

Kaipara District Council Infrastructure Strategy 2018-2048





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Contents

1	Executive summary1
1.1	Three Waters – water supply, stormwater and wastewater 3
1.2	Flood protection (including the Raupo District Drainage Scheme and
	29 other defined Land Drainage District Schemes)4
1.3	Roads and footpaths4
2	Proposed Regional Plan for Northland5
3	Strategic framework
3.1	Vision 5
3.2	Community outcomes
4	The Future of Kaipara: An overview of population and housing
	change6
4.1	Population growth6
4.2	Population growth distribution6
4.3	Population fluctuations7
4.4	Dwelling growth
4.5	Assumptions
4.6	Most likely scenario9
5	2018 economic overview of Kaipara district10
5.1	How fast has Kaipara district's economy grown?11
5.2	Assumptions
5.3	Most likely scenario
6	Summary of Financial Strategy14

7	The Provision of Roads and Footpaths	15
7.1	Overview	15
7.2	Assets, their age, condition and maintenance	17
7.3	Issues	24
7.4	Implications	25
7.5	Risk and hazard management	25
7.6	Options	25
7.7	Most likely scenario	29
7.8	Customer Levels of Service	31
7.9	Impact on rates	33
8	Flood Protection and Control Works	33
8.1	Overview	33
8.2	Assets, their age, condition and maintenance	34
8.3	Risk and hazard management	35
8.4	Issues, options and implications	35
8.5	Most likely scenario	39
8.6	Impact on rates	39
9	Stormwater Drainage	39
9.1	Overview	39
9.2	Assets, their age, condition and maintenance	40
9.3	Risk and hazard management	41
9.4	Issues, options and implications	42
9.5	Most likely scenario	46
9.6	Impact on rates	46
9.7	Impact by scheme	46



10	Wastewater	. 52
10.1	Overview	. 52
10.2	Assets, their age, condition and maintenance	. 52
10.3	Risk and hazard management	. 53
10.4	Issues, options and implications	. 53
10.5	Most likely scenario	. 57
10.6	Impact on rates	. 57
10.7	Impact by scheme	. 57
11	Water Supply	. 67
11.1	Overview	. 67
11.2	Assets, their age, condition and maintenance	. 67
11.3	Risk and hazard management	. 68
11.4	Issues, options and implications	. 69
11.5	Most likely scenario	. 73
11.6	Impact on rates	. 73
11.7	Impact by scheme	. 73
12	Technology and trends for infrastructure	. 84
12.1	Roading	. 84
12.2	Water	. 85
12.3	Wastewater	. 85
12.4	Stormwater	. 86
12.5	Flood protection	. 86



Infrastructure Strategy 2018/2048

1 Executive summary

Kaipara's infrastructure – its roads, water, wastewater, stormwater and flood protection – are its backbone, making it easy to live in functional and connected communities, and supporting thriving communities working together.

Infrastructure is Council's biggest spend. The funds needed to provide and keep this infrastructure working mainly come from rates: the General Rate (plus NZ Transport Agency (NZTA) subsidies) for roads, some targeted rates, development and financial contributions, and mainly targeted rates for Four Waters infrastructure (water supply, stormwater, wastewater, and land drainage). The key issues facing Council and ratepayers are:

- i. the Four Waters infrastructure has had insufficient investment historically, is getting old and in need of costly renewal (with the exception of Mangawhai wastewater which is relatively new, however will require some renewals over the life of this Strategy). Historically Council has not fully funded depreciation and therefore those reserve funds have not been building up;
- ii. the heavy traffic from forestry harvesting is damaging our roads and for the foreseeable future additional maintenance and renewals are required to respond to this;
- iii. the bridges on the roading network are reaching the end of their lives and require renewal;
- iv. customer expectations are, in some areas, above the ability of Council to provide e.g. sealing of roads and/or the standard of the unsealed low volume roads, and/or managing dust from unsealed roads;
- v. significant investment is required to extend the Mangawhai Community Wastewater Scheme (MCWWS) to complete the reticulation of the township and to accommodate growth; and
- vi. upgrades and improvements to the Mangawhai urban area infrastructure, including intersection upgrades, slow street environments, shared walkways/cycleways, and stormwater improvements are proposed as per the Mangawhai Community Plan.

Some communities may struggle on their own to afford the upgrades and/or renewal of the existing assets required to maintain current service levels.

Our strategic intent is to play our part in supporting thriving communities working together in Kaipara by:

- managing risk appropriately;
- ensuring continuity of these services to people and businesses;
- managing expenditure;



2 | Page

- meeting legislative obligations; and
- ensuring environmental quality is retained.

The strategic targets are in brief:

- i. within the 30 year timeframe of this Strategy, Council will have addressed any deficits in renewals in Four Waters infrastructure;
- ii. within one year all water supplies will demonstrate compliance with the Drinking-Water Standards for New Zealand 2005 (Revised 2008);
- iii. the Four Waters renewals programme will be based on robust asset knowledge to ensure efficient and targeted investment. The first three years will have significant condition assessments;
- iv. within six years the roads will meet all service levels set by NZTA's One Network Road Classification programme;
- v. the MCWWS will be extended to reticulate the township and to accommodate growth; and
- vi. the infrastructure projects identified in the Mangawhai Community Plan (MCP) will be implemented as budgets allow.

There are a number of factors similar in every option that is suggested and some differences. The following are included in all options:

- a) Depreciation will be fully funded by 2022, except for the NZTA portion of Roading, and for the MCWWS which will be fully funded by 2025;
- b) Response maintenance will continue as it is currently applied;
- c) Roads will continue to be mainly funded by the general rate with a targeted rate on forestry properties to fund the strengthening of unsealed roads heavily used by logging trucks and in later years for dust suppression, and possibly targeted rates for some community-initiated seal extensions, NZTA subsidy, and development and financial contributions;
- d) The current targeted rate regime for wastewater will continue i.e. a targeted rate for each scheme, based on individualised scheme defined capital costs and defined operational costs averaged across the district, with those connected paying 100% of the rate and those able to be connected paying 75% of the rate. An exception will be made for Te Kopuru where the averaging of operating costs has a negative impact that would make being connected to the scheme unaffordable;
- e) The targeted rate regime will continue for water supply and stormwater a targeted rate for each scheme, based on individualised scheme defined capital costs and defined operational costs averaged across the district;
- f) The current separate targeted rates for flood protection and control (including the Raupo District Drainage Scheme and 28 other defined land drainage schemes)
 will continue;



- g) Generally no new piping of open stormwater drains will occur except where funded by development;
- h) No extension of areas covered by each scheme has been considered with the exception of MCWWS. Capacity assessments of the schemes in possible growth areas will be undertaken over the next six years and any decision to extend a scheme will be considered on its merits and consulted with the affected communities.

Kaipara District Council (KDC) expects to spend \$774 million on new or replacement infrastructure over the next 30 years - 2018/2048. Over the same period \$962 million is expected to be spent on operational expenditure, excluding finance costs and depreciation. These figures are anticipated to be spread across the five infrastructural asset activities below:

Infrastructure Activity	Capital Expenditure (\$'000)	Operating Expenditure (\$'000)
Water Supply	61,411	96,640
Wastewater	92,293	207,451
Stormwater	77,846	59,341
Flood Protection	36,310	28,426
Roads and Footpaths	506,542	570,976
Total	\$774,402	\$962,834

1.1 Three Waters – water supply, stormwater and wastewater

The increasing renewals programme over the life of this Strategy will result in increased costs. The renewals programme will continue to be refined as and when more asset condition data becomes available over the years to defer any renewals for as long as is practical and economical.

The MCWWS will be extended to complete the reticulation of the township, and to accommodate growth. The majority of these costs will be funded via development contributions.

The option to construct a pipeline (estimated cost \$2.8 million) from the Waiatua Dam (Opanake Road) to Dargaville to improve security of supply for the Dargaville and Baylys community during moderate droughts has been included in this Strategy. Variations to the existing water take resource consents will also be required to support this initiative.



Council will undertake studies to assess the effects of the predicted climate change (particularly for lower lying areas), including a 1.0 metre sea level rise and an increase in severe weather events. This is likely to require improvements to the stormwater systems to provide the present level of service for stormwater.

The stormwater infrastructure projects identified in the MCP will be implemented as budgets allow.

1.2 Flood protection (including the Raupo District Drainage Scheme and 29 other defined Land Drainage District Schemes)

The current service levels are deemed appropriate for the full 30 years of this Strategy. The Raupo Drainage Committee will continue to set its own service levels, and Council will consequently set a targeted rate to fund the work. The service levels for the other 29 drainage areas will continue to be set in consultation with the targeted rate contributors.

These service levels may need to be reviewed over time once the studies to assess the effects of the predicted climate change, including a 1.0 metre sea level rise and an increase in severe weather events have been completed.

1.3 Roads and footpaths

Roads maintenance and renewal is already managed under direction of NZTA, through eligibility of Council to collect subsidy funding. Council's strategy for work on roads is that we generally only do work on roads where there is a subsidy available from NZTA, or funding is collected through financial and development contributions. The NZTA subsidy is currently 61%.

An increasing number of bridge assets are reaching the end of their lives and will require renewal. This will result in an increase in funding required for these bridge renewals.

There are no seal extensions programmed to be undertaken in the first three years, however budgets have been provided from Year 4 to undertake seal extensions in the higher growth area of Mangawhai and surrounds.

The roading infrastructure projects identified in the MCP will be implemented as budgets allow.

A business case to identify the preferred option to upgrade the first 10km of the unsealed portion of Pouto Road (Dargaville) that is subject to high forestry traffic volumes will be finalised to support a subsidy application to the NZTA. Otherwise the current service levels are proposed to be maintained for the 30 years.

Response to more severe weather events and the resulting damage to the network may require re-prioritising of renewal works.

The application of the One Network Road Classification system (as required by NZTA) is a relatively new initiative and may dictate some changes in the future to the way the network is operated and maintained as the initiative is refined.



2 Proposed Regional Plan for Northland

Submissions on the Proposed Regional Plan closed on 15 November 2017 and further submissions closed on 26 March 2018. Hearings are scheduled to commence in August 2018.

3 Strategic framework

3.1 Vision

The new Council Vision for Kaipara is 'Thriving communities working together'.

3.2 Community outcomes

The outcomes we wish to work with the community to achieve are:

A district with welcoming and strong communities

- Assisting and supporting community involvement
- Maintaining and improving infrastructure
- Recognising and supporting achievement

A trusted Council making good decisions for the future

- Making it simpler to work with us
- Open, transparent and engaged with communities and business
- Intent on lifting Kaipara's well-being

A district with plenty of active outdoor opportunities

- Partnering with communities to develop sports and recreation facilities
- Protecting and enhancing our natural assets and open spaces.



4 The Future of Kaipara: An overview of population and housing change

4.1 Population growth

Statistics New Zealand (SNZ) issued revised population projections on 22 February 2017, using an estimated resident population at 2013¹ as the new base.

The LTP 2015/2025 assumptions used the high growth scenario with population projections of:

- 20,000 in 2016 already exceeded by the 2013 base of 20,500;
- 21,400 in 2026 a figure now expected to be exceeded three years earlier in 2023 by even the updated low growth scenario of 22,600; and
- 22,000 in 2031 a figure now expected to be exceeded three years earlier in 2028 by even the updated low growth scenario of 22,800.

These higher projections reflect stronger than expected growth up to the 2013 Census and estimated between 2013 and 2016 with the economic recovery and strong migration. In moving to the latest 2017 projections data, a decision needs to be taken on whether to continue to use the high growth scenario or to use lower growth options. The annual average population increases under the three scenarios are:

- High population increase of 8,300 over 30 years = 276 persons per annum;
- Medium population increase of 4,700 over 30 years = 157 persons per annum; and
- Low population increase of 1,200 over 30 years = 40 persons per annum.

For comparison, the SNZ subnational population estimates going back to 1996 show that despite slower growth in the 10 years up to 2006, the district grew by an average of 315 persons per annum in the 10 years from 2006 to 2016. Even the recently updated SNZ *high* growth scenario of 276 persons per annum is below the average of 315 persons per annum seen from 2006 to 2016. If one assumes some moderation of the 2006/2016 highs due to the cyclic nature of economic development and growth, then use of the updated *high* growth scenario is reasonable. This is supported by the increasing influence of Auckland over time, particularly in the southern part of the district, which should see sustained population growth over time.

4.2 Population growth distribution

It is expected that most population growth will continue to occur in the eastern part of the district. The SNZ revised population *projections (high series)* issued on 22 February 2017, give resident population projections down to Census Area Unit (CAU) level using the 2013 base.

¹ This estimate differs from the usually resident (UR) population of the district of 18,963 published in the 2013 Census results but because the 22 February 2017 release data with 20,500 usual residents represents the latest calculations by Statistics New Zealand, it is used for the purposes of the LTP 2018/2028 assumptions.



The table shows shares of district growth over various time periods. With reference to the LTP timeframe 2018/2028, it shows:

- Dargaville taking 10.7% of district population growth, growing by 310 persons to reach a population of 5,330 by 2028;
- a 76.2% share of district population growth (2,210 persons) occurring in the southern half of the district with rural Rehia-Oneriri (31.0%) and the combined Mangawhai CAUs (40%) taking the bulk of that growth;
- relatively low shares of growth in the smaller urban CAUs of Ruawai (0.3%), Kaiwaka (2.8%) and Maungaturoto (2.1%) totalling just 150 persons; and
- continued low shares of district growth (14.5%) in the north and northwest, totalling 420 persons.

4.3 **Population fluctuations**

The LTP 2015/2025 assumption, using occupied to unoccupied dwelling data from the Census, was that a significant proportion of unoccupied dwellings in the district become occupied during holiday periods. The data used in the LTP 2015/2025 was from the 2006 Census. Data is now available for the 2013 Census and the assumption can be updated with the new data. At the time of the 2013 Census an average 26% of dwellings (2,764 of 10,681) were unoccupied with highs of 63% and 35% unoccupied dwellings in the two Mangawhai CAUs (an average of 52.7%). Rates of unoccupied dwellings in Te Kopuru (10.6%), Maungaru (6.5%), Dargaville (7.2%), Maungaturoto (10.0%), Ruawai (11.4%) and Kaiwaka (13.3%) are lower and likely reflect normal rates of vacant dwellings, at any given time of the year; those under renovation, awaiting new owners or tenants etcetera. It is not expected that these areas will have any significant numbers of vacant holiday homes that fill and add to population in holiday periods. By contrast, Kaipara Coastal (27.3%), Rehia-Oneriri (24.8%) and Mangawhai (52.7%) have significantly higher vacancy rates and are likely to see population fluctuations as vacant homes are occupied in holiday periods. In an effort to estimate the scale of population fluctuation:

- assume occupancy of up to 100% of dwellings in Kaipara Coastal, Rehia-Oneriri and Mangawhai during holiday periods;
- for normally unoccupied dwellings in these areas, assume occupancy of 0.5 persons per dwelling above the 2013 average occupancy in Kaipara Coastal, Rehia-Oneriri and Mangawhai during holiday periods to take account of families with children and guests, which are likely to result in higher average occupancy than normally occupied dwellings; and
- assume no change in dwelling occupancy in Maungaru, Dargaville, Te Kopuru, Ruawai, Maungaturoto and Kaiwaka during holiday periods.

Using the 2013 base data, the usually resident district population of 20,600:

- could have risen during holiday peak times by over 7,000 persons (7,111) to 27,600, an increase of 35%; and
- just under half of that increase was in Mangawhai, gaining 3,400 persons at peak, an increase of 131%.



4.4 Dwelling growth

The assumption is for steady to strong dwelling growth in LTP decade 2018/2028 moderating in the 2028/2038 decade as population growth rates begin to slow with an aging population. Projections indicate:

- nearly 2,000 (1,912) additional dwellings built in the district over the LTP 2018/2028 period; and
- another 1,400 built between 2028 and 2038.

The largest amounts of dwelling growth will be in the Mangawhai CAUs with over 1,000 dwellings delivered in the 2018/2028 period and another 900 dwellings by 2038. Rehia-Oneriri CAU, covering much of the southern part of the district is expected to see ongoing strong growth (450 dwellings in the LTP decade 2018/2028 and over 300 more dwellings out to 2038). Dargaville is expected to gain 130 dwellings over the LTP period and 70 more homes built in the following decade to meet a modest growth in population.

4.5 Assumptions

The assumption is that population growth will be in line with Statistics New Zealand's 2013 base high series projections which will see population increases of:

- 2,900 (12.5%) from 23,100 to 26,000 between 2018 and 2028; and
- 2,000 (7.7%) from 26,000 to 28,000 between 2028 and 2038.

The SNZ projections show the population growth rate slowing in all regions, cities, districts of New Zealand, including Kaipara district, between 2018 and 2038 because:

- all areas will be home to more people aged 65 years and over by 2038; and
- deaths will increase relative to births in almost all areas as the population ages.

The assumption is that between 2018 and 2028, most population growth will continue to occur in the southern part of the district with rural Rehia-Oneriri CAU growing by 900 people and Mangawhai growing by 1,160 people to reach a population close to 5,000. The smaller urban CAU in the south, Ruawai, Kaiwaka and Maungaturoto, will grow by a combined 150 persons although there will be considerable growth in the rural area around them. Dargaville will grow quite strongly by 310 people to reach a population of 5,330 by 2028. There will be a continued low share of district growth (just 14.5%) in the north and northwest, totalling 420 persons.

The population of Kaipara district is known to fluctuate significantly during the year. Assumptions are that:

- the resident district population of 23,100 persons in 2018 could increase by around 5,600 persons during peak holiday periods to almost 30,000;
- the resident district population of 26,000 persons in 2028 could increase by over 7,000 persons during peak holiday periods to over 33,000; and
- as Mangawhai grows from a usual resident population of around 3,700 in 2018 to around 4,890 in 2028, its population could fluctuate to 7,700 in 2018 (an increase of around 4,000 at peak) and just over 10,000 in 2028 (an increase of over 5,000 at peak).



4.6 Most likely scenario

The following table shows shares of district growth over various time periods. With reference to the LTP timeframe 2018/2028, it shows:

- Dargaville taking 10.7% of district population growth, growing by 310 persons to reach a population of 5,330 by 2028;
- a 76.2% share of district population (2,210 persons) occurring in the southern half of the district with rural Rehia-Oneriri (31.0%) and the combined Mangawhai CAUs (40%) taking the bulk of that growth:
- relatively low shares of growth in the smaller urban CAUs of Ruawai (0.3%), Kaiwaka (2.8%) and Maungaturoto (2.1%) totalling just 150 persons; and
- continued low shares of district growth (14.5%) in the north and northwest, totalling 420 persons.

Projected population of terr	ritorial authority areas													
2013(base)-2043 update														
Territorial authority area ⁽¹⁾	Projection ⁽²⁾	Population at 30 June							Population change 2013-43	Population change 2018-28	Population change 2028-38	Percentage share of District growth 2013-43	Percentage share of District growth 2018-28	Percentage share of District growth 2028-38
		2013 (3)	2018	2023	2028	2033	2038	2043	Number 2013-43					
Kaipara district	High	20,500	23,100	24,600	26,000	27,100	28,000	28,800	8,300	2900	2000			
High growth projections by CAU														
504400 Te Kopuru		510	540	560	580	590	610	620	110	40	30	1.3%	1.4%	1.5%
504501 Kaipara Coastal		3190	3370	3470	3560	3610	3610	3570	380	190	50	4.6%	6.6%	2.5%
504502 Maungaru		1820	1950	2050	2140	2220	2280	2310	490	190	140	5.9%	6.6%	7.0%
504600 Dargaville		4610	5020	5180	5330	5440	5500	5530	920	310	170	11.1%	10.7%	8.5%
504700 Maungaturoto		810	920	950	980	1000	1010	1030	220	60	30	2.7%	2.1%	1.5%
504800 Ruawai		470	490	490	500	510	530	540	70	10	30	0.8%	0.3%	1.5%
504900 Kaiwaka		640	700	740	780	830	860	900	260	80	80	3.1%	2.8%	4.0%
505010 Rehia-Oneriri		5840	6510	6980	7410	7770	8060	8310	2,470	900	650	29.8%	31.0%	32.5%
505021 Mangawhai		1430	2060	2400	2710	2990	3240	3460	2,030	650	530	24.5%	22.4%	26.5%
505022 Mangawhai Heads		1170	1670	1930	2180	2400	2580	2750	1,580	510	400	19.0%	17.6%	20.0%
615302 Inlet-Mangawhai Harbour		0	0	0	0	0	0	0	0	0	0	0.0%	0.0%	0.0%
Mangawhai combined CAUs	2,415	2,600	3,730	4,330	4,890	5,390	5,820	6,210	3,610	1,160	930	43.5%	40.0%	46.5%



10 | Page

5 2018 economic overview of Kaipara district

Kaipara's economic expansion continued through winter 2018. Infometrics' provisional estimate of GDP showed growth of 2.9% over the September (2017) year. Although this growth rate was down from 4.8% a year ago, it was still above the 2.5% rate of growth experienced nationally over the past year. Traffic flows in Kaipara were up 5.2% in the September year.

Kaipara is currently experiencing rapid population growth. Population estimates from Statistics New Zealand show that Kaipara's population grew by 3.7% over the June 2018 year, following 2.8% growth the previous year. By comparison, population growth nationally has been 2.1% over each of the past two years.

This increase in population has pushed up demand for housing but there are some signs that housing market activity is moderating. House price growth has eased from 22% per annum to 15% per annum, while there were 33% fewer sales over the September year compared to the previous year. A key risk for Kaipara's housing market in 2018 will be a cooling Auckland market. Lower house prices in Auckland reduce the incentives for Aucklanders to search for housing in neighbouring districts around the fringes of the city.

However any downside risks to housing must be balanced against a buoyant business outlook. Non-residential building consents climbed 30% in the September year, while commercial vehicle registrations increased 33%.

Consumer spending is also growing strongly. Data from Marketview shows that electronic card spending on retail purchases was up 7.5% over the September year. Car registrations rose 15% to a record level.

Dairy prices have eased slightly over recent months, but remain ahead of last season. Using a farmgate milk price of \$6.50/kgms, the total dairy payout in the 2017/2018 season would equate to \$212 million, up from \$200 million in the season ended May when the price was \$6.12/kgms.

Other commodity prices have also risen over recent months. Global prices for horticulture products increased 2.6% in September month. Forestry prices remain solid, lifting 0.5% in September; their twelfth month of consecutive rises.



11 | Page

* Annual percentage change (latest quarter compared to a year earlier)

Indicator	Kaipara District	Northland Region	New Zealand
Annual average % change			
Gross domestic product	2.9%	3.2%	2.5%
Traffic flow	5.2%	4.8%	2.3%
Residential consents	-2.0%	15%	3.0%
Non-residential consents	30%	68%	5.9%
House prices*	15%	12%	3.1%
House sales	-33%	-19%	-17%
Guest nights	-9.9%	4.5%	2.6%
Retail trade	7.5%	6.5%	3.8%
Car registrations	15%	11%	9.4%
Commercial vehicle registrations	33%	21%	. 19%
Jobseeker Support recipients	0.5%	1.4%	0.6%
Tourism expenditure	12%	9.5%	6.4%
Level			

5.1 How fast has Kaipara district's economy grown?

This section measures economic performance in Kaipara district during the year to June 2017 and previous years. All GDP estimates are measured in constant 2010 prices.

- GDP in Kaipara district was up 2.7% for the year to September 2017. Growth was behind Northland at 3.3% and New Zealand at 3.6%;
- GDP was \$737 million in Kaipara district for the year to September 2017;





Which broad industries made the largest contribution to economic growth?

- Agriculture, forestry and fishing made the largest contribution to overall growth in Kaipara district between 2015 and 2017 with the industry growing by 4.0% over the year;
- The next largest contributor was manufacturing followed closely by construction.

In which industries does Kaipara district have a comparative advantage?

• The industries in which Kaipara district has the largest comparative advantages are dairy cattle farming (location quotient = 6.5), horticulture and fruit growing (6.3), and forestry and logging (5.4).



Which are the largest employing industries in Kaipara district?

- Among broad industries agriculture, forestry and fishing was the largest in Kaipara district in 2017 accounting for 29.3% of total;
- The second largest was manufacturing (10.9%) followed by construction (10.1%);
- Agriculture, forestry and fishing was the largest industry in Kaipara district in 2017 employing 2,527 persons and accounting for 29.3% of total employment in the district. By contrast this industry accounted for 6.2% of total employment in New Zealand; and
- The second largest employing industries were manufacturing followed by construction.

Which industries have created the most jobs?

- Agriculture, forestry and fishing made the largest contribution to employment growth in Kaipara district between 2015 and 2017 with the industry;
- The next largest contributor was administrative and support services followed by professional, scientific and technical services;
- The largest detractor from growth over the year was accommodation and food services in which employment declined;
- Vegetable growing (outdoors) was the largest creator of jobs in Kaipara district between 2015 and 2017;
- This was followed by labour supply services;
- Cafes and restaurants were the largest detractor of jobs in Kaipara district between 2015 and 2017; and
- This was followed by nursery production (outdoors).

(Source: Infometrics).

5.2 Assumptions

When planning for infrastructure over the next 30 years, Council has made the assumptions that:

- Kaipara's economy will continue to remain securely founded on its primary industries supported by the manufacturing and building sectors; and
- Large-scale land use change is not anticipated in the district over the next 30 years, excepting that the east of the district is anticipated to experience an expansion in rural-residential living (lifestyle blocks).

5.3 Most likely scenario

Kaipara's economy will continue to remain securely founded on its primary industries, supported by the manufacturing and building sectors.



Large-scale land use patterns in the district are expected to remain the same over the next 30 years. An exception to this is the anticipated expansion of rural/residential, lifestyle block, living in eastern parts of the district.

The greatest current limitations on industry in Kaipara are limitations in transport networks and water supply, generation/security of electricity supply and digital infrastructure (ultra-fast broadband). Of these Council has direct responsibility for the local roading network (excludes State Highways) and water supply.

6 Summary of Financial Strategy

The Financial Strategy 2018/2028 remains a simple one. We will run a balanced budget. We will treat the district more equitably. We will have a sustainable plan.

Key points of the new Financial Strategy are set out below.

- A balanced budget is maintained²;
- An unchanged rating structure;
- Operating expenditure is projected to be \$523 million and Capital expenditure is \$227 million for the 10 years to 2028. Funding of this expenditure is primarily through rates, user charges and NZTA subsidies;
- Rates will increase around 4.97% over the rates set in 2017/2018 to ensure that we deliver a sustainable and balanced budget for 2018/2019. The rates³ will move from approximately \$29.4 million in 2017/2018 to \$31.2 million for 2018/2019;
- Rates increases averaging approximately 3.42% per annum over the life of the Plan will generate sufficient income to manage ongoing renewals, make progress on catch-up renewals and begin funding reserves;
- Capital costs (reflecting the capital works and remaining debt) for each scheme will be combined with the operational costs, which are being allocated uniformly across all schemes to calculate the targeted rate payable in each community for wastewater. Stormwater and water operating costs are averaged across the district to which capital costs from each scheme are added;
- Lump sum contributions to fund the capital cost of the MCWWS system and reduce debt continue; projected income from development contributions will fund expenditure required to meet growth;
- Debt requirements⁴ is projected to trend downwards to \$38.7 million by 2027/2028 at the end of the 10 years covered by the Plan.

² i.e. operational revenue funds operational expenses (before depreciation) except for a portion of interest attributable to future development. In addition, desludging costs for cleaning out wastewater ponds are loan funded rather than rates funded to avoid spikes in rates.

³ Excluding rates for water and penalties.

⁴ Projected debt plus increasing capacity to fund reserve expenditure.



Council has allocated \$20.05 million, of which the significant majority will be funded by development contributions, over the next 10 years to upgrade and extend the MCWWS. This is part of a 27 year, \$35 million programme to extend the overall connectable area of the MCWWS funded through debt and mostly recoverable from Development Contributions. Council is working under the assumption that growth will continue at Mangawhai.

There is a risk that there could be a significant downturn in growth (generally aligned with a downturn in the economy) resulting in Council being exposed to higher debt as a result of extending the scheme, and with little or no income from Development Contributions. The investment is staged and therefore provides Council the flexibility to manage this risk by deferring expenditure at any stage if required in the event of a significant reduction in growth.

7 The Provision of Roads and Footpaths

7.1 Overview

The 2018 Government Policy Statement on Land Transport (GPS) has three objectives for the country's roads: *economic growth and productivity, road safety and value for money.* The new Government is likely to change some of the priorities within the draft 2018 GPS. However, it is likely that the three strategic themes will remain. These GPS strategic priorities are at the heart of the Infrastructure Strategy as they align with Kaipara's own priorities. To align with these objectives KDC aims to manage its roading network to ensure people and goods can move safely and efficiently around the district by a variety of means. The NZTA has introduced a new one network road classification (ONRC) system that is intended to become the funding mechanism base to ensure that funding is equitably distributed across New Zealand mainly based on traffic volumes and usage.

Some of the issues facing Kaipara's roading infrastructure include:

- small population, sometimes isolated, rural nature of much of the district;
- high percentage of access and access low volume roads (79% or 1,247km);
- difficult topography and unstable geology combined with regular high intensity rainfall events;
- scarcity and high costs of roading materials, typically aggregates; and
- locally sourced aggregates are less durable than elsewhere in the country.

The total weight of freight generated in Kaipara district is estimated at 1.04 million tonnes per annum (Source: Morrison Low Roading Differentials Report May 2012).

The following figure shows how the different industries in Kaipara contribute to this total.





(Source: Morrison Low Roading differentials report May 2012)

Road maintenance requirements are likely to increase as Northland's forestry volumes are predicted to increase. Northland has 202,286 ha (as at 2007) of exotic forest, making it the second largest forestry estate in the North Island, and 11.3% of the national total. Forecasts indicate that the availability of radiata pine from Northland forests will increase over the next 10 years (Source: Northland Forest Industry and Wood Availability Forecasts 2009; Regional Economic Activity Report). It is also expected that there will be more trucks travelling to Northport, as the port's freight handling increases. While these trends will help boost Northland's economy, growing truck movements will put additional pressure on Kaipara roads.

Forestry harvesting volumes over the next 25 years are expected to be 75% above the 2010 planted forest areas in Northland. Most of the new plantings will not be ready for harvest until 2035 onward, so the more major effects on the roading network for the increased truck movements will not start to be realised until 2035. In the shorter term the harvest volumes are set to increase over the next few years ideally catered for by strengthening of approximately 90km of Kaipara's roading network (2km of sealed and 88km of unsealed). Any strengthening work would be in addition to Council's normally managed programme. The forecast budgets have allowed for the additional works required to be undertaken as a result of the increased truck movements. A forestry targeted rate is levied to fund these additional works but does not include an allowance for any dust suppression.

16 | Page



7.2 Assets, their age, condition and maintenance

The Kaipara district has a large roading network spanning 1,573km. Of this network, 28% (448km) are sealed and 72% (1,125km) are unsealed. This roading infrastructure includes 348 bridges, 1,184 streetlights, 91km of footpaths and more than 6,600 road traffic signs.

- In the last seven years Council has significantly strengthened unsealed and sealed pavements more is needed;
- Roads formed in 1960s and before are of low quality and where they now experience increases in traffic levels (especially heavy vehicles) are in need of rehabilitation and sometimes reconstruction especially in regard to pavement depth;
- Some bridge approaches would be more cost-effective if sealed rather than continued maintenance;
- Kaipara has difficult geology and climate. Rolling hills, patches of Onerahi Chaos and variable densities of clay, with heavy rainfall events and contrasting droughts, causes unpredictable subsidence and slumping;
- Changes in traffic volumes have occurred and will continue with more heavy vehicles, heavier heavy vehicles, and more commuters; and
- Forestry harvesting is expected to impact on roads in the district in the next 25 years. These roads represent both sealed and unsealed roads on the network.

The life of roads and footpaths assets varies considerably by use and component. With the exception of bridges, renewal, replacement and repair of road assets are not based on asset age but on:

- available budgets;
- traffic volumes and use;
- asset condition rating and surveys;
- treatment selection analysis and validation, including skid resistance;
- engineering and Contractor inspections and customer feedback;
- historical achievement records;
- falling weight deflectometer testing and selected test pit analysis for assessing bearing capacity; and
- NZTA standards that affect funding criteria.

For bridges, components are assessed by all the factors above plus age.

The total projected budget expenditure on roading for 2018/2048 is \$1.1 billion. Of this, \$571 million is operating (maintenance) and \$507 million is capital (renewal, improving the level of service, and growth). \$49 million is included in the budget for sealed road pavement rehabilitation between 2018 and 2048. This involves modifying the pavement to restore its life by adding new aggregate and strengthening with lime or cement, then re-sealing. Forestry targeted rates of \$397,800 per year are included to enable Council to deal with the impact of forestry and logging trucks on roads.

7.2.1 Unsealed roads

Kaipara has over 1,125km of unsealed roads; 72% of the network. Council has limited ability to extend seal and therefore unsealed roads will continue to be the norm for the foreseeable future. The condition of the unsealed network is mixed. For delivering planned service levels, the age of the road is not particularly relevant. Other factors are of more importance including depth and quality of the basecourse and effectiveness of drainage facilities. The cost of maintaining unsealed roads (\$2,120/km) is on average 60% of the cost of maintaining sealed roads (\$3,500/km).

With the implementation of the new maintenance and renewals contract (2018/2019 financial year), the maintenance of the network will be based on value for money over the whole life of the asset. This is a change in philosophy for managing the unsealed network, in keeping with the ONRC levels and being more pro-active in priority decision-making.

The levels of service Council delivers for unsealed roads is the biggest area of complaint and concern for the people of Kaipara. The major challenges we deal with are:

- Carriageway width 520km or 46% of unsealed roads are under the standard for width for their traffic volumes;
- Crossfall (camber) there is a need to provide sufficient crossfall (6-8%) to allow drainage of the road surface. The level of corrugations on roads, caused by loss of fine clay particles that bind the basecourse, and the flattening of the road from traffic overtime, compromise crossfall. Regular grading and heavy metalling corrects this where there is sufficient aggregate available. Currently, crossfalls are typically 4-5% i.e. substandard;
- Forestry roads many forestry plantations are serviced by unsealed roads with narrow widths and thin pavements. During harvesting when there are high volumes of heavy vehicles, the damage caused can be so high complete reconstruction of the route is required;
- Urbanisation of rural land with the increase of residential and lifestyle subdivisions, this is accompanied by a demand to seal associated roads because of dust nuisance. Council collects development contributions and financial contributions for this purpose to seal roads with higher traffic flows. There is unlikely to be any NZTA subsidy funding available for seal extensions. Over the next three to four years, it is expected that sufficient contributions from developers will be collected to extend the seal on sections of prioritised roads in Mangawhai and surrounds.



 Pavement depths – the unsealed network has varied and often marginal pavement depth. This makes them vulnerable to damage from heavy vehicles and heavy rain. In recent years, a focus has been on pavement rehabilitation. This programme will continue. It will not address the forestry traffic increases expected for the next six years. Gravel loss remains higher than replenishment levels and Council is looking to implement maintenance techniques that reduce gravel loss and an increased gravel replacement programme (heavy metalling). This will also start to address the backlog but will take many years to catch up.

Council has an unsealed roads strategy that directs work to:

- Investigate practical ways of reducing metal loss e.g.
 - o use alternate practices to stabilise and compact metal such as the use of rollers; and
 - o trial alternate products;
- Work with forestry to programme harvesting during the dry season (late summer) as road damage is far less when the road is dry (although dry conditions increases dust nuisance);
- Use best performing and lowest cost soil-aggregate mixture;
- Increase knowledge of depth, make-up and strength characteristics of high volume roads throughout the network;
- Develop knowledge of the availability and characteristics of different materials from quarries within the district and maintain this in a register;
- Increase knowledge of road performance, especially <u>actual</u> metal loss prioritising forestry routes;
- Improve stormwater management:
 - maintain crossfall at 6-8%;
 - o improve drainage facilities to contain water below road surface, and effectively drain the sub-base; and
 - o keep culverts clear at all times.
- Improve the management of roadside vegetation to:
 - maintain good visibility;
 - keep drainage facilities clear; and
 - prevent pavement damage from roots.
 - Have a programme for managing forestry impacts:
 - collect \$397,800 per year (to be adjusted annually for escalation) funding from Forestry properties for strengthening forestry-impacted roads, and possibly dust suppression in the latter years.



7.2.2 Sealed roads

There is currently a total of 448km of sealed network. Most of this (99%) is surfaced in chip seal with the remaining surfacing being asphaltic concrete and concrete. It consists of two components: the pavement layers and the surfacing. This asset carries the bulk of the heavy vehicle volume. It is an all-weather surface and not as sensitive to loading issues. Traffic travels at higher speeds on a sealed road so safety concerns are of increased interest. The lifecycle of seal surfaces varies from 14 years for a two-coat seal with lighter volumes, to two years for a single chip first seal coat on high volume roads, with an average across Kaipara's network of 11 years. The programme of reseals is currently a life of 16 years with 60km programmed to be completed each year over the next three years, and then back to 30km per year. This doubling of the reseal programme reduces the cost for more expensive repairs. The backlog will be addressed by 2021.

Pavement age of the network



Recent analysis of pavement data after completion of the forward works programme has suggested pavements are achieving average lives of around 50 years. Adopting an average pavement age of 50 years and applying this to the KDC sealed road network requires 4km or 0.8% of sealed roads to be renewed annually.

Three indexes are used to measure condition on an annual basis:

- smoothness by distance travelled;
- pavement integrity weaknesses from faults, rutting and shoving; and
- condition assessment of faults, cracking, ravelling, potholes and patches, flushing.



Our pavement integrity measures lower than our neighbouring authorities. Our smoothness measure is more similar to our neighbours but half the national average. The rehabilitation and reseal programme addresses these issues over time.

Road development over the next 10 years will be driven by the need to increase carriageway widths on some rural primary and secondary collector roads because of the use of these roads by heavy vehicles, roads providing detours when the State Highways are closed, and increased private development (mainly in and around Mangawhai).

Road widths – there are deficiencies compared to Kaipara's Engineering Standards affecting 17% of sealed roads. This is partially addressed through the annual pavement rehabilitation and reseals programme and NZTA subsidies are available for the work.

Resilience – there are no additional criteria used by NZTA to provide greater road resilience of key routes. The use of Kaipara roads as detours for the State Highways causes wear and tear over and above normal use. No additional NZTA subsidies are available to strengthen these roads to stop the damage from use as detours.

Bridges, culverts and structures

There are 348 bridges (over 3.4m of waterway) and bridge culverts (under 3.4m of waterway) in Kaipara. Most of these are short structures. Over time, many of these will be replaced by culverts, depending on water flow data. Climate change also needs to be taken into account given the long intended life of these assets (the design life is 100 years). Earlier bridges were constructed out of material that means they have shorter lives. Pre-1940 structures will be replaced over the next 10-15 years. Culverts are younger with a greater remaining useful life.

There are five bridges with weight restrictions. None of these are in high volume roads. 20% of bridges are inspected each year. The latest condition rating categorised the majority of bridges and culverts in average to good condition.

The following condition rating split has been determined for all KDC bridges inspected in the last two years.





Due to the increased pressure on drainage systems due to adverse weather events, we will progressively increase the minimum sizes of our culverts to be 450mm diameter. This will allow for easier through flow and reduce ponding and saturation of the pavement layers.

The emphasis for the next period will be on improving asset knowledge of bridges and culverts, while addressing known maintenance and renewal requirements to strengthen bridges where heavy traffic use occurs, replace older bridges built prior to 1940 with either new bridges or culverts as appropriate.

A budget of \$19.6 million is included for this bridge replacement work. This is in addition to \$7.5 million for maintenance and \$22.5 million for renewals.

7.2.3 Drainage facilities

There is a total length of 131,625m of culverts (not associated with bridges), and 1,837km of surface water channels within the district. Drainage facilities that drain the road pavement are considered to form part of the roading asset. A recent review of the condition of drainage facilities has assessed most as performing well. However, there are some causing problems. Heavy rainfall events have also highlighted some weaknesses in road drainage, hence the gradual planned increase in minimum size of the culverts.

Drainage facilities are usually installed as part of road construction. Those constructed from concrete are very durable. There is no cause to renew these assets as they have an expected life up to 80 years. They are replaced during reconstruction of the pavement.

Maintenance is very important for drainage facilities. If they are functioning well, the road lasts longer and require less maintenance. Kerb and channel drains are cleaned twice-yearly. Sumps are cleaned annually. Culverts are cleaned as response maintenance after inspections or as assessed by the Contractor or Client Representative. The Contractor has key performance indicators (KPIs) in the contract stating service levels.

There is \$19.5 million budgeted for routine drainage maintenance and \$12.2 million for renewals.

7.2.4 Guardrails and sight rails

Guardrails are erected at the edge of some roads to protect vehicles from hazards. There are over 12,500m of such rails in Kaipara. Many are on bridges and managed as part of that programme. Sight rails generally last indefinitely and replacement tends to only be needed after accidents.

7.2.5 Streetlighting

Council owns 1,184 road-related streetlights. Streetlight fittings have a standard life of 15 years and most streetlight poles have a life of 40 years. All maintenance is response maintenance. The future initiative is to continue with the LED replacement of all of the current luminaries. This is an initiative that is supported by NZTA at



a higher than normal FAR (85%) and the aim is to have this completed by the end of 2018 and then reap the benefits of less power consumption costs, as well as associated reduced streetlight maintenance costs.

7.2.6 Signs and roadmarking, raised pavement markers and edge marker posts

There are:

- 1,064 street and information signs;
- 3,889 permanent warning of hazards signs;
- 2,101 signs to communicate regulations; and
- 1,319 miscellaneous signs.

The life of signs is averaged at 15 years. However, theft, vandalism and accidents can reduce this life. Signs are replaced as they deteriorate as identified by regular inspections or as they are damaged or removed. The current sign stock is relatively new.

There are 6,687 signs on roads in Kaipara. This includes roadmarking (499km), intersection controls (392), and parking controls (108). These markers other than roadmarking are condition assessed annually and maintained/renewed as required. The roadmarking is replaced annually.

7.2.7 Vegetation control

The vegetation standard is no lower than 4.5m above the road surface and no closer than 1.5m from the pavement edge. Weed spraying, trimming and mowing is required to meet this standard in current contracts.

7.2.8 Carparks and service lanes

There are 14 carparks (total area of 21,098m²) and 23 service lanes (7.55km) in Kaipara. Condition assessment and renewals are planned alongside the sealed network.

7.2.9 Retaining walls

There are 188 retaining walls in Kaipara (this may not be a complete list). Condition information has only just begun to be collected. Most walls are built as emergency responses to slips and slumps and are therefore not planned works.



24 | Page

7.2.10 Footpaths and walkways

There are about 91km of footpaths in the district. Most are in the township of Dargaville (44km) with an increasing length in Mangawhai (22km). Condition rating is done every five years. Renewals are therefore planned for five year blocks, where only those rated "poor" or "very poor" are addressed. A new condition rating is needed to confirm the next five year programme. Most new footpaths are developed as part of new subdivisions with an average length of 1.5km a year.

NZTA subsidies are not available for footpaths. Council includes an allowance of \$2.5 million to extend footpaths and \$6.6 million for maintenance and renewals.

7.3 Issues

Our roading network was built in times of considerably lower traffic volumes and lighter commercial vehicles. Increasing repairs are needed as vehicle volumes increase and heavy vehicles get heavier. The cost of many of the materials needed to repair, maintain or improve roads, (like bitumen), have increased by 150% (*Source*: NZTA Bitumen Cost Adjustment Series) over the last 10 years; so affordability is a key issue, to maintain or increase the standard of our roads. Dust levels on unsealed roads in summer is exacerbated by intense logging truck activity. NZTA will pay 61% of the costs for road repairs and upgrades in Kaipara, through the NZTA Funding Assistance Rates (FARs) if the requests have been approved by NZTA and the development of business cases for the additional requests have been made.

The state of the national State Highway network combined with the increased incidence of intense rainfall weather systems and accidents, adversely impacts the Council roads by forcing the diversion of State Highway traffic volumes onto the Council network. As Council roads are not designed to deal with the extra traffic, the lifespan of the roads is lessened and more maintenance is needed, which has cost implications for Council.

Forestry growth in Kaipara would ideally be accompanied by those roads used by logging trucks being strengthened. Those roads are not designed to carry such heavy loads over such intensive (harvesting) periods. (Source: MWH, Forestry Roads: Kaipara District Council Forestry Routes Submission, 2014). If strengthening is not done, those roads will deteriorate faster than they are designed to. The main years of concern are 2015/2021. To respond to this Council is including \$5.5 million over the next three remaining years to strengthen the roads identified as being used by forestry harvesting. This will enable Council to maintain current service levels.

Road width data taken from RAMM (NZTA Road Assessment and Maintenance Management Manual) shows there are deficiencies where the carriageway width does not meet the desired width in Kaipara's Engineering Standards. The width deficiencies are triggered by increased traffic volumes and truck sizes.

As the population increases (mainly in the east) with people shifting to Kaipara from urban areas with higher levels of service, the demand for seal extensions and dust suppression increases. Currently, KDC cannot respond to these demands. Customer satisfaction with roads and footpaths is generally low, particularly on the unsealed network.

7.4 Implications

Roading is funded by the following; general rate, NZTA subsidies, targeted rates, and development and financial contributions (paid when land is subdivided or developed) that help pay for growth in road capacity.

The level of funding received from all these sources is only sufficient to maintain roads at current levels and only have a minimal response to the wear and tear from forestry traffic. Service levels for roads will therefore be impacted; even maintaining current standards will require increased rates, while any ratepayer funded increase in the proportion of sealed roads would require substantially greater rates increase. Affordability of infrastructure management is the biggest issue faced by this district.

The latest funding application to NZTA (for the 2018/2021 period) is requesting additional funding with the appropriate evidence, however this is only a request at this point in time and approval is still to be obtained by mid-2018.

7.5 Risk and hazard management

The biggest risk to roads is flooding events and other impacts from heavy rain. Secondly, there is the risk of asset failure typically from ground conditions (slips and slumps) and asset condition (bridges mainly). There is a dedicated budget of \$28.5 million for preventative works so that these events do not cause as much damage. However, it is often this budget that is used for dealing with the consequences of such events. For anything over and above this amount, addressing the damage from unplanned events can mean deferring other maintenance and renewal work. Addressing failures because of asset condition is being addressed by improved knowledge of our assets and surrounding conditions with better targeted maintenance and renewals.

Climate change will increase the frequency of floods and heavy rain, and flooding of low-lying roads by waterways. The impact of this is not expected to be severe in the first 10 years but may affect roads beyond that.

7.6 Options

Option 1 – status quo

To manage Kaipara's road network:

• Plan to rehabilitate roads in areas of high or increasing use and at most risk of severe deterioration as funding allows.

To manage road width deficiencies triggered by increased traffic volumes:

• Identify roads with width deficiencies and address them as sealed road rehabilitation or unsealed pavement strengthening projects as funding allows.

To manage low volume roads:

• Identify low volume roads where maintenance could be reduced or possibly stopped.



Option 2 – status quo plus strengthening roads used by a high volume of logging trucks

To manage the impact of forestry on the roading network:

- Identify routes where logging trucks will operate, and importantly when, and undertake strengthening work on a 'just in time' basis; and
- Council has submitted a request to NZTA for additional funding as part of the Asset Management Plan (AMP) submission, to help meet the cost of the additional renewals needed as a result of forestry activity (NZTA is promoting a 'one network' approach to the management of forestry routes throughout Northland).

Option 3 - increase service levels on the unsealed network towards delivering to customer feedback on

- Comfort of driving on unsealed roads (corrugation, potholes); and
- Dust reduction.





Prospective Infrastructure Strategy Costs - The Provision of Roads and Footpaths - adjusted for inflation

						Total						Total
For the year ended:	Budget											
30 June	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2018-2023	2023-2024	2024-2025	2025-2026	2026-2027	2027-2028	2023-2028
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Operating expenditure												
Total operating expenditure	12,318	12,907	13,222	13,462	13,802	65,712	14,160	14,526	14,929	15,343	15,817	74,775
Capital expenditure												
Capital Expenditure - Growth	2,274	201	309	1,304	1,329	5,417	1,358	1,401	1,428	1,467	1,518	7,173
Capital Expenditure - LoS	2,930	3,282	3,669	3,470	3,162	16,513	3,581	3,683	3,765	3,867	3,990	18,886
Capital Expenditure - Renewal	8,343	8,245	9,149	8,076	8,198	42,010	8,226	8,392	8,592	8,824	9,091	43,127
Total capital expenditure	13.547	11.727	13.126	12.850	12.690	63.940	13.165	13.477	13,786	14.159	14.598	69.186
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Total expenditure	25,865	24,634	26,349	26,311	26,492	129,652	27,325	28,004	28,715	29,501	30,416	143,961

	Total						
For the year ended:	Budget						
30 June	2018-2023	2023-2028	2028-2033	2033-2038	2038-2043	2043-2048	2018-2048
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Operating expenditure							
Total operating expenditure	65,712	74,775	86,669	99,331	113,831	130,658	570,976
Capital expenditure							
Capital Expenditure - Growth	5,417	7,173	278	319	366	420	13,972
Capital Expenditure - LoS	16,513	18,886	524	602	691	794	38,011
Capital Expenditure - Renewal	42,010	43,127	74,192	85,177	97,788	112,267	454,560
Total capital expenditure	63,940	69,186	74,994	86,097	98,845	113,480	506,542
Total expenditure	129,652	143,961	161,663	185,429	212,676	244,138	1,077,518



Prospective Infrastructure Strategy Costs - The Provision of Roads and Footpaths - excluding adjustment for inflation

						Total						Total
For the year ended:	Budget											
30 June	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2018-2023	2023-2024	2024-2025	2025-2026	2026-2027	2027-2028	2023-2028
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Operating expenditure												
Total operating expenditure	12,318	12,640	12,670	12,616	12,642	62,885	12,665	12,679	12,702	12,715	12,750	63,511
Capital expenditure												
Capital Expenditure - Growth	2,274	196	296	1,220	1,215	5,201	1,212	1,220	1,212	1,212	1,220	6,077
Capital Expenditure - LoS	2,930	3,211	3,513	3,247	2,890	15,792	3,196	3,207	3,196	3,196	3,207	16,002
Capital Expenditure - Renewal	8,343	8,067	8,759	7,558	7,493	40,220	7,342	7,308	7,292	7,292	7,308	36,543
Total capital expenditure	13,547	11,475	12,567	12,026	11,598	61,213	11,750	11,735	11,700	11,700	11,735	58,622
Total expenditure	25,865	24,114	25,237	24,642	24,239	124,098	24,416	24,414	24,402	24,416	24,485	122,133

	Total						
For the year ended:	Budget						
30 June	2018-2023	2023-2028	2028-2033	2033-2038	2038-2043	2043-2048	2018-2048
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Operating expenditure							
Total operating expenditure	62,885	63,511	64,212	64,017	63,791	63,645	382,061
Capital expenditure							
Capital Expenditure - Growth	5,201	6,077	205	205	205	205	12,100
Capital Expenditure - LoS	15,792	16,002	388	388	388	388	33,344
Capital Expenditure - Renewal	40,220	36,543	54,857	54,857	54,857	54,857	296,191
Total capital expenditure	61,213	58,622	55,450	55,450	55,450	55,450	341,634
Total expenditure	124,098	122,133	119,662	119,467	119,241	119,095	723,696

7.7 Most likely scenario

Option 2 is the preferred option. Roads will be maintained as affordable within the proposed budget levels plus a targeted rate on forestry properties. This will mean that Council will not respond to customer demands for increased levels of service, and those acting as detours when State Highways are closed may deteriorate. There is only minor funding available for improvements in service levels. The improvements in service levels will be driven by availability of funding from a mixture of NZTA, development and financial contributions and the general rate. No rates or NZTA funding are available for seal extensions in the medium term future.

Council will prevent the anticipated damage to roads used for forestry traffic from harvesting in the years 2018 to 2021 by rating \$1.17 million from setting a targeted rate on exotic forestry properties. Council will continue with the forestry target rate beyond 2021 to strengthen the pavements on forestry routes. Any balance of funds available after 2021 will be used for dust suppression.

Road development over the next 10 years will be driven by the need to increase carriageway widths on some rural primary and secondary collector roads. The need is based on the level of heavy commercial vehicles using these roads, roads providing alternative detour access of State Highway traffic and increase in private development especially around the Mangawhai area.

The width deficiencies will be addressed as sealed road rehabilitation or unsealed pavement strengthening projects are completed.

7.7.1 Road widening projects

It is proposed to do minor realignment and safety improvements to address sight distance deficiencies for frequently used forestry, dairy tanker, general produce and quarrying operations routes.

Sealed roads have been identified for sections of widening because they do not meet the standard width requirement causing safety concerns or potential increased traffic volume from new developments.

Road widening, in conjunction with rehabilitation projects, is planned where pavement width poses a safety concern or there is pavement support deficiency and it is economically justified. It is expected a consistent approach to that of adjacent councils will be taken to width and delineation on State Highway detour routes and primary and secondary collector routes. Key routes are: Paparoa-Oakleigh Road, Kaiwaka-Mangawhai Road, Molesworth Drive, Mangawhai Heads Road, Cove Road and Pouto Road.

7.7.2 Road strengthening

There are road strengthening projects in the programme, for the sealed network it is part of the rehabilitation projects, and for the unsealed roads the strengthening will be done as part of the heavy metalling programme.



7.7.3 Seal extensions

NZTA subsidy for seal extensions are generally no longer available, however the greater Mangawhai area is identified as a growing area that has a number of roads requiring upgrading to meet demand created from development. To assist with road improvements Council will fund seal extensions through a number of funding avenues triggered by development and financial contributions attributed to a specific development. The funding of seal extensions will be done from year 4 onwards, but no seal extensions are proposed for the first three years. Also Council, where justified, will strengthen unsealed road sections in anticipation of sealing the road and may improve safety aspects using minor works subsidised allocations to meet demand.

Roading improvements are funded from subsidies received from the NZTA, development and financial contributions paid by developers and rates.

7.7.4 Bridges

In the next five years a number of bridges will be replaced, as well as bridge strengthening and new culverts constructed. This programme will be updated as condition investigations are completed.

7.7.5 NZTA One Network Road Classification (ONRC)

The purpose of ONRC is to bring national consistency to service levels and efficient investment management of the road network across territorial boundaries. Council is yet to be fully informed or fully understand the implications of the new system. However, we do know the following:

The ONRC consists of:

- Road classification system;
- Customer levels of service (provisional); and
- Performance measures.

The new NZTA classification system will be implemented over three years. The system is intended to:

- provide a nationally consistent framework that helps to inform activity management planning, investment choices, and maintenance and operational decisions;
- over time, road users can increasingly expect to have similar experiences across the country, on roads in the same category;
- support more consistent asset management across the country; and
- make collaboration and prioritisation easier between those organisations responsible for the planning, delivery, operation and maintenance of the nation's road network, leading to a more efficient and safer network and improved value for money.



31 | Page

There are six functional categories. Two categories have sub-categories.

- National (two volume levels);
- Regional;
- Arterial;
- Primary connector;
- Secondary connector; and
- Access (two volume levels).

To be classified in each category, a number of criteria need to be met. Volume criteria are different for urban and rural roads:

- movement of people and goods (volume of daily traffic, HCV, buses, active modes); and
- economic and social (linking places, access to ports and airports, lifelines, tourist destinations).

For Kaipara district, no roads meet the criteria for national, regional or arterial classification (except State Highways). Most of our roads fall within the classification of secondary connector and access categories.

7.8 Customer Levels of Service

Each classification has a specific service level. They are based on the principles of national consistency, safety, fit for purpose and affordability. The information on services levels currently available is provisional.

Service levels cover four categories/outcomes:

- mobility (travel time, resilience, optimal speeds);
- safety;
- amenity; and
- accessibility.

The service levels are very general, and differ by degree between classifications. It is the performance measures that quantify these service levels.



32 | P a g e

For roads within Kaipara this means (in summary):

	Mobility – travel times	Mobility - resilience	Mobility – optimal speed	Safety	Amenity	Accessibility
Arterial	Users experience consistent travel times except during holidays, major events, weather events.	The route or a viable alternative is always available except in emergencies. Priority restoration and users advised.	Higher speeds except where risks exist e.g. intersections, schools, high volumes, shops etcetera.	Variable road standards – safety guidance provided to users.	Good level of comfort, tolerance of some roughness. Contribute to local character and land use (urban or rural).	Some land use access restrictions tolerated. Higher classified roads have priority. Good quality information available to users.
Primary collector	Generally consistent travel times except where affected by weather or other road users.	Route nearly always available except in weather events or emergencies. Alternate routes usually available. Moderate priority to clear incidents.	Travel speed depends on risk, mixed use, adjacent land use.	Variable road standards and alignments. Lower speeds and user vigilance required. Some safety guidance may be available to users.	Moderate levels of comfort, occasional areas of roughness. Roads contribute to local character and adjacent land use.	Some land use access restrictions tolerated. Higher classified roads have priority. Good quality information available to users.
Secondary Collector	Travel times may vary as a result of other road users, weather and road conditions.				Moderate level of comfort, more areas of roughness. Roads contribute to local character and adjacent land use.	Some land use access restrictions tolerated. Some condition variability. Higher classified roads have priority. Good quality information available to users.
Access	Varied travel times affected by other users, weather and road conditions.	Route may not be available at all times. Alternates may not exist. Lower priority for clearance of incidents.	Travel times depend on risk. Recognition of road use for access to schools, shops etcetera.	Variable road standards and alignment. Driver vigilance required.	Low levels of comfort, extended areas of roughness. Conditions reflect adjacent land use and function.	Access to all adjacent properties Users should expect variability. Higher classified roads have priority.
Access (low volume)		Route may not be available in some weather. Alternatives may not exist. Lowest priority for clearance.				



The AMP will introduce a transition plan to support NZTA investment in the Kaipara district road network regarding maintenance renewal and operation decisions. Over time NZTA is aiming for national consistency for the level of service delivered by a network for the customers. The transition plan will fully implement the ONRC and apply the business case approach principles in the preparation for the 2018/2021 National Land Transport Programme (NLTP).

7.9 Impact on rates

Funding for Roads and Footpaths comes from the:

- general rate; this activity accounts for around 42% of rates revenue;
- NZTA subsidy at 61%; and
- 'Forestry Roading Rate' imposed on exotic forestry properties based on land value levies \$397,800 (to be adjusted annually for inflation) per year.

8 Flood Protection and Control Works

8.1 Overview

Flood control is a shared responsibility between KDC and NRC. Flood protection and control work consists of flood control schemes, river alignment control, and land drainage. Stopbanks and floodgates help protect against flooding, and the monitoring of tidal and stormwater levels during weather events helps to provide warning of potential flooding. Weedspraying, drain clearance, floodgate and outlet maintenance helps the land drainage network operate to full capacity. The purpose of the infrastructure is to protect people and properties (including private land and infrastructure and especially productive land) from flooding and tidal flows.

Flood protection work in Kaipara district is split into two separate categories of responsibility; rural and urban flood protection. Rural flood protection is largely concentrated in the Raupo Drainage District; the area of the Ruawai flats adjacent to the Northern Wairoa River. This very fertile area makes a substantial economic contribution, primarily dairy farming and kumara growing. The main function of this type of flood protection is "Land Drainage" and is to ensure that for the majority of the year the land is kept drained and able to be used in an efficient and effective manner for the production of dairy, kumara etcetera. The Ruawai village stormwater controls are in an 'Urban' setting but are managed under the Raupo Drainage District.

Urban flood protection is currently concentrated around the township of Dargaville; this includes stopbanks and floodgates. Flood protection for Dargaville is currently included in the stormwater activity and though this activity is currently centred around Dargaville, with the adoption of the NRC Coastal Hazard Maps and the finalisation of the regional policy, more investigation will be required to identify any other low-lying areas within the district that will be affected in the future and what the councils responsibilities will be in these instances.


8.2 Assets, their age, condition and maintenance

There is the Raupo District Drainage Scheme (Raupo) and 29 other defined 'land drainage' area schemes although Raupo currently accounts for the majority of the total expenditure. Raupo is managed by a standing committee of KDC. Construction of the flood protection infrastructure began in the early 1900s and was paid for by landowners and grants from the central government of the time that had an interest in promoting the reclaiming of arable land.

The size range of these defined areas varies from small and what is considered non-active, such as Sunnynook with 840m of drains and stopbanks with one floodgate, to the largest, Raupo with 69km of drains and stopbanks and 52 floodgates.

Raupo meets quarterly to discuss maintenance and any other issues within the system, whereas the smaller districts meet once or twice yearly to determine the amount of maintenance needed within their district.

Asset profile:				
Northern Area Land Drainage	e Assets by Asset Type	as at 13 July 2016		
Asset Type	Replacement Cost (\$)	Depreciated Replacement Cost (\$)	Accumulated Depreciation (\$)	Annual Depreciation (\$)
Drains	\$4,319,879	\$4,319,879	\$0	\$0
Floodgates	\$1,797,622	\$711,075	\$1,086,546	\$31,825
Total 2016	\$6,117,500	\$5,030,954	\$1,086,546	\$31,825
Raupo Land Drainage Assets	s by Asset Type as at 13	July 2016		
Community	Replacement Cost (\$)	Depreciated Replacement Cost (\$)	Accumulated Depreciation (\$)	Annual Depreciation (\$)
Wharf Road buildings	\$245,220	\$85,863	\$159,356	\$2,452
Jellicoe Depot	\$36,106	\$8,665	\$27,441	\$361
Drains	\$4,346,256	\$4,346,256	\$0	\$0
Stopbanks	\$2,697,952	\$2,697,952	\$0	\$0
Rip rap	\$523,715	\$57,609	\$466,107	\$5,237
Floodgates	\$6,018,741	\$1,449,879	\$4,568,861	\$116,902
Wallace Road pump station	\$349,329	\$108,312	\$241,017	\$5,356
Boundary gates	\$35,042	\$6,308	\$28,734	\$701
Total 2016	\$14,252,361	\$8,760,845	\$5,491,516	\$131,010



8.3 Risk and hazard management

Risk and hazard management is managed by operational staff with a working knowledge of each system, and also relies heavily on the local farmers and residents within each district who maintain constant vigilance over the drainage assets and update the status of the assets to Council representatives as required. Their working knowledge includes where any pressure points are in weather events and which areas are likely to be at risk, how often and when the best time to complete planned maintenance will be, and how to most effectively complete the work.

Impairment testing is also carried out on major asset components including flood protection. The purpose of testing is to identify any significant change in the performance or condition of the assets from when they were last investigated, in some cases this may be the date of installation. Investigation of the flood protection assets first occurred in 2014, and has been done yearly since then; to date the flood protection investigations have identified several gates which have required immediate replacement and some which need varying degrees of attention.

Ongoing investigations will need to be undertaken for all drainage districts, to update Council-held records on basic information such as condition and age, and more in depth information surrounding height in relation to sea level, and capacity. In conjunction with NRC it is noted that there will be an impact from climate change and sea level rise which in turn will have an impact on the current flood protection measures. It is yet to be determined what the impact will be or how we will formulate an appropriate response to these measures and implement them for the future.

8.4 Issues, options and implications

Climate change will mean more flooding from extreme weather events and sea level rise, leading to higher water levels in rivers, the harbour and other waterways. The impact of this occurrence will reinforce the importance of the renewal/improvement programme. The stopbank heights are being raised in part using the dredged material as it is removed. There are also sections being widened and strengthened in preparation for being raised, as any permanent stopbank structure needs to meet specific design and testing requirements. This is both a financially prudent way of disposal of the material and in response to the need to prepare for higher future flood levels. Council estimates of what will be spent on flood control from 2018 to 2048 can be viewed in the attached tables, showing operational (maintenance) spending, and some renewal work. As more investigations are completed on the current systems, and taking into account the NRC's recently released Coastal Hazard Maps for Northland that include areas of current risk as well as other areas which could be at future risk over a 100 year time frame as a result of predicted sea level rise, this may change.

Council's budgeted spend on floodgate replacement in the next 30 years (this assumes that one floodgate will be replaced every three years; floodgates cost between \$25,000 and \$100,000 depending on size) can be viewed in the attached tables. Council's budgeted spend on stopbanks (this assumes that annual programmed work will continue at \$40,000 per year) to increase stopbank levels within the Raupo Drainage District over the next 30 years, can also be viewed below.



Flood control infrastructure is funded by a targeted rate on Dargaville and Ruawai properties, the people that can use and benefit from the service pay for it, rather than the whole district, though as the need for bigger and better flood protection measures are realised this may need to a 'general rate' that will be spread across the entire district as the smaller areas may not be able to cover the required expenditure by themselves.

One possible alternative option is the transfer of responsibility for this activity to NRC, though this has never been formally investigated nor an actual proposal tabled for review and discussion.





Prospective Infrastructure Strategy Costs - Flood Protection and Control Works - adjusted for inflation

For the year ended:	Budget	Budget	Budget	Budget	Budget	Total Budget	Budget	Budget	Budget	Budget	Budget	Total Budget
30 June	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2018-2023	2023-2024	2024-2025	2025-2026	2026-2027	2027-2028	2023-2028
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Operating expenditure												
Total operating expenditure	559	571	535	548	585	2,798	555	586	616	631	676	3,064
Capital expenditure												
Capital Expenditure - Growth	0	0	0	0	0	0	0	0	0	0	0	0
Capital Expenditure - LoS	0	0	0	0	0	0	0	0	0	0	127	127
Capital Expenditure - Renewal	159	133	58	53	98	501	101	103	202	108	111	625
Total capital expenditure	159	133	58	53	98	501	101	103	202	108	238	752
Total expenditure	717	704	592	602	683	3,299	656	689	817	739	914	3,816

	Total						
For the year ended:	Budget						
30 June	2018-2023	2023-2028	2028-2033	2033-2038	2038-2043	2043-2048	2018-2048
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Operating expenditure							
Total operating expenditure	2,798	3,064	5,423	7,755	11,606	13,952	44,598
Capital expenditure							
Capital Expenditure - Growth	0	0	0	0	0	0	0
Capital Expenditure - LoS	0	127	7,272	8,188	9,218	10,379	35,185
Capital Expenditure - Renewal	501	625	0	0	0	0	1,126
Total canital expenditure	501	752	7 272	8 188	9 218	10 379	36 310
Total capital experiation	501	752	7,272	0,100	5,210	10,575	50,510
Total expenditure	3,299	3,816	12,695	15,943	20,824	24,332	80,909



Prospective Infrastructure Strategy Costs - Flood Protection and Control Works - excluding adjustment for inflation

For the year ended:	Budget	Budget	Budget	Budget	Budget	Total Budget	Budget	Budget	Budget	Budget	Budget	Total Budget
30 June	2018-2019 \$'000	2019-2020 \$'000	2020-2021 \$'000	2021-2022 \$'000	2022-2023 \$'000	2018-2023 \$'000	2023-2024 \$'000	2024-2025 \$'000	2025-2026 \$'000	2026-2027 \$'000	2027-2028 \$'000	2023-2028 \$'000
Operating expenditure												
Total operating expenditure	559	556	508	509	529	2,661	. 489	502	513	510	531	2,545
Capital expenditure												
Capital Expenditure - Growth	C	0	0	0	0	0	0	0	0	0	0	0
Capital Expenditure - LoS	C	0	0	0	0	0	0	0	0	0	104	104
Capital Expenditure - Renewal	159	130	55	50	90	484	90	90	172	90	90	532
Total capital expenditure	159	130	55	50	90	484	90	90	172	90	194	636
Total expenditure	717	686	563	559	619	3,144	579	592	685	600	724	3,181
	Total											
For the year ended:	Budget											
30 June	2018-2023	2023-2028	2028-2033	2033-2038	2038-2043	2043-2048	2018-2048					
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000					
Operating expenditure												
Total operating expenditure	2,661	2,545	3,873	4,815	6,249	6,527	26,670					
Capital expenditure												
Capital Expenditure - Growth	0	0	0	0	0	0	0					
Capital Expenditure - LoS	0	104	5,500	5,500	5,500	5,500	22,104					
Capital Expenditure - Renewal	484	532	0	0	0	0	1,016					
Total capital expenditure	484	636	5,500	5,500	5,500	5,500	23,119					
Total expenditure	3,144	3,181	9,373	10,315	11,749	12,027	49,789					



8.5 Most likely scenario

Council's maintenance programme for flood control will continue to direct expenditure where and when required for the infrastructure to perform as required.

Projected operating expenditure for the years 2018 to 2048 is outlined in the above table.

The capital expenditure as identified above will continue to be directed by onsite condition assessments of the assets and as an agreed upon response to the changing environment.

NRC is undertaking a Northland catchment mapping and modelling exercise, making extensive use of LiDAR (Light Detection and Ranging - remote sensing technology used to make high resolution maps). The impending outcome of this exercise will influence Kaipara's flood protection and control works management.

8.6 Impact on rates

The impact on rates is dependent on decisions made by the drainage groups themselves. The targeted rates are based on land value and vary every year between each drainage area, depending on the works programme agreed. There is one drainage district within Kaipara under the governance of NRC, that being Kaihu Valley Drainage District. The number of properties currently funding flood protection is 505 within Raupo and 1,389 within the other schemes, there are also 456 properties in Kaihu that pay to the NRC.

Aoroa	Aratapu Village	Hoanga	Koremoa	Notorious	Tangowahine Nº1	Tatarariki Nº2
Arapohue Nº1	Awakino Point	Horehore	Mangatara	Oruariki	Tangowahine Nº2	Tatarariki Nº3
Arapohue Nº2	Awakino Village	Kaihu	Manganui	Otiria	Tangowahine Valley	Te Hapai
Aratapu Swamp	Greenhill	Kopuru Swamp	Mititai	Owairangi	Tatarariki Nº1	Tikinui
Whakahara						

The targeted rates apply to all land in each of the following land drainage schemes:

9 Stormwater Drainage

9.1 Overview

Council operates stormwater schemes for the Baylys, Dargaville, Te Kopuru, Kaiwaka and Mangawhai communities, using a mixture of open drains and underground pipes. The aim of the service is to protect people, dwellings, private property and public spaces from flooding, by managing the flow of stormwater in a manner that protects public and environmental health.



Stormwater systems are mainly funded by a targeted rate on properties in Dargaville/Baylys, Te Kopuru, Kaiwaka and Mangawhai, the Ruawai area is a targeted rate under the Raupo Land Drainage Scheme, with the remainder of Kaipara district paying 10% of the cost.

Stormwater drainage systems are incorporated into the roading network (as roadside drains), in other communities such as Glinks Gully, Kelly's Bay, Pahi, Whakapirau, Tinopai, Paparoa and Matakohe.

9.2 Assets, their age, condition and maintenance

Council has five stormwater schemes – Dargaville/Baylys, Kaiwaka, Mangawhai and Te Kopuru. These consist of piped drains, open drains, manholes, inlets/outlets and detention ponds.

Community	Pipeline Length (m)	Open Drain(m)
Baylys	3,989	10
Dargaville	35,638	34,671
Kaiwaka	1,646	262
Mangawhai	24,806	7,311
Te Kopuru	149	4,760
Grand Total	66,228	47,014

Notes

Pipelines are composed of the following pipe types: Culvert, Gravity Main and Catchpit Lead.

Open Drains are composed of the following pipe types: Drain, Open Drain, Overland Flow Path, and Swale Drain.

Various natural assets such as overland flow paths and soft assets including riparian planting are located throughout the district.

Condition and performance data relating to stormwater assets is not currently well-documented across the district. The asset register also needs improvement to remove errors and to update missing information to allow Council to more efficiently plan and programme repairs, renewals and upgrades due to under capacity. For example, 36% of pipe diameters are unknown and 52% of pipe materials are unknown. Of all pipes, 34% have no data on either diameters or materials, and there are no operations and maintenance manuals for the existing stormwater detention ponds. A programme is underway to improve knowledge of Council assets and their condition, as reflected in future budgeting.



The average life expectancy of stormwater pipes is 60-70 years. The average life expectancy of stormwater points (manholes, catch pits) is closer to 100 years. With our current knowledge, most components have some years of life left, but some are suspected to be at the end of their effective life. The condition of critical aboveground assets is better known and a maintenance and renewal programme is in place to address condition issues over time.

There is currently no budget available to increase the length of piped drains. This means that the open drains, predominantly in rural or lifestyle areas, will remain. Their maintenance is essential to retain good flow, and open drains are very efficient for the cost associated with the maintenance and operations, and carry a large amount of water and work very well within our current systems.

Many drains flow into harbours or waterways which are covered by discharge consents from NRC.

9.3 Risk and hazard management

Climate change will place additional demand on stormwater infrastructure as heavy rain events become more common and more severe. This will need to be addressed by commissioning stormwater management reports for the serviced areas which will identify any issues created by climate change and sea level rise; these documents will form a major part of any replacement programme where pipe capacity may need increasing. Open drains should manage any extra demand expected.

The District Plan requires new buildings to have all habitable floors designed with a minimum freeboard height to floor level of 500mm above the 100 year average recurrence interval flood level. This will be able to be better applied once NRC completes their programme of catchment mapping and modelling of key catchments and the reports from these projects are finalised. LiDAR for Northland is programmed to be completed by the end of 2019.

Dargaville has a reasonably high flood risk; to protect against this it has stopbanks, floodgates and a floodwall along the Kaihu and Northern Wairoa Rivers. These have been constructed over many years to provide the current level of flood protection for Dargaville and all need to be investigated and assessed for condition, structural integrity and height to ensure that they meet future needs set against altered climate conditions and rising sea levels.

Environmental management issues may become more pressing given that over 100 stormwater outfalls flow into harbours/watercourses which all need to be covered by discharge consents, this will be investigated when possible to try to reduce the number of floodgates into the receiving environments. 14 swimming sites are monitored by NRC over summer.

Silting of the receiving waterways and the upper harbour is likely to reduce the effectiveness of the drainage systems. The implications will be assessed in conjunction with the investigations of climate change and sea level rise.



9.4 Issues, options and implications

Much of our underground assets are of unknown condition. Given the age of some pipes, it is suspected that some are at the end of their effective life, and at risk of failure. There have been no significant failures to date so the life may be more than expected. Improved condition knowledge is essential as this allows Council to base the repair and renewal strategies on known information and more efficient and cost-effective programmes for the future. We do know that there is a significant backlog of renewal work to clear especially in Dargaville. The Dargaville system has already been identified as being under capacity in earlier reports.

As a result, projected costs are indicative and actuals may vary from those projected.

There are some growth-related projects planned for Mangawhai, but no significant growth work is planned anywhere else in the district. There is no programme to pipe (enclose) open drains.

Options

Option 1: Enhanced status quo

Institute an affordable renewals programme that:

- meets consent conditions; and
- addresses any backlog of renewals required over time refining the renewals programme.

Once the condition of the assets is known:

- preliminary conditions assessments completed by 2021; and
- detailed assessments with preferred approach by 2023.

Option 2: Consider affordable alternatives

Institute a maintenance approach (without renewals) for three years that:

• maintains performance at current services levels, while we investigate alternatives for funding and/or provision of service.

Option 3: Review service delivery model

Institute an affordable renewals programme that:

meets consent conditions: and



- 43 | P a g e
- addresses the backlog of renewals required over time while we investigate alternatives for provision e.g. community management, industry management based on dominant user/s.

Projected capital expenditure for this period is shown on the below graphs and tables, this outlines renewals, level of service and growth related projects.



Projected operating expenditure for the years 2018 to 2048 is shown on the tables below.



Prospective Infrastructure Strategy Costs - Stormwater Drainage - adjusted for inflation

For the year and ad-	Budgot	Rudgot	Budgot	Budgot	Rudgot	Total	Budgot	Budget	Budgot	Budget	Budgot	Total
For the year ended.	Duuget											
30 June	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2018-2023	2023-2024	2024-2025	2025-2026	2026-2027	2027-2028	2023-2028
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Operating expenditure												
Total operating expenditure	1,073	1,254	1,162	963	1,005	5,456	1,044	1,099	1,123	1,220	1,293	5,779
Capital expenditure												
Capital Expenditure - Growth	7	40	41	34	40	161	41	35	36	37	38	185
Capital Expenditure - LoS	114	529	541	664	763	2,611	810	752	801	853	908	4,124
Capital Expenditure - Renewal	49	149	152	397	407	1,154	445	486	528	573	620	2,651
	170			4 000	4 000	2.026	4 996	4.070			4 866	6.050
lotal capital expenditure	170	718	734	1,095	1,209	3,926	1,296	1,272	1,364	1,462	1,566	6,960
Total expenditure	1,243	1,971	1,896	2,058	2,215	9,383	2,340	2,371	2,487	2,682	2,859	12,739

	Total						
For the year ended:	Budget						
30 June	2018-2023	2023-2028	2028-2033	2033-2038	2038-2043	2043-2048	2018-2048
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Operating expenditure							
Total operating expenditure	5,456	5,779	7,931	10,212	13,186	16,777	59,341
Capital expenditure							
Capital Expenditure - Growth	161	185	123	150	205	279	1,103
Capital Expenditure - LoS	2,611	4,124	4,834	6,869	9,123	13,556	41,117
Capital Expenditure - Renewal	1,154	2,651	4,347	6,394	8,461	12,619	35,626
		6.050		10.110	12 200		
lotal capital expenditure	3,926	6,960	9,304	13,413	17,789	26,454	77,846
Total expenditure	9,383	12,739	17,235	23,624	30,975	43,231	137,187



Prospective Infrastructure Strategy Costs - Stormwater Drainage - excluding adjustment for inflation

						Total						Total
For the year ended:	Budget											
30 June	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2018-2023	2023-2024	2024-2025	2025-2026	2026-2027	2027-2028	2023-2028
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Operating expenditure												
Total operating expenditure	1,073	1,221	1,106	894	911	5,205	922	946	940	994	1,023	4,824
Capital expenditure												
Capital Expenditure - Growth	7	39	39	31	36	152	36	30	30	30	30	156
Capital Expenditure - LoS	114	516	516	619	694	2,459	719	650	675	700	725	3,469
Capital Expenditure - Renewal	49	145	145	370	370	1,079	395	420	445	470	495	2,225
Total capital expenditure	170	700	700	1,020	1,100	3,690	1,150	1,100	1,150	1,200	1,250	5,850
Total expenditure	1,243	1,921	1,806	1,914	2,011	8,895	2,072	2,046	2,090	2,194	2,273	10,674

	Total						
For the year ended:	Budget						
30 June	2018-2023	2023-2028	2028-2033	2033-2038	2038-2043	2043-2048	2018-2048
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Operating expenditure							
Total operating expenditure	5,205	4,824	5,746	6,386	7,142	7,867	37,169
Capital expenditure							
Capital Expenditure - Growth	152	156	90	96	114	135	743
Capital Expenditure - LoS	2,459	3,469	3,550	4,370	5,080	6,575	25,503
Capital Expenditure - Renewal	1,079	2,225	3,193	4,069	4,713	6,120	21,399
Total canital expenditure	3 690	5 850	6 833	8 535	9 907	12 830	47 645
iotal capital experiature	3,050	3,030	0,035	0,000	3,307	12,030	47,043
Total expenditure	8,895	10,674	12,579	14,921	17,049	20,697	84,814



INFRASTRUCTURE STRATEGY 2018-2048

46 | P a g e

9.5 Most likely scenario

Option 1: Enhanced status quo

Institute an affordable renewals programme that:

- meets consent conditions: and
- addresses any backlog of renewals required, and over time refining the renewals programme.

Once the condition of the assets is known:

- preliminary conditions assessments completed by 2021; and
- detailed assessments with preferred approach by 2023.

There are no current plans to pipe open drains.

9.6 Impact on rates

The proposed impact on rates will vary by scheme. The targeted rate is proposed to increase steadily as more investigation work is completed and projects required across the district are identified as per the tables below.

Council has set rates so that 10% of the stormwater network costs are funded by all ratepayers through the general rate. The remaining 90% of costs continue to be funded by the targeted rate.

Operating costs for stormwater (except interest and depreciation) are split evenly between individual networks based upon land values. The operating costs (excluding interest and depreciation) are then combined with the capital costs (including interest, funded depreciation and loan repayments) in each individual scheme to calculate the rate payable for those connected to each scheme. This reflects a move towards 'equalising' the rate payable for the service being received irrespective of location. This approach recognises the argument that the service being received by the end user is the 'same' irrespective of location and hence the costs should be similar.

9.7 Impact by scheme

9.7.1 Te Kopuru

Issues

Te Kopuru's stormwater is primarily managed through a network of 4.7km of open drains which flow into gullies and then into the Northern Wairoa River.

There is also 149m of stormwater pipeline which is aging and will need renewal in future years. Te Kopuru will require a Stormwater Catchment Management Plan (SWCMP) completed at some point within the next 10 years.



Implications

Te Kopuru's stormwater system is mainly funded by a targeted rate on Te Kopuru properties.

Operating expenditure for the years 2018 to 2048 is approximately \$0.903 million.

Capital expenditure for the years 2018 to 2048 is currently set at zero until more is known about Te Kopuru's system and the community's needs.

Most likely scenario

Option 1: Enhanced status quo

Institute an affordable renewals programme that:

- meets consent conditions: and
- addresses any backlog of renewals required, and over time refining the renewals programme.

Once the condition of the assets is known:

- preliminary conditions assessments completed by 2021; and
- detailed assessments with preferred approach by 2023.

Impact on rates in 2018/2019

The proposed impact on rates will be an increase of the targeted rate by \$900 (5.63%) in 2018/2019. No capital works are currently identified for Te Kopuru until investigation of the state of the current assets and a SWCMP is completed for the area.

9.7.2 Dargaville/Baylys

Issues

The Dargaville urban area is serviced by an underground pipeline and open drain stormwater network. Much of the pipeline infrastructure is aged and there is a significant amount of deferred work to be addressed and earlier reports have identified Dargaville as being significantly under capacity for current population levels. Baylys also has some stormwater infrastructure though this is not as significant and has been implemented in the last decade. There are some issues surrounding stormwater flows through existing gullies that are causing some scour issues, and these are bringing water from large catchment areas starting in the hills surrounding the Baylys township.

After heavy rain events, Dargaville experiences stormwater infiltrating the wastewater infrastructure, this has been known to cause some overflow into the Northern Wairoa River and surrounding areas. (Some tolerance to 'consents' is allowed for heavy weather events.)

Implications

The Dargaville stormwater system is 90% funded by a targeted rate on Dargaville properties.

The changing demographic makes a full upgrade and replacement uneconomic and unaffordable under the current funding model, though this is an issue that will only get worse over time and other sources or avenues of funding may be required to complete the works required to bring Dargaville up to a standard that provides our minimum level of service.

Operating expenditure for Dargaville for the years 2018 to 2048 is \$35.34 million.

Capital expenditure for Dargaville for the years 2018 to 2048 is as follows:



Operating expenditure for Baylys for the years 2018 to 2048 is \$2.21 million.

Capital expenditure for Baylys for the years 2018 to 2048 is as follows:





Most likely scenario

Option 1: Enhanced status quo

Institute an affordable renewals programme that:

- meets consent conditions; and
- addresses any backlog of renewals required, and over time refining the renewals programme.

Once the condition of the assets is known:

- preliminary conditions assessments completed by 2021; and
- detailed assessments with preferred approach by 2023.

Impact on rates in 2018/2019

The proposed impact on rates for Dargaville will be a decrease of the targeted rate by \$109,000 (18.52%) in 2018/2019.

The proposed impact on rates for Baylys will be a decrease of the targeted rate by \$5,000 (8.10%) in 2018/2019.

9.7.3 Kaiwaka

Issues

The stormwater system in Kaiwaka is mainly associated with the State Highway and the roads joining it. The assets are ageing and will require substantial replacement over time, though this is still yet to be determined, knowledge of the current assets and their condition is sparse, NZTA seems to have little knowledge of this also. It is not confirmed how much network is currently in Kaiwaka as we understand there are stormwater assets that are not marked and do not appear in our current asset register.

Implications

Kaiwaka's stormwater system is 90% funded by a targeted rate on Kaiwaka properties and the remaining 10% is from the general rate, due to the lack of knowledge of our assets within Kaiwaka, and the need to produce a stormwater management plan on the back of data cleansing and investigation that will allow for any prospective growth within the Kaiwaka area, in part this will be due to the eventual extension of the motorway from Auckland.

Renewal work will keep the system working in the interim, but will have far reaching cost implications if growth is realised and the system is unable to meet capacity requirements.



INFRASTRUCTURE STRATEGY 2018-2048

50 | P a g e

Operating expenditure for the years 2018 to 2048 is \$1.65 million.

Capital expenditure for the years 2018 to 2048 is currently set at zero until further investigation and a SWCMP can be completed for the area, this Plan will also focus on expected growth and what will need to be completed to allow for this to happen and expand.

Most likely scenario

Option 1: Enhanced status quo

Institute an affordable renewals programme that:

- meets consent conditions; and
- addresses any backlog of renewals required, and over time refining the renewals programme.

Once the condition of the assets is known:

- preliminary conditions assessments completed by 2021; and
- detailed assessments with preferred approach by 2023.

Impact on rates in 2018/2019

The proposed impact on rates will be an increase of the targeted rate by \$5,700 (39.04%) in 2018/2019. This represents the operational cost of the Kaiwaka stormwater network. No capital investment is planned in the next 10 years.

9.7.4 Mangawhai

Issues

Mangawhai has a mixture of old and new stormwater infrastructure, currently the issues we have revolve around the lack of infrastructure within currently built up areas as information supplied by previous stormwater management reports was either ignored or deemed unpalatable to the community. There is a lot of the network that is unknown within the older areas (Mangawhai Heads) and due to a lack of accurately updating information on our asset registers in the past new infrastructure that has been installed is not recorded.

The implications are such that the true extent and capacity of the current network is unknown and makes it difficult to accurately plan a renewal strategy or prepare plans and strategies for growth. Low-lying areas need to be identified and hydraulic analysis completed to predict any negative impacts from climate change and sea level rise as NRC finalises their draft plans and maps, this may include the implementation of drainage districts including stopbanks, floodgates and diversion channels; if the cost of the implementation of a drainage district is prohibitive with consultation these areas may need to be ring-fenced and all further development stopped.



Implications

Mangawhai's stormwater system is 90% funded by a targeted rate on Mangawhai properties and the remaining 10% is from the general rate.

The projected total cost of capital expenditure for Mangawhai stormwater for the next 30 years is shown below, however as stormwater AMPs are completed this estimate may need to be revised, though if the management plans are completed and implemented in a timely manner the largest portion of cost will be borne by future developments.

Operating expenditure for the years 2018 to 2048 is \$17.39 million.

Capital expenditure for the years 2018 to 2048 is as follows:



Most likely scenario

Option 1: Enhanced status quo

Institute an affordable renewals programme that:

- meets consent conditions; and
- addresses any backlog of renewals required, and over time refining the renewals programme.



Once the condition of the assets is known:

- preliminary condition assessments completed by 2021; and
- detailed assessments with preferred approach by 2023.

Impact on rates in 2018/2019

The proposed impact on rates will be an increase of the targeted rate by \$128,700 (18.73%) in 2018/2019. The system is relatively new so renewals is not a major component. The cost increase represents extensions needed to the network to cater for growth being experienced.

10 Wastewater

10.1 Overview

Council operates wastewater schemes in the Dargaville, Te Kopuru, Glinks Gully, Maungaturoto, Kaiwaka and Mangawhai communities. The wastewater systems collect and treat wastewater and then discharge it into surrounding environments in a sustainable, environmentally friendly manner. The purpose of the service is to protect public and environmental health.

Dargaville, Kaiwaka, Maungaturoto, Te Kopuru and Glinks Gully wastewater systems are funded by a targeted rate on properties in those areas.

Mangawhai's wastewater system is currently funded by a targeted rate on Mangawhai properties, as well as being partly funded by the general rate on all Kaipara properties.

10.2 Assets, their age, condition and maintenance

The assets that form the wastewater systems include treatment plants (5), a disposal field, pump stations (32), rising mains (31km) gravity lines (109km), points (approximately 1,870) and connections (4,561). The condition of wastewater assets is not well documented and the current asset register contains errors. There is a programme of data cleansing and condition assessments in progress and planned to continue over the next three years. This has already begun for critical assets including those aboveground. The least known is about underground assets. It is known that there are sections of the older schemes that have old asbestos cement pipes in poor condition. The known issues are:

- Dargaville has over 10,000m of pipes aged over 60 years, which translate to about 25% of the network; and
- Maungaturoto, Te Kopuru and Kaiwaka have most of their pipes aged over 30 years.

While Dargaville has the biggest backlog, renewals will be due in other schemes in 10 plus years with the exception of Kaiwaka which has very recently begun to show signs of failure. Therefore, project costs are indicative and actuals may vary from those projected. For some small communities, and where population is in decline, funding this renewal programme may prove to be unaffordable.



10.3 Risk and hazard management

Stormwater inflow and infiltration (I/I) and vice versa places capacity challenges on network pipes and treatment plants. Dargaville has the greatest level of infiltration and also has the greatest risk of flooding which would increase I/I risks. The renewal programme will need to take these issues into account.

Unplanned discharges can occur during power failures. This creates environmental risk as overflows of raw sewage can go into waterways. There are currently no plans to install emergency power systems at plants.

Trade waste going into the Dargaville plant creates greater work for the retention ponds. This means that they require more desludging at a cost to all properties connected to the system.

10.4 Issues, options and implications

Aside from Mangawhai, much of this infrastructure is aging or aged, so the most significant expenditure over the next 30 years will be on renewal work. There is a backlog of renewal work for Dargaville and the quickly approaching renewal wave needed for all other schemes, except Mangawhai, will be a challenge of affordability for these communities.

As a result, and as noted above, project costs are indicative and actuals may vary from those projected.

Significant expenditure will be needed for Mangawhai to accommodate growth and new connections. This has been allowed for in the LTP 2018/2028. The Mangawhai system and reticulation network is fairly new; there is no more than relatively minor renewal work until the latter part of the next 10 years.

Options

Option 1: Enhanced status quo

Institute an affordable renewals programme that:

- meets consent conditions; and
- addresses any backlog of renewals required over time refining the renewals programme.

Once the condition of the assets is known:

- preliminary conditions assessments completed by 2021; and
- detailed assessments with preferred approach by 2023.

Option 2: Consider affordable alternatives

Institute a maintenance approach (without renewals) for three years that:

maintains performance at current services levels, while we investigate alternatives for funding and/or provision of service.



Option 3: Review service delivery model

Institute an affordable renewals programme that:

- meets consent conditions: and
- addresses the backlog of renewals required over time while we investigate alternatives for provision e.g. community management, industry management based on dominant user/s.

Operating expenditure for the years 2018 to 2048 is projected to be \$207 million (inflated).

Projected capital expenditure for this period is shown on the tables and graphs below outlining renewals, level of service and growth related projects.





INFRASTRUCTURE STRATEGY 2018-2048

55 | Page

Prospective Infrastructure Strategy Costs - Sewerage and the Treatment and Disposal of Sewage - adjusted for inflation

						Total						Total
For the year ended:	Budget											
30 June	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2018-2023	2023-2024	2024-2025	2025-2026	2026-2027	2027-2028	2023-2028
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Operating expenditure												
Total operating expenditure	6 209	7 036	6 905	5 502	5 750	21 500	6 068	6 088	6 28/	6 680	6 977	32 007
Total operating experiature	0,205	7,030	0,505	3,332	3,733	31,300	0,008	0,088	0,204	0,080	0,577	32,037
Capital expenditure												
Capital Expenditure - Growth	1,915	1,553	1,772	1,815	2,463	9,517	2,524	480	2,272	2,790	2,868	10,935
Capital Expenditure - LoS	748	895	420	554	301	2,917	, 59	159	756	624	16	1,615
Capital Expenditure - Renewal	1,041	634	414	489	550	3,128	1,163	1,134	1,267	1,292	1,286	6,142
Total canital expenditure	3 704	3 083	2 606	2 857	3 313	15 562	3 747	1 773	4 295	4 706	4 169	18 691
	0,701	3,005	2,000	2,007	0,010	10,002	3,7 17		1)233	-1,700	-1,200	10,001
Total expenditure	9,912	10,118	9,511	8,448	9,073	47,063	9,815	7,861	10,579	11,386	11,146	50,788
	Total											
For the year ended:	Budget											
30 June	2018-2023	2023-2028	2028-2033	2033-2038	2038-2043	2043-2048	2018-2048					
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000					
Operating expenditure												
Total operating expenditure	31,500	32,097	36,655	36,278	34,721	36,199	207,451					
Capital expenditure												
Capital Expenditure Growth	0 517	10 025	12 202	1 212	711	9 160	44 019					
	3,317	1 615	1 029	1,313	711	2 954	44,018					
Capital Expenditure - Renewal	2,917	6 1/2	6 598	1 845	15 8/0	5 216	3,497					
	3,128	0,142	0,550	1,043	15,045	5,210	50,778					
Total capital expenditure	15,562	18,691	21,008	3,888	16,913	16,230	92,293					
Total expenditure	47,063	50,788	57,663	40,166	51,635	52,429	299,744					



Prospective Infrastructure Strategy Costs - Sewerage and the Treatment and Disposal of Sewage - excluding adjustment for inflation

						Total						Total
For the year ended:	Budget											
30 June	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2018-2023	2023-2024	2024-2025	2025-2026	2026-2027	2027-2028	2023-2028
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Operating expenditure												
Total operating expenditure	6.209	6.850	6,569	5,199	5,232	30.058	5,390	5,284	5,333	5,531	5,659	27,196
	0,200	0,000	0,000	0,200	3,232	00,000	5,550	0,201	5,000	0,001	5,005	27,250
Capital expenditure												
Capital Expenditure - Growth	1,915	1,515	1,690	1,690	2,240	9,050	2,240	415	1,915	2,290	2,290	9,150
Capital Expenditure - LoS	748	874	401	516	274	2,811	53	138	638	513	13	1,353
Capital Expenditure - Renewal	1,041	619	395	455	500	3,010	1,032	981	1,068	1,060	1,026	5,167
Total capital expenditure	3,704	3,007	2,486	2,661	3,014	14,870	3,325	1,534	3,620	3,863	3,329	15,670
Total expenditure	9,912	9,858	9,054	7,859	8,246	44,929	8,715	6,818	8,953	9,393	8,987	42,866
	Total											
For the year ended:	Budget											
30 June	2018-2023	2023-2028	2028-2033	2033-2038	2038-2043	2043-2048	2018-2048					
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000					
Operating expenditure												
Total operating expenditure	30,058	27,196	27,480	24,342	20,869	17,606	147,550					
Capital expenditure	0.050	0.450	0.025	0.00	275	4 1 2 5	22,402					
Capital Expenditure - Growth	9,050	9,150	9,835	868	375	4,125	33,403					
Capital Expenditure - Los	2,811	1,353	/65	490	190	1,440	7,048					
Capital Expenditure - Renewal	3,010	5,167	4,837	1,182	8,841	2,490	25,528					
Total capital expenditure	14,870	15,670	15,437	2,539	9,406	8,055	65,978					
Total expenditure	44,929	42,866	42,916	26,881	30,275	25,661	213,528					



INFRASTRUCTURE STRATEGY 2018-2048

57 | Page

10.5 Most likely scenario

The most likely option differs between schemes and will be discussed scheme by scheme in the following section.

There are two schemes that are situated in small communities. The schemes are old and in need of asset renewal work within the life of this Strategy. Under the current charging policy, the communities would be charged targeted rates to pay for the needed renewals and upgrade. This may result in rates far higher than is seen as affordable for these communities (Te Kopuru and Glinks Gully). This Strategy allows for the deferral of upgrades to the Te Kopuru treatment plant to assess the most cost-effective option for addressing the plant's non-complying ammonia levels. The wastewater treatment plant in Kaiwaka is non-compliant and requires further investigation which is currently involving the NRC and could culminate into an upgrade of the treatment system. An upgrade to the treatment plant will have an impact on the rates. Glinks Gully's pump stations and rising main will be renewed in the third year of the 30 year strategy.

10.6 Impact on rates

For 2018/2019, over \$1.68 million of historic costs associated with the Mangawhai Community Wastewater Scheme are included in the calculation of the general rate. The remaining costs related to wastewater are separated into defined operating and defined capital costs. Defined operating costs are operational costs excluding interest and depreciation and defined capital costs (i.e. including loan repayments) plus interest and funded depreciation.

For the purposes of calculating each targeted rate, except the Te Kopuru network, defined operating costs are aggregated across all wastewater schemes and divided by the total number of wastewater charges (connected equivalent) for properties connected and capable of connection to the networks. The defined capital costs for each respective network are added onto the average defined operating costs.

10.7 Impact by scheme

10.7.1 Te Kopuru

Issues

Te Kopuru's wastewater treatment system and pipelines are ageing and renewal of much of the system will be required within the period of this strategy. Te Kopuru's small population makes affordability a challenge.

Implications

Te Kopuru's wastewater system is funded by a targeted rate on Te Kopuru properties.

The small population is likely to make any significant renewal to the treatment plant and renewal of the reticulation unaffordable under the current funding model.



This scheme has breached its environmental discharge consent with regards to ammonia discharge which is slightly above the consent limit. KDC is working with NRC to review the consent.

Operating expenditure for the years 2018 to 2048 is approximately \$4.0 million (inflated).

Capital expenditure for the years 2018 to 2048 is as follows:



Most likely scenario

Option 1: Enhanced status quo

Institute an affordable renewals programme that:

- meets consent conditions; and
- addresses any backlog of renewals required over time refining the renewals programme.



INFRASTRUCTURE STRATEGY 2018-2048

59 | P a g e

Once the condition of the assets is known:

- preliminary conditions assessments completed by 2021; and
- detailed assessments with preferred approach by 2023.

Impact on rates in 2018/2019

The proposed impact on rates will be an increase of the targeted rate by \$22,500 (20.36%) in 2018/2019.

The proposed impact on rates for the next three years will be negligible whilst alternatives for funding are investigated.

10.7.2 Glinks Gully

Issues

Glinks Gully's wastewater scheme is designed to service a peak population of 72, and the system connects to 18 septic tanks serving 24 houses located on private properties. The wastewater disposal field and pipelines are aging, and replacement work will be needed in the future.

The small population and small number of properties may make a full upgrade and replacement unaffordable e.g. a \$420,000, 30 year CAPEX programme for 24 properties.

Implications

Glinks Gully's wastewater system is funded by a targeted rate on Glinks Gully properties.

Operating expenditure for the years 2018 to 2048 is approximately \$2.8 million (inflated).



INFRASTRUCTURE STRATEGY 2018-2048

60 | P a g e

Capital expenditure for the years 2018 to 2048 is as follows:



Most likely scenario

Option 1: Enhanced status quo

Institute an affordable renewals programme that:

- meets consent conditions; and
- addresses any backlog of renewals required over time refining the renewals programme.

Once the condition of the assets is known:

- preliminary conditions assessments completed by 2021; and
- detailed assessments with preferred approach by 2023.



Impact on rates in 2018/2019

The proposed impact on rates will be an increase of the targeted rate by \$2,800 (11.02%) in 2018/2019.

The proposed impact on rates for the next three years will be negligible whilst alternatives for funding and/or provision of service are investigated.

The proposed impact on rates if the renewal programme was fully funded may be unaffordable to the community e.g. \$23,000 in year 2019/2020 across 26 ratepayers, any upgrades will need to be loan funded and costs spread over a greater time period.

10.7.3 Dargaville

Issues

Dargaville is serviced by a wastewater treatment plant, 40km of wastewater pipelines, 15 pump stations and 9km of rising main pipes that pump wastewater from pump stations to the treatment plant.

Dargaville's wastewater system and pipelines are aged and there is a significant amount of deferred renewal work to be addressed.

After heavy rain events, stormwater can infiltrate the wastewater infrastructure, leading to overflow into the Northern Wairoa River and surrounding areas. (Some tolerance to 'consents' is allowed for heavy weather events.)

Programmed work: Undertake an assessment of the wastewater system.

Implications

Dargaville's wastewater system is funded by a targeted rate on Dargaville properties.

Operating expenditure for the years 2018 to 2048 is \$49 million (inflated).



Capital expenditure for the years 2018 to 2048 is as follows:



Most likely scenario

Option 1: Enhanced status quo

Institute an affordable renewals programme that:

- meets consent conditions; and
- addresses any backlog of renewals required over time refining the renewals programme.

Once the condition of the assets is known:

- preliminary conditions assessments completed by 2021; and
- detailed assessments with preferred approach by 2023.

Impact on rates in 2018/2019

The proposed impact on rates will be an increase of the targeted rate by \$192,900 (9.49%) in 2018/2019.



10.7.4 Maungaturoto

Issues

Maungaturoto is serviced by a single treatment plant constructed in 1992, comprising 11km of wastewater pipelines, 3 pump stations and 1.2km of rising main pipes that pump wastewater from pumping stations to the treatment plant. Maungaturoto's wastewater system is aging and there is a significant amount of deferred renewal work to be addressed.

Implications

Maungaturoto's wastewater system is funded by a targeted rate on Maungaturoto properties.

Operating expenditure for the years 2018 to 2048 is approximately \$12 million.

Capital expenditure for the years 2018 to 2048 is as follows:





Most likely scenario

Option 1: Enhanced status quo

Institute an affordable renewals programme that:

- meets consent conditions; and
- addresses any backlog of renewals required over time refining the renewals programme.

Once the condition of the assets is known:

- preliminary conditions assessments completed by 2021; and
- detailed assessments with preferred approach by 2023.

Impact on rates in 2018/2019

The proposed impact on rates will be an increase of the targeted rate by \$62,900 (13.91%) in 2018/2019.

10.7.5 Kaiwaka

Issues

Kaiwaka wastewater system consists of 4km of gravity pipeline, 69 manholes, 1 pumping station and a single treatment plant. Kaiwaka's wastewater system is aging, and will need replacing in the future.

Implications

Kaiwaka's wastewater system is funded by a targeted rate on Kaiwaka properties.

Operating expenditure for the years 2018 to 2048 is approximately \$9.1 million.



Capital expenditure for the years 2018 to 2048 is as follows:



Most likely scenario

Option 1: Enhanced status quo

Institute an affordable renewals programme that:

- meets consent conditions; and
- addresses any backlog of renewals required over time refining the renewals programme.

Once the condition of the assets is known:

- preliminary conditions assessments completed by 2021; and
- detailed assessments with preferred approach by 2023.

Impact on rates

The proposed impact on rates will be an increase of the targeted rate by \$35,300 (20.48%) in 2018/2019



10.7.6 Mangawhai

Issues

The Mangawhai Community Wastewater Scheme (MCWWS) is a 'state of the art' collection, treatment and reuse system.

Implications

Mangawhai's wastewater system is partly funded by a targeted rate on Mangawhai properties as well as being funded by the general rate on all Kaipara properties (to fund a portion of the historic costs). The wastewater system and reticulation network is fairly new; there is no more than minor renewal work until the latter part of the next seven years. However, there is significant growth predicted in Mangawhai and growth related projects will continue to be implemented in 2018/2019.

Operating expenditure for the years 2018 to 2048 is approximately \$70 million.

Capital expenditure for the years 2018 to 2048 is as follows:





Most likely scenario

Option 4 which includes significant capital expenditure to extend the scheme and augment the WWTP and disposal system.

Impact on rates in 2018/2019

The proposed impact on rates will be an increase of the targeted rate by \$375,300 (15.97%) in 2018/2019

11 Water Supply

11.1 Overview

Council operates community water supply schemes in the Dargaville (including Baylys), Glinks Gully, Ruawai, Maungaturoto and Mangawhai communities, by collecting raw water, treating it and piping it to properties for use by households. The purpose of the service is to help to protect public health, by providing readily accessible potable water to communities. In Dargaville, the water service is used by the local emergency Fire Service, helping them protect the community against fire incidents.

11.2 Assets, their age, condition and maintenance

The assets associated with the five water supply schemes in Kaipara include:

- 15 water source points;
- 4 water treatment plants;
- 7 pump stations;
- 17 storage facilities;
- 160 km of reticulated piping;
- 3,583 connections; and
- 3,763 points (fire hydrants, valves, meters).

The condition of these assets is mainly unknown. It is recognised that the current level of condition and performance data is not well-documented. The current asset register has errors and data cleansing is required. The knowledge of the condition of assets is varied and more knowledge on condition is also required. Most critical assets have been condition-assessed over the last two years however the pipe network remains to be done.



- We do not know the material of 40,000m of pipes;
- We do not know the size of 30,000m of pipes;
- 20,000m of pipes in Dargaville are over 50 years old;
- 19,000m of pipes in Maungaturoto are over 40 years old;
- All other schemes have pipes as old as 40 years but not at the quantity of the others; and
- The exception is Mangawhai where the pipe network is newer.

Two of the schemes do not meet Drinking-water Standards for New Zealand 2005 (Revised 2008) currently. They are Maungaturoto and Mangawhai. Mangawhai was upgraded in December 2016 and is equipped with cartridge filtration and UV and current monitoring is yet to go through a full year cycle required for assessment for compliance with the Drinking-water Standards for New Zealand 2005 (Revised 2008). Maungaturoto is yet to be assessed for the full year for the newly installed UV lamp outage alarms.

There is a storage dam built for the Dargaville water supply however it is not connected. The cost of connecting it to the Dargaville system is approximately \$2.8 million. Although this has been included in the 2021/2022 year, an ecological study will evaluate the environmental impact of extracting water when the Kaihu River is at a lower flow than is currently consented.

11.3 Risk and hazard management

Climate change may bring with it lesser rainfall over summer, with increased rainfall at other times of the year. This may result in more severe security of supply issues in Dargaville, and perhaps for those homeowners and businesses who have their own rainwater collection systems.

Any raising of drinking water standards may be unaffordable for Kaipara. Current standards are already challenging.

The Northland District Health Board has submitted to Council that they would like to see Council increase the public water supply to more properties. Council has no plans to do this, and in fact is not increasing connections at the periphery of towns because of supply and demand issues.

Council has 111 metered connections on its Dargaville and Maungaturoto raw water mains (i.e. untreated and non-potable water). These are extraordinary supplies and are for the purpose of supplying untreated water for farming uses in the rural areas. There is a risk that this raw water is used inappropriately as a source of potable water for dwellings. Council has commenced sanitary assessments of the properties with raw water connections and insanitary building notices are issued where required, requiring the property owners to remediate the issue.



11.4 Issues, options and implications

Much of Council's water infrastructure is aging or aged, so the most significant expenditure over the next 30 years will be on renewal work to renew water systems. There is some backlog of renewal work to be done, mainly pipes, especially in Dargaville and Maungaturoto.

The level of service related to bringing all our water treatment plants up to the standard needed to comply with Drinking-water Standards for New Zealand Drinking 2005 (Revised 2008) has been completed. Compliance will be granted after the Northland District Health Board assesses the supplies over a full year cycle. Some small schemes may become unaffordable.

As a result, projected costs are indicative and actuals may vary from those projected. The tendency of the main water source at Waiparataniwha Stream which supplies Dargaville and Baylys, is to dry up in droughts, making it hard to provide security of supply to these communities.

11.4.1 Options

Option 1: Enhanced status quo

Institute an affordable renewals programme that:

- meets consent conditions; and
- addresses any backlog of renewals required over time refining the renewals programme.

Once the condition of the assets is known:

- preliminary conditions assessments completed by 2021;
- detailed assessments with preferred approach by 2023; and
- the renewals programme for the schemes will increase costs over the lifetime of this Strategy, and the renewals programme will continue to be refined when more condition data becomes available over the years to defer any renewals for as long as is practical and economical.

Option 2: Consider affordable alternatives

Institute a maintenance approach (without renewals) for three years that:

maintains performance at current services levels, while we investigate alternatives for funding and/or provision of service.


Option 3: Review service delivery model

Institute an affordable renewals programme that:

- meets consent conditions: and
- addresses the backlog of renewals required over time while we investigate alternatives for provision e.g. community management, industry management based on dominant user/s.

Option 4: Self-supply (applies to all schemes)

Prohibit new connections on the periphery of the water supply zone in favour of self-supply (e.g. roof tank) to preserve the existing infrastructure, increase water conservation education and use water pricing to lower usage.

Option 5: Pipeline (Dargaville only)

Construct a pipeline (estimated cost \$2.8 million) from Waiatua Dam (Opanake Road) to Dargaville to improve security of supply during moderate droughts.

Operating expenditure for the years 2018 to 2048 is approximately \$53 million.

Projected capital expenditure for this period is shown on the tables and graphs below outlining renewals, level of service and growth related projects.





71 | P a g e

Prospective Infrastructure Strategy Costs - Water Supply - adjusted for inflation

For the year ended:	Budget	Budget	Budget	Budget	Budget	Total Budget	Budget	Budget	Budget	Budget	Budget	Total Budget
30 June	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2018-2023	2023-2024	2024-2025	2025-2026	2026-2027	2027-2028	2023-2028
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Operating expenditure												
Total operating expenditure	2,317	2,365	2,412	2,376	2,510	11,980	2,642	2,674	2,721	2,768	2,821	13,627
Capital expenditure												
Capital Expenditure - Growth	0	0	0	0	0	0	0	0	0	0	0	0
Capital Expenditure - LoS	13	13	13	1,490	1,526	3,054	14	14	15	15	16	74
Capital Expenditure - Renewal	1,866	1,825	1,471	1,443	762	7,366	3,407	2,793	3,802	2,333	3,551	15,886
Total capital expenditure	1,878	1,838	1,485	2,932	2,288	10,420	3,421	2,808	3,817	2,348	3,567	15,960
Total expenditure	4,195	4,203	3,896	5,309	4,797	22,400	6,063	5,481	6,538	5,117	6,388	29,587

	Total						
For the year ended:	Budget						
30 June	2018-2023	2023-2028	2028-2033	2033-2038	2038-2043	2043-2048	2018-2048
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Operating expenditure							
Total operating expenditure	11,980	13,627	15,074	16,516	18,390	21,055	96,640
Capital expenditure							
Capital Expenditure - Growth	0	0	0	0	0	0	C
Capital Expenditure - LoS	3,054	74	99	114	131	150	3,623
Capital Expenditure - Renewal	7,366	15,886	8,081	9,857	10,150	6,447	57,788
Total capital expenditure	10,420	15,960	8,180	9,971	10,281	6,597	61,411
Total expenditure	22,400	29,587	23,254	26,487	28,671	27,652	158,051



Prospective Infrastructure Strategy Costs - Water Supply - excluding adjustment for inflation

For the year ended:	Budget	Budget	Budget	Budget	Budget	Total Budget	Budget	Budget	Budget	Budget	Budget	Total Budget
	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2018-2023	2023-2024	2024-2025	2025-2026	2026-2027	2027-2028	2023-2028
50 June	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
				,				,				
Operating expenditure												
Total operating expenditure	2,317	2,305	2,296	2,209	2,277	11,405	2,337	2,303	2,281	2,257	2,233	11,411
Capital expenditure												
Capital Expenditure - Growth	0	0	0	0	0	0	0	0	0	0	0	0
Capital Expenditure - LoS	13	13	13	1,388	1,388	2,813	13	13	13	13	13	63
Capital Expenditure - Renewal	1,866	1,780	1,403	1,344	693	7,086	3,023	2,416	3,205	1,915	2,835	13,393
Total capital expenditure	1,878	1,793	1,416	2,731	2,080	9,898	3,035	2,428	3,218	1,928	2,848	13,456
Total expenditure	4,195	4,097	3,712	4,940	4,358	21,303	5,372	4,731	5,499	4,184	5,080	24,867
	Total	Total	Total	Total	Total	Total	Total					
For the year ended:	Budget	Budget	Budget	Budget	Budget	Budget	Budget					
30 lune	2018-2023	2023-2028	2028-2033	2033-2038	2038-2043	2043-2048	2018-2048					
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000					
Operating expenditure												
Total operating expenditure	11,405	11,411	10,915	10,299	9,870	9,725	63,624					
Capital expenditure												
Capital Expenditure - Growth	0	0	0	0	0	0	0					
Capital Expenditure - LoS	2,813	63	73	73	73	73	3,167					
Capital Expenditure - Renewal	7,086	13,393	5,933	6,285	5,678	3,160	41,535					
Total capital expenditure	9,898	13,456	6,006	6,358	5,751	3,233	44,702					
Total expenditure	21,303	24,867	16,921	16,658	15,620	12,958	108,327					



73 | P a g e

11.5 Most likely scenario

The most likely option differs between schemes and will be discussed scheme by scheme in the section below.

Within Kaipara there are schemes for water supply situated in small communities with a small population. The schemes are old and in need of asset renewal work. Under the current charging policy, these communities would be charged targeted rates to pay for the needed renewals and upgrade. This may result in the rates being higher than is seen as affordable e.g. Glinks Gully or Ruawai.

There is a small water supply scheme serving a small number of private properties in Mangawhai Heads, the Wood Street shops and the Mangawhai Heads Camp Ground. The scheme was upgraded in December 2016 so that it would meet the requirements of the Drinking-water Standard for New Zealand 2005 (Revised 2008).

11.6 Impact on rates

Water rates are not classified as property rates because they are based on volume, therefore set as an activity fee.

Operating costs (excluding interest and depreciation) for water supply are to be split evenly between individual networks based upon usage. The operating costs (excluding interest and depreciation) are then combined with the capital costs (including interest, funded depreciation and loan repayments) in each individual scheme to calculate the rate payable for those connected to each scheme. This reflects a move towards 'equalising' the rate payable for the service being received irrespective of location. This approach recognises the argument that the service being received by the end user is the 'same' irrespective of location and hence the costs should be similar.

Revenue from water rates is proposed to increase by \$403,800 (14.67%) in 2018/2019.

11.7 Impact by scheme

11.7.1 Glinks Gully

Issues

Council supplies water to 80 properties in Glinks Gully. Maintaining an aging system for a small number of users means higher costs.

Glinks Gully's water supply complies with Drinking-water Standards for New Zealand 2005 (Revised 2008).

Implications

Glinks Gully's water system is funded by a targeted rate on Glinks Gully properties.

Operating expenditure for the years 2018 to 2048 is approximately \$2.8 million.



74 | Page

Capital expenditure for the years 2018 to 2048 is as follows:



Most likely scenario

Option 1: Enhanced status quo

Institute an affordable renewals programme that:

- meets consent conditions; and
- addresses any backlog of renewals required over time refining the renewals programme.

- preliminary conditions assessments completed by 2021;
- detailed assessments with preferred approach by 2023; and
- the renewals programme for the schemes will increase costs over the lifetime of this Strategy, and the renewals programme will continue to be refined when more condition data becomes available over the years to defer any renewals for as long as is practical and economical.



Impact on rates in 2018/2019

The proposed impact on rates will be an increase of the revenue from water charged of \$4,400 (15.38%) in 2018/2019.

The proposed impact on rates for the next three years will be negligible whilst alternatives for funding and/or provision of service are investigated.

The proposed impact on rates if the renewal programme was fully funded would be, we believe, unaffordable to the community.

11.7.2 Dargaville

Issues

The water supply for Dargaville is used by both Dargaville and Baylys communities. It serves about 4,683 people and there are 2,782 connections to the system (most use water treated by the system, however there are some connections to the raw water lines).

There are several issues with Dargaville's drinking water. There is a significant amount of deferred renewal work to be addressed and the tendency of the main water source at Waiparataniwha Stream to dry up in droughts make it hard to provide security of supply.

Dargaville's water supply complies with Drinking-water Standards for New Zealand 2005 (Revised 2008).

Additional Options

Option 5: Pipeline

Construct a pipeline (estimated cost \$2.8 million) from Waiatua Dam (Opanake Road) to Dargaville to improve security of supply during moderate droughts.

Implications

Dargaville's water system is funded by a targeted rate on Dargaville properties. The renewals programme for the schemes will increase costs over the lifetime of this Strategy, and the renewals programme will continue to be refined when more condition data becomes available over the years to defer any renewals for as long as is practical and economical.

Operating expenditure for the years 2018 to 2048 is approximately \$53 million.



76 | Page

Capital expenditure for the years 2018 to 2048 is as follows:



Most likely scenario

Option 1: Enhanced status quo

Institute an affordable renewals programme that:

- meets consent conditions; and
- addresses any backlog of renewals required over time refining the renewals programme.

- preliminary condition assessments completed by 2021;
- detailed assessments with preferred approach by 2023; and
- the renewals programme for the schemes will increase costs over the lifetime of this strategy, and the renewals programme will continue to be refined when more condition data becomes available over the years to defer any renewals for as long as is practical and economical.



Impact on rates

The proposed impact on rates will be an increase of the revenue from water charged of \$224,900 (10.27%) in 2018/2019.

One of the larger level of service projects requires the water take, pumps, telemetry and reticulation to be upgraded, a Magflow meter installed and a resource consent variation obtained for water abstraction.

11.7.3 Ruawai

Issues

The Ruawai Water Supply system has 251 connections and services approximately 500 people. Much of Ruawai's water supply infrastructure is aged and needs renewing. Ruawai's relatively small and likely declining population, will make affordability challenging.

Ruawai's water supply complies with Drinking-water Standards for New Zealand 2005 (Revised 2008).

Implications

Ruawai's water system is funded by a targeted rate on Ruawai properties. To maintain Ruawai's water supply, capital expenditure for the next 30 years is projected to be \$5.7 million of which \$5.6 million is renewal.

Operating expenditure for the years 2018 to 2048 is \$10 million.



78 | Page

Capital expenditure for the years 2018 to 2048 is as follows:



Most likely scenario

Option 1: Enhanced status quo

Institute an affordable renewals programme that:

- meets consent conditions; and
- addresses any backlog of renewals required over time refining the renewals programme.

- preliminary conditions assessments completed by 2021;
- detailed assessments with preferred approach by 2023; and



• the renewals programme for the schemes will increase costs over the lifetime of this Strategy, and the renewals programme will continue to be refined when more condition data becomes available over the years to defer any renewals for as long as is practical and economical.

Impact on rates

The proposed impact on rates will be an increase of the revenue from water charged of \$45,000 (36.56%) in 2018/2019.

11.7.4 Maungaturoto

Issues

The Maungaturoto water supply services approximately 895 people. There are in total 447 connections; 410 from the township and 37 from the Railway Village. Raw water (i.e. untreated water) is also supplied to Fonterra.

The age of the infrastructure, a backlog of deferred renewals and affordability are the key issues.

Programmed work

Maungaturoto's water supply does not comply with the Drinking-water Standards for New Zealand 2005 (Revised 2008) (DWSNZ)), and is on course for compliance after a full year cycle monitoring of the newly installed UV lamp outage alarms i.e. whilst the water quality complies with the DWSNZ, a period of 12 months is required to demonstrate this. Operational adjustments and installation of a supervisory control and data acquisition (SCADA) system to bring the plant up to standard is complete.

Implications

Maungaturoto's water system is funded by a targeted rate and a volumetric charge on Maungaturoto properties. Fonterra uses approximately 75% of the water consumed.

Operating expenditure for the years 2018 to 2048 is approximately \$24 million.



Capital expenditure for the years 2018 to 2048 is as follows:



Most likely scenario

Option 1: Enhanced status quo

Institute an affordable renewals programme that:

- meets consent conditions; and
- addresses any backlog of renewals required over time refining the renewals programme.

- preliminary conditions assessments completed by 2021;
- detailed assessments with preferred approach by 2023; and
- the renewals programme for the schemes will increase costs over the lifetime of this Strategy, and the renewals programme will continue to be refined when more condition data becomes available over the years to defer any renewals for as long as is practical and economical.



Impact on rates

The proposed impact on rates will be an increase of the revenue from water charged of \$125,200 (31.73%) in 2018/2019.

Fonterra is charged \$485,000 (excluding GST) annually for water supplied from Maungaturoto's water scheme.

11.7.5 Mangawhai

Issues

Mangawhai has a small water scheme with only 18 connections. The scheme primarily provides potable water to the Mangawhai Heads Camp Ground, Wood Street shops and community housing. Maintaining water services for a small number of users means high costs, with relatively little benefit for the wider community.

Mangawhai's water supply is on course to comply with the Drinking-water Standards for New Zealand 2005 (Revised 2008) after the installation of a new cartridge filter and UV water treatment plant in December 2016

Programmed works

A sum of \$10,000 is provided in 2020/2021 Capital Works Programme to renew part of the reticulation in addition to the yearly \$1,500 for compliance type level of service minor works from 2018 to 2021.

Implications

Mangawhai's water system is funded by a targeted rate on Mangawhai properties.

Maintaining and renewing the water service has cost implications, however reducing services would mean current users would need to secure alternate water sources.

Operating expenditure for the years 2018 to 2048 is approximately \$4.0 million.



82 | P a g e

Capital expenditure for the years 2018 to 2048 is as follows:



Most likely scenario

Option 1: Enhanced status quo

Institute an affordable renewals programme that:

- meets consent conditions; and
- addresses any backlog of renewals required over time refining the renewals programme.

- preliminary conditions assessments completed by 2021;
- detailed assessments with preferred approach by 2023; and



• the renewals programme for the schemes will increase costs over the lifetime of this Strategy, and the renewals programme will continue to be refined when more condition data becomes available over the years to defer any renewals for as long as is practical and economical.

Impact on rates

The proposed impact on rates will be an increase of the revenue from water charged of \$4,300 (27.04%) in 2018/2019.

The proposed impact on rates for the next three years will be negligible whilst alternatives for funding and/or provision of service are investigated.

The proposed impact on rates if the renewal programme is fully funded would be, we believe, unaffordable to the community e.g. \$12,000 in year 2019/2020 across 18 connections.



12 Technology and trends for infrastructure

Outlined below are some possible technological advances and trends which could affect the management of Kaipara's infrastructure over the next 30 years:

12.1 Roading

12.1.1 Technology

- Improved construction materials;
- Real time data collection systems for roads;
- Engineering design improvements and changes;
- Technology that changes work patterns, assists in longer life of assets, and reduces renewal programmes;
- Three- and four-dimensional design systems introducing new ways of designing roads;
- Intelligent transport systems (ITS) in which information, data processing, communication, and sensor technologies are applied to transport infrastructure, vehicles and users (so they can sense each other and communicate);
- Development technology to use roadways to generate energy for example roads acting as solar panels; and
- The usage of Unmanned Aerial Vehicles (UAV's) to carry out surveys, network screening, quality assurance, emergency response assessment, etcetera.

12.1.2 Trends

- Movement towards regional management of roading networks in New Zealand;
- Focus on Transport customers and what they need from the network, why and when, a change from managing the network to managing the activity and providing the appropriate means;
- Focus on economic benefits of roading networks;
- Focus on infrastructure resilience particularly in dealing with natural disasters and weather events;
- New funding models including user pays systems to fund uptake of new technology and road improvements;
- Design and planning to adapt to changing conditions, including climate change;
- Public interest in the environmental impact of road use; and
- Greater use of public transport where available or integrated transport solutions e.g. road and rail.



85 | P a g e

12.2 Water

12.2.1 Technology

- Technological improvements in treating raw water;
- Improved technology in water monitoring;
- Improved technology for conserving, purifying, recycling, reclaiming and desalinating water; and
- Improved technology in stand-alone (private) systems.

12.2.2 Trends

- Higher standards for drinking water quality and monitoring (as part of national drinking water standards);
- Water conservation becoming more of a focus, and water being used more efficiently;
- Recycling and reuse of water;
- Rainwater harvesting;
- Water becoming more regulated; and
- Increased interest in stand-alone private water systems and storage.

12.3 Wastewater

12.3.1 Technology

- Improvements to membrane filtration resulting in very high quality wastewater treatment;
- Improved technology and techniques in pipeline rehabilitation;
- Low pressure wastewater systems which eliminate the need for deep pipe systems;
- Improved technology in self-contained private wastewater systems (e.g. composting toilets); and
- Control of pressure systems discharge by timed and sectional discharge.

12.3.2 Trends

- Membrane filtration and other treatment technology becoming more affordable;
- Higher environmental standards for discharge from wastewater systems into waterways; and
- Increased interest and affordability in stand-alone private wastewater systems and storage.



12.4 Stormwater

12.4.1 Technology

- Low impact design stormwater management mimicking the natural environment and reducing the impact of stormwater run-off and discharge on the environment;
- Climate change predicted to increase the risk, magnitude and frequency of extreme weather events;
- Stream restoration and riparian planting replacing standard, lined stormwater channels; and
- Treatment drain systems which use two or more treatment methods, such as ground soakage and riparian planting, to improve discharge quality.

12.4.2 Trends

- Focus on working with the natural environment to provide effective stormwater systems, and to lessen environmental impacts;
- Rising environmental standards for discharge into waterways; and
- Increased interest in private, self-sufficient stormwater systems.

12.5 Flood protection

12.5.1 Technology

- Temporary or semi-permanent flood resilience technology that can be used in extreme conditions including barriers, protection walls and flood products;
- Smart technology systems in which information, data processing, communication and sensor technologies are applied to flood protection and water level monitoring;
- Changes in engineering and design of flood protection systems e.g. three- and four- dimensional design systems; and
- Flood protection systems that focus on working with the natural environment.

12.5.2 Trends

- Climate change predicted to increase the risk, magnitude and frequency of extreme weather events;
- Increasing interest in the role of flood protection to support primary industries and communities;
- Holistic approach to flood risk management adaptable and flexible systems; and
- New approaches towards 'living with' flooding rather than 'defending from' flooding, for example by making more space for water or enhancing the resilience of buildings and environments.