic tanks) only removes the solid material, and does not treat the pathogens in the water. Thus it is not safe for any re-use purpose or even for disposal to waterways. It should only be disposed of by soil infiltration

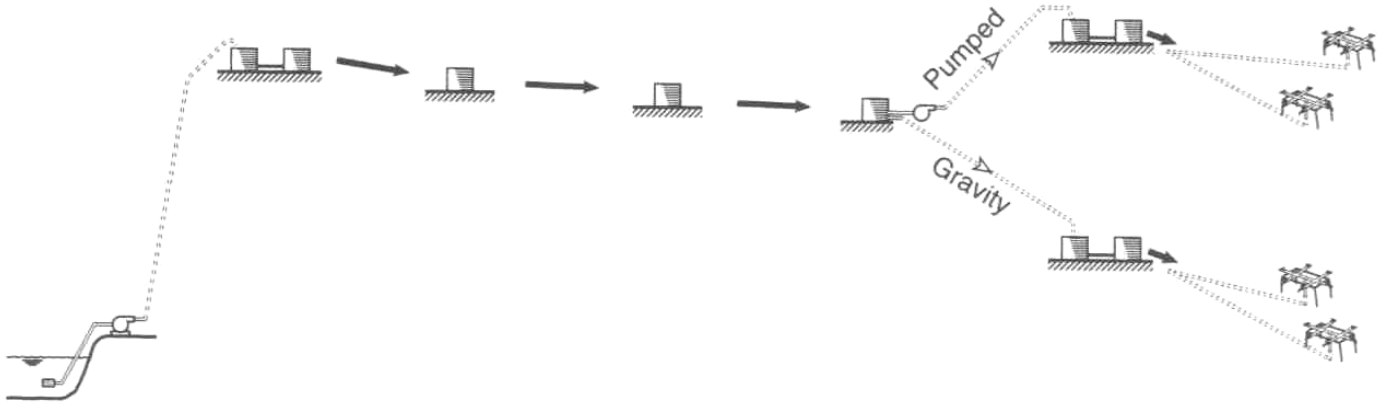
- Secondary on-site treatment system

The degree of biological treatment in secondary on-site wastewater treatment systems, means the treated water quality is higher than a septic tank thus the wastewater, in theory, can be disposed off by irrigation on plants and trees as an alternative to soakage field soil infiltration. However, the large range of manufacturers means each secondary system operates uniquely and the treated water output should be quality tested on an individual basis before re-use for spray irrigation is considered.

- Grey-water systems

Grey-water systems dispose of water from washing, food preparation and wasted tap water. It does not contain human waste thus the pathogen loading is much less. It usually contains more oils and grease thus the on-site treatment effort required to clean it to drinking water standard makes it unsuitable for re-use, where it is not part of a reticulated system.

Figure 36 – Stages in a Water Supply System



Elevation: (ideal)							
Stage:	**Water abstraction** Surface intake. Infiltration gallery or well(s). Spring(s). Large diameter well(s). Borehole(s).	**Raw water storage** Contingency reserve. May be combined with settlement and/or pH correction.	**Pre-treatment** Either: Settlement – plain or chemically assisted. Or: Roughing filtration.	**Slow sand filtration** Only include if filter can accept the turbidity of the influent.	**Chlorination** Final treatment stage. Safeguards downstream supplies.	**Storage** At strategic points on the distribution system. May be combined with chlorination contact tanks in simple systems.	**Distribution** To communal collection points – tapstands.
Design capacity:	Average flow rate over operating period.	Several tanks. Storage capacity will depend on reliability of the source (a few hours' to one day's supply).	Average flow rate over operating period.	Average flow rate over 24 hours.	Sufficient capacity to give the required contact time at the average flow rate.	Several tanks. A minimum of one day's storage.	Sized to meet peak demand flow rate.

Source: Engineering in Emergencies - Davis J and Lambert R, RedR 1999

Water supply

Water systems comprise a suitable source, an abstraction method, treatment if necessary, storage and distribution to the community as shown in Figure 36.

- **Collection**

A summary of water sources is shown in Table 40.

Table 40 – Water Source Characteristics

TYPE	Surface water		Groundwater		
SOURCE	Stream	River, lake, reservoir	Rainfall collection	Spring	Well
YIELD	Seasonally variable	Seasonally variable	May not meet total demand. Useful as a supplement.	Seasonally variable. Wide variation between springs	Yield fairly constant, except in drought. Wide variation between boreholes; flowing or non-flowing
COLLECTION	Stream diversion or pumped abstraction. Controlled access	Stream diversion or pumped abstraction. Controlled access	Collect from roofs or divert surface runoff to ground tanks	Protect. Gravity flow to storage	Protect and cover. Pump to storage
LIKELY FAECAL CONTAM--INATION*	Low to High	High or Very High	Low to High	Very low	Very Low
TURBIDITY **	Low	High or very high	Low	Low	Low
TREATMENT REQUIRED	Slow sand filtration Chlorination	Storage Coagulation/ /settlement (or Roughing and Slow sand filtration) Chlorination	Storage possible Slow sand filtration	Possible chlorination	Possible chlorination and aeration
ADVANTAGES	Easily accessible			Usually clean source	
DIS--ADVANTAGES	High treatment level		Availability of equipment Lower quantity		Relatively expensive Specialised equipment needed

*E. coli/100ml – Low, < 10; Med 10-100; High, 100-10,000; Very High, 10,000-100,000+
**Turbidity (NTU) Low < 20; Med 20-75; High 76-250;, Very High, 250-2,000+
Source: Engineering in Emergencies - Davis J and Lambert R, RedR 1999

Groundwater is by far the preferred option as it is generally cleaner than surface water. Surface water takes are generally not an easy option as the water will usually require treatment. Also the extraction method requires significant construction works which increases the cost. It is really only a sensible choice where groundwater is not readily available or requires treatment.

No treatment is required when an aquifer is deemed secure because any original pathogens are considered safe. This is determined by 99.995% of the water having been in it for more than 1 year. This is the case for the Heretaunga plains aquifer that serves Napier.

The type of aquifer can also have effect on the water quality. An artesian well is where the pressure of the aquifer causes the water to flow from the well without the need for additional pumping. Wells of this type are less prone to contamination from the ingress of contaminated water at the well head, if not properly sealed, as the natural pressure of the water keeps contamination out.

- **Treatment**

The quality of water is generally concerned with 3 aspects;

- Microbiological

The microbiological quality can vary greatly with time thus a single point sample can only show the situation at that moment. Hence the specific sampling pattern required of the Drinking Water Standards monitoring programme to gain a meaningful picture of ongoing water quality.

- Chemical

Chemical quality of water is a lot less subject to change, thus single point samplings may be reasonably representative of the long term situation, except in the cases of localised chemical spillage which clearly would be a temporary condition until cleaning and/or dispersal has taken effect.

- Aesthetic

Aspects such as smell, taste and appearance may have little consequences of health risk; however, perception of the quality is very subjective and can have implications in usage patterns.

Pre-treatment is required for turbid waters to remove suspended solids which will clarify the water sufficiently so that further treatment is effective. It also can improve the taste of water.

Pre-treatment regimes include;

- Sedimentation for the large particles of sufficient weight to self settle
- Aeration: reduces tastes and smells due to the presence of hydrogen sulphide in groundwater or decaying organic and bacterial matter in surface water. Also oxidises and removes iron and manganese.
- Roughing Filtration: The removal of suspended solids by passing water through a coarse medium.

OR

- Chemical assisted sedimentation (coagulation and flocculation) for the particles that do not self settle

Main treatment methods for the improvement of the microbiological quality of the water by the removal of pathogens include:

- Slow Sand Filtration
- Rapid filtration and Chlorination

Point of use treatment is an alternative where no in system process is use. This involves small individual scale methods at the distribution point (the tap) such as

- Natural sunlight UV
- Boiling
- Home filters

There are other less common treatment options such as

- Ozone
- Distillation
- Reverse osmosis

These are advanced or specialised treatments used for particular special case requirements or situations.

- **Storage**

Assuming the supply is adequate for the population intended, then the health implications of water storage are;

- Insufficient capacity of the tank (it has been sized incorrectly or there has been a localised increase in number of users)
- Contamination of the tanks

Tanks should be sized according to the community it serves and their usage pattern including peak daily demands.

- **Distribution**

There are several ways to distribute water to the populace;

- Mains Urban Reticulated
- Community well(s) with small scale reticulation
- Community well(s) to tanks
- Single property individual wells to tanks
- Tankered (temporary), expensive private arrangement , town supply

The Ministry of Health requires all drinking water supplies which serve at least 25 people for at least 60 days of the year to be registered, regardless of the location and purpose. Also all schools must be registered. The quality of these supplies must be monitored on a regular basis according to the regime specified in the Ministry of Health: Drinking-Water standards for New Zealand 2000.

Registered supplies serving over 500 people are also graded to show the status of treatment plants and distribution zones, relating to chemical and bacteriological health risk to community, condition of the system and its quality of care.

Stormwater

Stormwater management is a bit different to other services such as wastewater and water supply management as it is not a household driven entity. It is a catchment based issue regarding flood water containment, until it can be disposed of through;

- Ground soak
- Natural geographical features (gullies, valleys, ponding areas)
- Road side channels
- Constructed Drains
- Reticulated

For stormwater management the concept of serviced and unserviced does not apply in the same way as for say the reticulated system where a dwelling is either connected or it is not.
Level of service is not isolated to individual properties and lack of service at one location may have an effect at another location or several locations.
A more appropriate way of distinguishing the level of service is to concentrate on the level of design of the stormwater system

It is important to distinguish between the public and private responsibility for stormwater management. The public responsibility is to manage the overall disposal network for the catchments.
The private responsibility is to manage collection of runoff at the local property level without adverse consequences to the immediate areas, in accordance with the water discharge rules of the HBRC regional plan and the Drainage Act 1908..
However note that the boundary between public and private systems is more blurred for stormwater as it is catchment based, which has no respect for property boundaries. Stormwater may move from private land to public areas and vice versa whether wanted or not. Unlike wastewater and water supply which is a controllable activity at the individual property level.

Adverse effect of stormwater is generally from urban development and the consequence affects both developed and undeveloped areas unless appropriately managed.

The process of stormwater management can be separated into two parts: collection and conveyance and there are three levels of provision for stormwater management;

- Top level (HBRC) – environmental protection measures for main water ways such as river embankments, open channels. Pump stations for the conveyance of water.
- Mid level (NCC) – built environment macro measures for inhabited areas for the protection of people and property. Collection and conveyance measures such as reticulated collection mains, roadside drains, open channels, retention dams, pump stations
- Local level (private) – local collection provisions to get water off individual properties, local reticulated collection pipes, drainage gutters.

Identified flood areas are unrelated to land use they are just a statement of geographical fact based on scientific analysis of stormwater behaviour in extreme flood conditions. However, land development can have a direct influence on flood zones if no stormwater management infrastructure is included. Thus good management of stormwater relates to having a good balance of appropriate infrastructure on individual properties versus no infrastructure with simple reliance on geographical features.

Two aspects of this private responsibility with regard to the health impact of flooding are;

- Urban small properties; how does an individual get water off a property safely and effectively, taking note that stormwater should not be disposed of to wastewater drains.
- Larger rural properties subject to geographical constraints have the option to build stormwater defences. However two considerations are; where the responsibility lies and to what standard the work is expected.

Individual provisions for infrastructure can be;

- On-site soakage
- Piped networks discharge to local surface water
- Piped network to public system
- Silt traps
- Detention structures

Effective stormwater quality management should form part of overall stormwater management activities, both on site and off site. Pollution prevention and environmental management controls can be structural, and non-structural. Structural controls are generally facilities created to treat stormwater runoff, while non-structural controls minimise the opportunity of pollutants to come in contact with rainfall and runoff. Full details of a Stormwater Pollution Prevention Plan is in the Stormwater Essential Services Development Report 2000, section 6.5.

If prevention or source controls methods are not sufficient to meet water quality standards, treatment of the stormwater runoff may be necessary. Treatment methods vary widely from simple detention to the sophisticated wetland and/or filtration systems.

However, what is necessary is on a case by case basis based on considerations such as;

- Cost versus benefit analysis
- Level of pollution of the runoff
- Desired quality of discharge

Table 41 below gives an indication of the range of stormwater runoff treatment systems available.

Table 41 – Stormwater Treatment Methods

Treatment Facility	Description
Detention ponds	Ponds designed primarily for flood control provide little treatment but depending on retention time cause settlement of silt which often binds heavy metals and other chemicals.
Evaporation basins	These are flat shallow ponds where runoff is stored and treated by evaporation. They are suitable for treating relatively small quantities of runoff in low rainfall areas.
Infiltration ponds	These can be trenches filled with rock for treating small quantities of stormwater, or basins which infiltrate runoff through flat bottoms covered with rubble. They are suitable for high permeability soils, where there is no risk of underground water contamination. Often they can be designed as combination evaporation/infiltration ponds.
Shallow wetlands	These are shallow ponds with some wetland plants. Suspended material, which is effective in binding chemical substances, settles in the ponds and some of the pollutants are taken up by the plants. Detention is controlled by an orifice at the outlet.
Deep wet ponds	These are designed with a permanent wet pool, their capacity being determined by water balance analysis.
Sand filters	The sand filters can be surface or underground. They treat runoff first by settling in a pre-treatment chamber/pond and then by filtering through a bed (or underground) layer of sand.
Organic sand filters	Organic sand filters have a layer of organic material, such as peat, to increase the ability of the filters to remove pollutants, such as heavy metals.
Bioretention	Runoff is first stored into a ponding area and then slowly filtered through sand and organic material in a planted bed. The stormwater provides irrigation for the plants, which should preferably comprise native vegetation. With appropriate landscaping, they can be incorporated into parks.
Submerged gravel wetlands	These treat runoff as it flows through a bed of gravel planted with wetland plants, such as rushes.

Although, treated stormwater re-use is not a necessary consideration for NCC at this time, as water sources become scarce through overuse, in the long term this may be an option. Therefore, in the medium-term, next 20 years, comprehensive investigations of treatment and re-use options are required to prepare for alternative supplies in the long-term future.

Public Toilets

Consider public toilets as two types;

- Council owned and operated facilities for the general public, including community halls and sports facilities.
- Facilities in privately owned commercial or non-residential properties for use by patrons of a business or visitors to the building

Council owned facilities are constructed to a minimum NCC standard toilet design of two back to back self-contained toilets, including paraplegic facilities, and allowing for relative ease of maintenance. The separate unit design provides security for the user and security for the facilities as individual units can be locked when necessary, for example at night to minimise incidents of vandalism.

For facilities in private buildings, there are specific Building Act requirements, for dwellings and commercial properties. For all buildings, the Building Act 2004 required suitable sanitary facilities, base on the design occupancy of the building which is related to the intended use. The specific quantities are in accordance with the Government Department of Building and Housing, Acceptable Solutions G1/AS1 Personal Hygiene 2000. This requirement is the responsibility of the building owner or developer, and is included in the building consent process.

Regarding disposal methods, these facilities may be on the reticulated system or use septic tanks or even be composting toilets in remote rural places, although none are known in the NCC area. The functional aspects of the facilities are covered by the same principles in the wastewater section of this assessment.

Cemeteries

Ground burials in public cemeteries are the usual, well established and accepted practices for the interment of human bodies after death. The Burial and Cremations Act 1964 does not permit home burials thus public health is protected by limiting the location of burials to designated places where the environmental impact, if any, can be managed and where practices under the Health and Safety in Employment Act 1992 take care of any potential health issues.

The only alternative would be private cemeteries, of which there are none in the Napier City Council area of responsibility. Private cemeteries and home burials are permitted by the Burial and Cremations Act 1964 only where dwellings are more than 25 kilometres from an existing open cemetery. Due to the limited size of the NCC area this criteria is not applicable.

Crematoria

The same principles for cemeteries applies to crematoria under the Burials and Cremations Act 1964. However, crematoria are also subject to appropriate discharge to air permits from the HBRC.

Appendix 3 Resource Consents for Stormwater Disposal

NCC held resource consents for stormwater disposal are shown in Table 42.

Table 42 – HBRC Resource Consents – Type: Discharge Water

ConsentID	DecisionActual	ExpireActual	PropertyAddress	Purpose
DP000680W	29-Jun-01	31-May-36	Churchill Drive / O'Dowd Road, Taradale	to dam the headwaters of the Taipo Stream with a 4.8m high earth detention dam forming a reservoir of up to 76,000 m3 (known as O'Dowd dam) to provide flood protection to the Taradale urban area, and to discharge water from dam to original water course
DP030601W	17-Nov-03	31-May-38	Oak Road, Taradale	to divert and discharge stormwater from an arterial road into the Taipo Stream
CD940014W	4-Feb-94	31-May-07	West Quay, Ahuriri	to discharge stormwater collected from the Burns Road catchment area to the Bridge Street end of the Iron Pot along with existing stormwater discharges in the area
DP930232W	8-Dec-93	31-May-07	Cnr Georges Drive & Kennedy Roads	to discharge stormwater into the old bed of the Tutaekuri River at Georges Drive
CD960274Wa	16-Sep-03	31-May-27	Southern fringe of Napier City to CMA off Kenny Road	discharge stormwater from the Cross Country Drain into the Coastal Marine Area
DP000681W	29-Jun-01	31-May-36	Puketapu Road & Kent Terrace, Taradale	to dam the headwaters of the Taipo Stream with a 4.15m high earth detention dam forming a reservoir of up to 88,000 m3 to provide flood protection to the Taradale urban area, and to discharge water from the dam into the original water course
HKB890182	12-Oct-89	30-Sep-26	Hyderabad and Embankment Road	discharge stormwater to the old bed of the Tutaekuri River
P030723L	12-Dec-03	31-May-23	Lagoon Farm	To discharge stormwater from an 81 hectare residential subdivision to an open channel
DP030122 W	2-May-03	31-May-13	Summerset Holdings, Hastings 26 & 28 Oak Road & 38 Puketitiri Rd	To discharge stormwater from a 7-Ha site into the Taipo Stream
DP030123 W	2-May-03	31-May-05	Summerset Holdings, Hastings 27 & 28 Oak Road & 38 Puketitiri Rd	To discharge stormwater from a property undergoing subdivision works into the Taipo Stream
CD990516W	8-Nov-02	30-Jun-18	Ahuriri Estuary	To discharge stormwater from part of Napier City urban area and surrounding rural land,into the Ahuriri Estuary via the Westshore tidal floodgates

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Appendix 4 HBRC rules for wastewater permitted activities

These are the relevant rules for the purposes of the assessment relating to permitted on-site wastewater disposal methods extracted from the HBRC Regional Resource Management Plan 2001. This extract is for guidance only and should not be used as the definitive. Refer to the full Plan and HBRC for a full explanation and for resource consent information.

Table 43 – HBRC RRMP 2001 Rules for Wastewater Permitted Activities

Rule	Activity	Classification	Conditions/Standards/Terms
35 Existing domestic sewage disposal systems Refer POL 16, 71, 75	The discharge of contaminants onto or into land from any domestic sewage* disposal system, which existed prior to notification of this Plan**	Permitted	a. The rate of discharge shall not exceed 2 m^3/d, averaged over any 7 day period; b. The discharge shall not occur over the Heretaunga Plains unconfined aquifer as shown in Schedule Va; c. There shall be no surface ponding as a result of the discharge, or direct discharge into any water body; d. There shall be no increase in the concentration of pathogenic organisms in any surface water body as a result of the discharge; e. Either – (i) The point of discharge shall be no less than 600 mm above the winter groundwater table; or (ii) The discharge shall not result in, or contribute to, a breach of the *"Drinking Water Quality Standards for New Zealand"* (Ministry of Health, 1995) in any groundwater body after reasonable mixing*** f. The discharge shall not cause any emission of offensive or objectionable odour, or release of noxious or dangerous gases (including aerosols) beyond the boundary of the subject property g. For discharges from pit privies, the privy shall be constructed in soil with an infiltration rate not exceeding 150 mm/h; h. Compliance with any conditions of a resource consent held for the activity prior to

Rule	Activity	Classification	Conditions/Standards/Terms
			notification of this Plan. i. A schedule and/or record of maintenance undertaken shall be forwarded to the HBRC on request.

* **Domestic sewage** – means any wastewater, including faecal matter, urine, household and commercial wastewater, that contains human waste
** **Existing systems** – For the purposes of this Rule, "existing systems" do not include systems that have been modified or replaced after notification of this Plan.
*** **After reasonable mixing** – See Glossary for a definition of "after reasonable mixing".

Rule	Activity	Classification	Conditions/Standards/Terms
37 New domestic sewage disposal systems, including greywater disposal Refer POL 16, 71, 75	The discharge of contaminants onto or into land from any domestic sewage including greywater established after notification of this Plan	Permitted	a. Where the wastewater receives no more than primary treatment, or advanced primary treatment, the discharge shall be onto or into a property with a land area of no less than 2500 m^2; b. The rate of discharge of domestic sewage (including greywater) shall not exceed 2 m^3/d, averaged over any 7 day period c. The treatment and disposal system shall be designed to cater for the peak daily loading d. The discharge shall not occur over the Heretaunga Plains unconfined aquifer as shown in Schedule Va nor on any land zoned for residential activity in any Proposed or Operative District Plan e. The discharge shall not occur within 20 m of any surface water body (including any stormwater open drain or roadside drain), or any tile drain or within 1.5 metres of any property boundary. f. There shall be no surface ponding as a result of the discharge, or direct discharge into any water body; g. The discharge shall be distributed evenly over the entire disposal area, h. There shall be no increase in the concentration of pathogenic organisms in any surface water body as a result of the discharge; i. The discharge shall not occur within 30 m of any bore drawing groundwater from an unconfined aquifer into which any contaminant may enter as a result of the discharge;

Rule	Activity	Classification	Conditions/Standards/Terms
			j. The point of discharge shall be no less than 600 mm above the winter ground water table; k. The discharge shall not result in, or contribute to, a breach of the *"Drinking Water Quality Standards for New Zealand"* (Ministry of Health, 1995) in any groundwater body after reasonable mixing; l. The discharge shall not cause any emission of offensive or objectionable odour, or release of noxious or dangerous gases (including aerosols) beyond the boundary of the subject property or on any public land; m. For discharges using the long-drop method, (i) the long-drop shall be constructed in soil with an infiltration rate not exceeding 150 mm/h and (ii) The long drop shall not be the primary wastewater system for any permanently occupied dwelling; n. The system shall be designed, constructed, operated and maintained in a manner which ensures that there is no clogging of the disposal system or soils o. Where the wastewater receives secondary treatment or better, the discharge shall not exceed 20 g/m^3 of BOD, and 30 g/m^3 of suspended solids; p. The treatment and disposal system shall be maintained in accordance with the manufacturers' instructions and a schedule of maintenance shall be forwarded to the HBRC upon request. q. The discharge shall not be disposed of by way of spray irrigation

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Appendix 5 Surface Water Quality Guidelines

Environmental guidelines for surface water quality as set out in Section 5.4 of the Hawke's Bay Regional Council - Regional Resource Management Plan 2001 are shown in Table 44 below:

Table 44 – Surface Water Quality Guidelines

TABLE 6.1
ENVIRONMENTAL GUIDELINES – SURFACE WATER QUALITY
PART I – GUIDELINES THAT APPLY ACROSS THE ENTIRE HAWKES BAY REGION

Issue	Guideline
1. Temperature	The temperature of the water should ~~not change by more than 3° celsius~~ be suitable for sustaining the aquatic habitat and not exceed 25° Celsius.
2. Dissolved Oxygen	The concentration of dissolved oxygen should exceed 80% of saturation concentration.
3. Ammoniacal Nitrogen	The concentration of ammoniacal nitrogen (N-NH_{4+}) should not exceed 0.1 mg/l.
4. Soluble Reactive Phosphorous	The concentration of soluble reactive phosphorous should not exceed 0.015 mg/l.
5. Clarity	In areas used for contact recreation, the horizontal sighting range of a 200 mm black disk should exceed 1.6 m.

TABLE 6.2
ENVIRONMENTAL GUIDELINES – SURFACE WATER QUALITY
PART II – GUIDELINES THAT APPLY TO SPECIFIC CATCHMENTS
(Parts that affect Napier City)

Catchment Area	Faecal Coliforms (cfu/100ml)	Suspended Solids (mg/l)
Esk River	200	50
Tutaekuri River upstream of Napier City Council boundary **(Redclyffe Bridge)**	50	10
Tutaekuri River between SH 50 (V21 415 767) and Napier City Council boundary **(Redclyffe Bridge)**	100	25
Tutaekuri River downstream of SH 50 (V21 415 767) **(the expressway bridge)**	150	25

The above apply after reasonable mixing. This has been set at:

(a) A distance of 200 m downstream of the point of discharge; or

(b) A distance equal to seven times the bed width of the surface water body, but which shall be not less than 50 m; or

(c) The distance downstream at which mixing of contaminants has occurred across the full width of the surface water body, but which shall not be less than 50 m.

There are slightly different rules for suspended solids depending on the receiving water.

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Appendix 6 Services Current and Future Demand

Table 45 – Current and Future Demand - Water Supply

CURRENT (2004)	Demographs (2001)						Peak day demand			Storage				
	Population		Households	@2.6/house			Required (2001 basis)		Actual (2004)	Required (2001 basis)		Reservoirs (2004)		
Supply Zone		% of 2001 total				**Subsystem**	l/d	m^3	m^3	l/d	m^3	m^3	% of needs	
Taradale/Napier Central	44,225	82%	17,256			Enfield	39,802,500	39,803	From asset manager calculations	22,112,500	22,113	20,240	92%	
Napier Hill	5,589	10%	2,256			Thompson	5,030,100	5,030		2,794,500	2,795	7,075	253%	High percentage is for technical purposes.
Bayview	1,423	3%	540			Bayview	1,280,728	1,281		711,516	712	635	89%	
Serviced	**51,237**	**95%**	**20,052**				Domestic demand	46,113		Domestic storage	25,619	27,950	109%	
Unserviced	2,415	5%	858				Industrial demand	8,000		Firefighting storage	2,500	2,500		
Total	53,652	100%	20,910				TOTAL required	**54,113**		TOTAL required	**28,119**			
							Current capacity		**55,600**	**Current capacity**		**30,450**	**108%**	

ADDITIONAL (2001-2021)	Demographs						peak day demand		storage			
	population		Households					Proposed additions			Proposed additions	
Supply Zone		% of 2001 total	All	Infill	Green	**Subsystem**		m^3			m^3	
Taradale/Napier Central	8,581	16.0%	3,300	1,515	1,785	Enfield		7,400			9,200	
Napier Hill	485	0.9%	187	187	0	Thompson		0			0	
Bayview	191	0.4%	73	73	0	Bayview		0			400	
Additional serviced	**9,257**	17.3%	**3,560**	1,775	1,785							
Additional unserviced	505	0.9%	190	190	0		**Additional capacity**	**7,400**	**Additional capacity**		**9,600**	
Total additional 2001-2021	9,761	18.2%	3,750									
Includes 2001-2004 growth already accounted for in upgrades as at 2004												

Design basis	
domestic consumption	900 l/p/d
Industrial cons.	8,000 l/d
storage	500 l/p
Fire fighting	2,500 l/d

FUTURE (2021)	Demographs (2021)						Peak day demand			Storage				
	Population		Households	@2.35/house			Required (2021)		Proposed (2021)	required (2021)		reservoirs (2021)		
Supply Zone	Total	% of 2021 total	total			**Subsystem**	l/d	m^3	m^3	l/d	m^3	m^3	% of needs	
Taradale/Napier Central	48,308	83%	20,556			Enfield	43,476,816	43,477	From asset manager calculation 2004	24,153,787	24,154	29,440	122%	
Napier Hill	5,740	10%	2,443			Thompson	5,165,929	5,166		2,869,960	2,870	7,075	247%	High percentage is for technical purposes.
Bayview	1,441	2%	613			Bayview	1,297,127	1,297		720,626	721	1,035	144%	High percentage is for technical purposes.
Serviced	**55,489**	**96%**	**23,612**				Domestic demand	49,940		Domestic storage	27,744	37,550	135%	
Unserviced	2,462	4%	1,048				Industrial demand	8,000		Firefighting storage	2,500	2,500		
Total	57,951	100%	24,660				TOTAL required	**57,940**		TOTAL required	**30,244**			
							Future capacity		**63,000**	**Future capacity**		**40,050**	**132%**	

Wastewater and stormwater current and future demand are not calculated by population and dwelling numbers, seen main report for details.

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Appendix 7 Effect of Population Growth on Services

The expected effect of new infill households (total 1,615 until 2021) on the catchments/subsystems is shown in the tables below.

Table 46 – Wastewater and Water Supply Growth Effect and Service Projections

New households 1992-1998 (INFILL)					
infill area	additional households	**wastewater catchment**		**Water supply Subsystem**	
Ahuriri	59	Latham		Enfield	
Awatoto	16	separate		Not reticulated	
Bay View**	70	Latham		80% Bayview±	
Bluff hill	55	Latham		Thompson	
Eskdale	6	Not reticulated		Not reticulated	
Greenmeadows	199	G 50% L 50%		Enfield	
Hospital Hill	59	Latham		Thompson	
Maraenui	12	Latham		Enfield	
Marewa	91	Latham		Enfield	
McLean Park	69	Latham		Enfield	
Meeanee*	23	Not reticulated		Not reticulated	
Nelson Park	25	Latham		Enfield	
Onekawa Central	27	Latham		Enfield	
Onekawa South	28	Latham		Enfield	
Pirimai	19	Latham		Enfield	
Poraiti	45	Not reticulated		Not reticulated	
Tamatea North	4	Latham		Enfield	
Tamatea South	13	Latham		Enfield	
Taradale North	183	Greenmeadows		Enfield	
Taradale South***	157	Greenmeadows		99.5% Enfield±±	
Westshore	41	Latham		Enfield	
Total	**1201**				
PROPORTIONS	**1992-1998**	**Wastewater**	**1992-1998**	**Water Supply**	
Catchment	housholds	%	Subsystem	households	%
Latham	672	56%	Enfield	926	77.1%
Greenmeadows	439	37%	Thompson	114	9.5%
Not reticulated	74	6%	Bay View	56	4.7%
Awatoto	16	1%	Not reticulated	105	8.7%
Projected INFILL households total 2004-2021			**1615**		
Projected 2004-2021		households	**Projected 2004-2021**		households
Latham	56%	904	Enfield	77.1%	1245.5
Greenmeadows	37%	590	Thompson	9.5%	153.3
Not reticulated	6%	100	Bay View±±±	3.7%	60.2
			BV non retic	0.9%	15.1
Awatoto (not ret)	1%	22	Not reticulated	8.7%	140.9
total reticulated infill		**1494**	total reticulated infill	90.3%	**1459**
total non-reticulated infill		**121**	total non-reticulated infill	9.7%	**156**

*includes Meeanne township, Jervoistown, Loop residential
**includes Kaimata, Bayview Rural, Bay View village, Bay View coastal, landcorp farm
*** includes Redclyffe
± 20% not reticulated in Kaimata and Bayview rural
±± 0.5% in Redclyffe not reticulated
±±± 80% reticulated / 20% non-reticulated

Greenfield growth (total 1,615 until 2021) is concentrated in one area, the Northwest of the City on Taradale fringe. The effect from greenfield growth on Wastewater and Water Supply is given in the main report.

Table 47 – Stormwater Growth Effect

Stormwater catchments (main)	infill area	additional households
Inner harbour	Ahuriri	59
Awatoto	Awatoto	16
Petane/Atherfold	Bay View**	70
Hill	Bluff hill	55
Eskdale	Eskdale	6
Purimu	Greenmeadows	199
Corunna/City/Inner Harbour	Hospital Hill	59
Plantation	Maraenui	12
Plantation	Marewa	91
Georges Drive	McLean Park	69
Purimu	Meeanee*	23
Georges Drive	Nelson Park	25
County	Onekawa Central	27
County	Onekawa South	28
County	Pirimai	19
Taipo	Poraiti	45
Purimu	Tamatea North	4
Purimu	Tamatea South	13
Purimu	Taradale North	183
Taipo	Taradale South***	157
Landcorp	Westshore	41
	Total	**1201**
PROPORTIONS		
catchment	**households**	**%**
Awatoto	16	1%
County	74	6%
Corunna/City/InnerHarbour	118	10%
Eskdale	6	0%
Georges Drive	94	8%
Hill	55	5%
Landcorp	41	3%
Petane/Atherfold	70	6%
Plantation	103	9%
Purimu	422	35%
Taipo	202	17%
	1201	100%

Table 48 – Stormwater Service Projections

Projected households total 2004-2021					
Catchment	**INFILL**	**GREENFIELD estimates**		**Service Requirements**	**New Capital Item**
Awatoto	22	0		None	None
County	100	0		None	Cross Country drain
Serpentine	0	0		None	Cross Country drain
Georges Drive	126	0		None	None
Corunna/City/InnerHarbour	159	0		None	None
Eskdale	8	0		None	None
Hill	74	0		None	None
Landcorp	55	0		None	None
Petane/Atherfold	94	0		Increase capacity of Petane drain	Bay View Stormwater Upgrading - option (d*)
Plantation	139	0		Increase capacity of drain	Cross Country drain Plantation drain widening
Purimu	567	850	Lagoon Farm	Lagoon farm overflow channel	Lagoon Farm concrete channel
		220	Citrus Grove	Saltwater creek increased capacity	Saltwater creek bank improvements
		130	Park Island	Additional pumping capacity at Purimu pumping station.	Completed 03/04
		150	King/Guppy**	Increased catchment drainage	Cross Country drain
Taipo	272	120	Kent Terrace	Halliwell detention dam upgrade	Hawke's Bay Regional Council
				Increase capacity of Taipo catchment	Upgrade Taipo stream
TOTAL	**1615**	**1470**	growth until 2021		

Note: Mission Heights catchment (350) drains to HDC
**remaining of 320 original. Reticulation and local drainage upgrade complete

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Appendix 8 Waterborne and sanitation related illnesses

Chemicals found in water can have adverse effects on human health if found in high enough concentrations as shown in Table 49.

Table 49 – Health Effect of Chemicals in Water

Parameter and Health Effect[20]		
Fluoride		
Critical values	< 1 mg/l	Tooth Decay
	1 mg/l	Protection against tooth decay
	> 1.5 mg/l	Mottling of teeth
	> 4 mg/l	Adverse effect on bone growth
Ministry of Health recommendations are 0.7-1.2 mg/l for drinking water supplies. Short-term exposure to high fluoride levels is not considered critical. However, long term exposure is a concern.		
Chlorides and sulphates		
These are the principal ions contributing to the Total Dissolved Solids in water, which comprises inorganic salts and small amounts of organic matter. They make water salty and unpleasant to drink in high quantities (chlorides above 200-300 mg/l, sulphates above 200-900 mg/l); however, it is not harmful by itself due to the saltiness, and is an individually subjective tolerance.		
Nitrates		
This can be harmful by causing methaemoglobonaemia, by inhibiting oxygen uptake in the blood. Infants are particularly susceptible which is why this condition is sometimes known as 'blue baby' syndrome. Nitrates in water occur from fertilizer seepage, organic pollution, and septic tank effluent contamination of groundwater. Safe level < 45 mg/l.		
Colour		
Iron and manganese can discolour water. It is purely an aesthetic issue and is not harmful to health.		
pH		
Low pH (acidic) water can contribute to corrosion of metals parts of a water system. This can affect taste but is not a health risk. Natural range for waters is 4 to 9.		
Turbidity		
Caused by suspended solids, turbidity can encourage bacterial growth and reduce the effect of disinfection. For the efficient disinfection of water the preference is turbidity < 1 NTU (Nepholometric Turbidity Units, an optical measure)		

[20] Adapted from Engineering in emergencies: Davis and Lambert, RedR, IT Publications, 1999

Lead Absorption[21]
There is potential for elevated lead levels in drinking-water from dissolution of lead pipes and solders, and brass fittings in homes. The weathering of lead-based paints may also be a concern in roof water supplies, as is the leaching from newly fitted uPVC pipes. The amount of lead dissolved is dependent on, amongst other things, pH, temperature, stagnation time and water hardness. The early stages of lead poisoning are non-specific and affect the gastrointestinal and nervous systems. In later stages, symptoms may develop in the blood, kidneys, bones, heart and reproductive systems and may, in extreme cases, cause death.

Pathogens are found in the environment from the presence of faecal matter in water and soil. They infect humans via the faecal oral route or contact with the skin. There are several types of pathogens and the health effects are:

- **Bacterial, Virus and Protozoa**

Cause diarrhoea or fevers. Transmitted via faecal-oral route from contaminated water or unhygienic environment.

- **Helminths**

Cause intestinal obstruction and damage, and invade other organs. Found in contaminated soil and transmit to humans via faecal –oral route, or by larvae get into the feet and skin

Each infection, with the transmission mode, type of pathogen that causes the disease and its notifiable status, is shown in Table 50. Faecal coliforms and E. coli are the indicator bacteria of presence of pathogens in water and are used for the detection of contamination.

The Ministry of Health collates incidence of notifiable diseases nationally and locally. The surveillance data has quality limitations such as:

- Sensitivity
- Completeness of data
- Data errors
- Small Numbers

The data does not allow useful interpretation, such as identification of clusters of disease, to connect incidences to the water and sanitary provisions within the NCC community.

Not all patients present to health professionals and cases may go unreported. This can be a hindrance to obtaining an accurate picture of community health.

[21] Ministry of Health. The Environmental Case Management of Lead Exposed Persons. Guidelines for Public Health Services. 1998. http://www.moh.govt.nz/moh.nsf/49ba80c00757b8804c256673001d47d0/cebc5384307ff9094c25666f003c1180/$FILE/Lead.pdf . 30/12/04

Note that most of the water and sanitary related diseases also have a transmission mode in contaminated food so cannot be conclusively linked to drinking water or wastewater services, without full reporting of each incidence.

Table 50 – Water Borne Infections

Faecal –Oral (waterborne infections)			
	Transmission mode	**Pathogenic agent**	**MoH Notifiable**
Diarrhoeas and Dysentries			
Acute Gastroenteritis/enterobiasis	Poor Hygiene	H	✓
Amoebic dysentery	Poor Hygiene	P	×
Balantidiasis	Poor Hygiene	P	×
Campylobacter enteritis	Contaminated Water/Food	B	✓
Cholera	Contaminated Water	B	✓
Cryptosporidium	Contaminated Water/Food	P	✓
E.Coli diarrhoea	Contaminated Water/Food	B	× see note *
Giardiasis	Poor Hygiene	P	✓
Hookworm	Contaminated Soil	H	×
Legionella	Contaminated Water		✓
Rotavirus diarrhoea	Poor Hygiene	V	×
Salmonellosis	Contaminated Water/Food	B	✓
Shigellosis (Bacillary dysentery)	Contaminated Water	B	✓
VTEC/STEC Infection		B	✓
Yersinia	Contaminated Water/Food	B	✓
Enteric Fevers			
Typhoid	Contaminated Water	B	✓
Paratyphoid	Contaminated Water	B	✓
Poliomyelitis	Poor Hygiene	V	✓
Hepatitis A	Poor Hygiene	V	✓
Leptospirosis		S	✓
Ascariasis	Contaminated Soil	H	×
Trichuriasis	Contaminated Soil	H	×

B=Bacterium P=Protozoa S=Sporichaete H=Helminth V=Virus

(STEC – Shiga toxin-producing Escherichia coli)

(VTEC – Verotoxigenic Escherichia coli)

* E.coli diarrhoea is notifiable if it presents as an acute gastroenteritis or in the case of VTEC infection (in particular 0157:H7 E.coli)

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