

## Understanding the affordability of improved wastewater management

A study of the affordability of the proposed wastewater solution project in Central Hawke's Bay

NZIER final report to Central Hawke's Bay District Council

16<sup>th</sup> August 2019



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## Authorship

This paper was prepared at NZIER by Peter Clough & Dion Gamperle.

It was quality approved by Mike Hensen.



L13 Willeston Tower, 22-28 Willeston Street | PO Box 3479, Wellington 6140  
Tel +64 4 472 1880 | [econ@nzier.org.nz](mailto:econ@nzier.org.nz)

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## Key points

Central Hawke's Bay District Council (CHBDC) is responsible for managing the wastewater generated by communities in the Central Hawke's Bay District. The community of Waipawa has been unable to consistently achieve compliance with resource consent conditions for the discharge of its wastewater in recent years. An Environment Court order was issued in 2017 requiring the determination of a solution to enable compliance with these resource consent conditions.

The Council has examined several options and reduced them to two preferred options: upgrading separate wastewater treatment plants in Waipukurau, and another in Waipawa handling flows from Waipawa and Otane, or constructing a combined plant at Waipawa handling flows from all three townships.

Upgrading separate plant at Waipawa and Waipukurau has lower present value costs over the first 10 years but a combined plant would be less costly over 30 years. Separate plant upgrades provide short term relief of burden on current residents at the expense of higher costs in the longer-term future, when expected growth in population and housing should allow costs to be spread more widely. The costs of either option are far higher than provision for wastewater upgrades in the Council's Long Term Plan. There is a substantial funding shortfall that needs to be filled to cover the investment needed to upgrade or construct these new plants to meet community aspirations, growth, consent requirements and long-term environmental needs.

The cost of the current projects (on an annual basis) would result in substantial additions to the rates burden on connected households in the District. Rates paid by connected properties are already a proportionately greater share of incomes than the national average share of 2.7%, equivalent to around 4-6% of mean household income in the areas with wastewater networks. The rates share could rise to around 9% of household income in some areas with implementation of the proposed projects. These impacts are sufficiently large to affect spending in the District, and associated incomes, jobs and well-being.

This report comments on the Productivity Commission's recent discussion paper on local government funding that discusses the challenges faced by local government in meeting infrastructure needs in an affordable way. That paper provides a general overview but has little detail relevant to Central Hawke's Bay.

Available statistics on Central Hawke's Bay show average incomes of resident households are well below the regional and national averages, and property rentals are proportionately greater than across New Zealand at large. Unemployment is low in some areas within the District but much higher in others and the resident population also has higher than national average proportion in the 65 and older age group.

Economics has no definitive rules to determine what is affordable in provision of public services, and this is usually set by the political process. But it does provide circumstantial evidence that the affordability of these wastewater upgrades is challenging for CHBD's wastewater-connected residents whose existing rates are already above the national average share of household incomes and who face rate increases higher than the national average. It would be prudent for Council to investigate grants from the Crown, regional council or other sources that it might apply to for capital funding for this project.

# Contents

1.	Introduction.....	1
2.	Dimensions of economics.....	3
2.1.	Well-being in economics.....	3
2.2.	Efficiency in economics.....	4
2.3.	Affordability in economics.....	4
3.	Economic characteristics of Central Hawkes Bay District .....	6
3.1.	Population and households .....	6
3.2.	Income, employment and housing costs.....	7
4.	Wastewater treatment provision in Central Hawke’s Bay District .....	11
4.1.	The problem to be addressed.....	11
4.2.	Existing wastewater charges .....	12
4.3.	Affordability impacts of proposed options.....	15
4.4.	What relief can external funds provide? .....	18
5.	Conclusions.....	20
6.	References.....	21

## Appendices

Appendix A Methodology .....	20
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## Figures

Figure 1 Age profile of the region.....	10
Figure 2 Distribution of total rates in Waipukurau.....	13
Figure 3 Distribution of total rates in Waipawa .....	14
Figure 4 Distribution of total rates in Otane.....	14
Figure 5 Variations in Public Private Partnerships.....	19
Figure 6 Geographic units of the Central Hawke’s Bay .....	23

## Tables

Table 1 Current and forecast population in Central Hawkes Bay .....	6
Table 2 Current and forecast households in Central Hawkes Bay .....	7
Table 3 Average household income, unemployment rate and housing costs 2018.....	8
Table 4 Preferred options for the wastewater plant upgrades .....	11
Table 5 Total and mean rates of wastewater connected properties .....	13
Table 6 Impact on resident households’ incomes of rate rises to cover capital costs .....	15
Table 7 Impact on resident households’ incomes of rate rises to cover total project costs .....	16
Table 8 Rise in average household rates with varying external grants .....	18

# 1. Introduction

This report assesses the economic effects and affordability of the proposed improvements to the Central Hawke’s Bay District Council’s (CHBDC) wastewater treatment plants in Waipukurau, Waipawa and Otane. The community of Waipawa has been unable to consistently achieve compliance with resource consent conditions for the discharge of their wastewater in recent years. An Environment Court order was issued in 2017 requiring the determination of a solution to enable compliance with these resource consent conditions.

These breaches have not significantly affected surface water quality yet, but may do in future if the population increases. The Council’s Long Term Plan identifies these three settlements as having available land to accommodate housing growth from anticipated movement of people into the district for lifestyle purposes, and also to meet the demands for smaller and more manageable housing from an ageing population.

The Council has examined various options for improving discharges from its wastewater treatment plant with the assistance of Beca and Lowe Environmental Impact (LEI). Further refinement has focused on a combination of rapid infiltration beds and upgraded bio-nutrient removal plant, either a combined plant serving all of Waipukurau, Waipawa and Otane or two separate plant serving Waipukurau alone and Waipawa and Otane combined. All options considered will cost much more than has been provided for in the District’s Long Term Plan, raising questions about their affordability and their impacts on the community.

The relevance of economics to decisions on consenting under the Resource Management Act (RMA) stems principally from references to enabling economic well-being in section 5 and to efficiency in section 7(b). Well-being in economic terms is related to people’s consumption possibilities, both of marketed goods and services and of other less tangible non-market effects, such as the contributions to quality of life derived from the state of the natural environment, including water quality. Efficiency is about obtaining greatest value from use or non-use of available resources, where value covers both marketed and non-market effects. The RMA can be viewed as a process for assessing and controlling effects that are not managed in markets, such as those that economics terms “externalities” that fall on third parties.

## A bigger infrastructure funding picture

In July 2019 the New Zealand Productivity Commission issued a draft report on *Local government funding and financing*. This assessed cost pressures faced by local authorities and drafted recommendations for future funding.

The report finds the current local government funding framework is broadly sound, and endorses rates as the predominant source of local government funding, as they are simple to administer, efficient and tied to territorial jurisdictions. But it also recommends new tools and financial arrangements where existing tools are insufficient to meet key pressures, which it identifies as:

- supplying enough infrastructure to support rapid urban growth;
- adapting to climate change;

- coping with the growth of tourism and its highly seasonal demands;
- the accumulation of responsibilities placed on local government by central government, particularly with regard to higher expectations for human health and environmental outcomes.

The Commission finds that for New Zealand local councils as a whole, although expenditure has been rising over time in line with growth in population and incomes, rates have remained relatively stable as a proportion of per capita household incomes “despite widespread concerns to the contrary”. Nevertheless, some councils face challenges in upgrading or renewing large infrastructure from a limited rating base, and there is a case for new funding instruments where councils provide public goods used by people who do not contribute to their upkeep (e.g. transient tourists) or where the attainment of health and environmental standards provides benefits with a wider national significance.

The Commission’s report includes a case study specific to the three waters (potable, waste and storm) which highlights the challenges of improving outcomes for environment and human health involving large fixed infrastructure networks. Some small communities face potentially very large costs, but the legislative framework imposes constraints in meeting the cost of these challenges. For example, although volumetric charging for water has been associated with sizeable reductions in consumption and deferment of new capital investments in places like Kapiti Coast and Tauranga, most councils are not legally allowed to apply volumetric charges to wastewater, which means that obligations to pay for wastewater services are mediated through the rating process and may not be distributed in ways that place most responsibility on those users who make greatest demands on the infrastructure.

The Commission also argues that a strong case can be made for many councils, to aggregate supply of these services across council boundaries to enable economies of scale to be realised in water and wastewater operations. Where councils prefer to retain ownership of the network assets in their jurisdictions, such trans-boundary benefits could be obtained with management contracts to organisations spanning different districts.

The Commission report does not specifically mention the Central Hawkes Bay District, but it does set the scene for wider consideration of funding infrastructure improvements. Its recommendations are not binding on Government but may influence a wider review on the provision of three waters services that is currently being undertaken.

For this report, however, we consider costs and affordability on the assumption that current funding arrangements prevail into the foreseeable future.

The report proceeds by defining some economic terms, before outlining the socio-economic characteristics of the communities in Central Hawke’s Bay District (CHBD) and their ability to bear the costs of upgrades to the treatment plant. It then examines the provision for wastewater management in the Long Term Plan, the incremental increase implied by the plant upgrades, and the implications for different timing arrangements for spreading costs across different types of ratepayer, both currently and across time. Finally, it discusses the implications of resource use efficiency of seeking higher cost treatment in the context of the wider catchments and the conditions across the district.

## 2. Dimensions of economics

The purpose of this report is to examine options for wastewater investments and alternative payment profiles and consider their contribution to community well-being, their efficiency and their affordability for the district's residents.

### 2.1. Well-being in economics

Government this year released what it called its first Well-being Budget, putting into effect a Living Standards Framework that the Treasury has been developing since 2011. This aims to broaden the focus of the budget from traditional economic measures like growth in Gross domestic product (GDP) to a broader range of social outcome measures.

In economics, well-being is synonymous with the technical term “economic welfare,” which is the notional sum of all individuals’ well-being, encompassing people’s opportunities for consumption of goods available through markets, of public services provided with open access by collective funding, and the availability of less tangible non-market services of natural ecosystems that contribute to people’s quality of life. Access to markets and publicly funded services depend on individual and collective capacity to pay within the community, which is principally measured through local incomes.

Income depends on the availability and productivity of employment in the District, and any transfer payments obtained from outside it (such as social welfare benefits). It can either be measured through surveys or censuses of residents in a district, or inferred from the economic accounts used for measuring economic value added, or GDP. GDP consists of the following principal components:

- Employee compensation, comprising salaries and wages for labour
- Fixed capital consumption, a measure of economic depreciation or the amount of repairs and maintenance required to offset the wearing out of capital equipment and plant
- Operating surplus, which is a profit measure from which business owners pay dividends on capital and fund expansion of their businesses
- Indirect taxes paid to government, net of subsidies received from government, where these are embedded in market prices and difficult to extract from them (like excise taxes, road user charges and financial assistance from the land transport fund).

As business owners may reside outside the District, employee compensation is the principal source of income in the district.

Water quality improvements create benefits for the District in reducing the costs of extracting, treating and using it, and also by creating benefits for amenity, recreation, biodiversity and the cultural sensitivities of tangata whenua. In the case of wastewater treatment in Central Hawkes Bay, for instance, if future residents have to travel to the Ruahines to find freshwater of a quality to partake in water-based recreation, they will face costs of travel expenses and time that detract from their ability to pay for other

things. This would reduce their well-being compared to a situation where there is water of suitable quality closer to home.

If it results in less spending in the district it will also detract from the incomes of others dependent on that spending. Hence deteriorating freshwater quality detracts from the district's economic well-being, both from the effect of loss of opportunity or increased costs for those directly affected, and the indirect effects of how this disrupts other spending patterns, businesses and incomes derived from them across the district.

The economic value of such environmental benefits is not fully expressed through markets so the RMA provides a process for determining public preferences for environmental outcomes, even where changes in such outcomes cannot be readily quantified or approximated in monetary terms. While there are techniques that infer values for non-market effects, these are site specific and costly to undertake, and in New Zealand too varied in subject matter and method used to provide a reliable pool of values for application in areas other than where they were derived.

## 2.2. Efficiency in economics

Efficiency in economics is obtained by maximising the value of outputs from available inputs, or minimising the inputs for a given level of outputs. Efficiency is achieved when the marginal value of an additional unit of outcome is just equal to the marginal cost of achieving it. This is the principle applied in economic cost benefit analysis, although implementation may vary according to what can feasibly be measured and included in such analysis. In the case of wastewater treatment in Central Hawkes Bay, where discharge breaches are not yet having significant effect on the quality of water and there are no ready values to apply to water quality improvement, options can still be compared in terms of their cost effectiveness. In that case efficiency is achieved by selecting the option that achieves a given outcome at lowest cost over time.

## 2.3. Affordability in economics

Affordability relates to individual's or the community's ability to pay for new services from which they will benefit. It is commonly measured through ratios of income to cost of a service. For instance, it has been common to refer to a housing affordability index when viewing wide swings in house prices. The simplest such index is formed by dividing the median house price in a region by the median income of people in the same region, to characterise the ease or difficulty with which a resident population can pay for housing. Slightly more sophisticated affordability indexes can be constructed from median annual housing costs (including rents and mortgage repayments, rates and utility services) divided by median incomes, sometimes divided into sub-groups of household types (single occupants, couples, families, other etc).

The Productivity Commission Report (2019) also discusses affordability, primarily focusing on the distribution of project costs or rating liabilities across household types and their impact on the most vulnerable households. It assesses current practice in terms of some guiding principles, chief of which is that costs of local government services should be borne in proportion to benefits received from them in the first instance, with a secondary consideration of making adjustments to lighten impacts on vulnerable households that would suffer most distress from such a primary

distribution. However, the Commission argues that Central Government is best placed to influence income distribution through its broad tax and benefits systems, through measures such as the housing supplement. Local government with its narrower ratepayer tax base has limited capacity for changing income distribution.

This report examines affordability by considering how much the options for improved wastewater treatment increase charges borne by connected households, primarily to consider the affordability of options for the community at large, rather than the impacts on specific households. This is to inform considerations of efficiency (which option delivers improvement at lowest costs) and well-being (which option detracts least from resident's other consumption opportunities). Such aggregate increases can be compared against existing annual rating payments and also against the average incomes of the households affected to identify broad implications for cost distribution and affordability.

## 3. Economic characteristics of Central Hawkes Bay District

Central Hawkes Bay District (CHBD) covers an area of 3,324 km<sup>2</sup> stretching between the coast and the Ruahine Range. Principal land uses are pastoral farming in the hill country and vegetables and fruit growing in the flatter areas. In 2017 it had a population of 13,720, and growth in population and housing is expected as an ageing population shifts to smaller households and new residents arrive for lifestyle purposes.

The main settlements in CHBD are Waipukurau, Waipawa and Otane, which are located close together on State Highway 2. These settlements have ample land for housing growth and Council's Long Term Plan is oriented to providing the infrastructure to support it. However, Council has a recurring problem with complying with the current consent conditions at the Waipukurau and Waipawa wastewater treatment plants, necessitating upgrades in dealing with wastewater that are not provided for in the Long Term Plan.

### 3.1. Population and households

Table 1 shows the current and forecast population to 2048, as reported in the Long Term Plan. The growth rate (annual average percentage change or aapcc) in all areas is forecast to be higher in the first 10 years to 2028 than in the following 20 years to 2048. The highest growth is expected in Otane and other Eastern District Rural Areas.

**Table 1 Current and forecast population in Central Hawkes Bay**

	2017	2028	2048	aapcc 2017- 2028	aapcc 2017- 2048
Waipukurau	5,035	5,250	5,560	0.4%	0.3%
Waipawa	2,505	2,535	2,615	0.1%	0.1%
Otane	615	710	755	1.3%	0.7%
<b>Sub-total main townships</b>	<b>8,155</b>	<b>8,495</b>	<b>8,930</b>	<b>0.4%</b>	<b>0.3%</b>
Coastal/Rural Townships	1,900	1,920	1,925	0.1%	0.0%
Porangahau Rural Township	235	255	335	0.7%	1.2%
Other Eastern District Rural Areas	195	250	355	2.3%	2.0%
Takapau Rural Township	530	535	545	0.1%	0.1%
Western District Rural Townships	2,025	2,035	2,055	0.0%	0.0%
Other Western District Rural Areas	680	710	755	0.4%	0.3%
Rest of district sub-total	<b>5,565</b>	<b>5,705</b>	<b>5,970</b>	<b>0.2%</b>	<b>0.2%</b>
<b>Combined total</b>	<b>13,720</b>	<b>14,200</b>	<b>14,900</b>	<b>0.3%</b>	<b>0.3%</b>

Source: NZIER drawing on CHBDC Long Term Plan and Economic Solutions (Table 5) data

Table 2 shows the corresponding growth rates for the number of households reported in the Long Term Plan. The annual average growth rates are higher than for population, reflecting an expected trend to smaller households, declining from an average of around 2.5 occupants per household in 2017 to 2.3 in 2028 and 2.2 in 2048. As with population, growth is expected to be greater in the 11 years to 2028 than the following 20 years to 2048, and the highest growth is expected to be in Eastern District Rural Areas, Porangahau Rural Township and Otane. However, the largest forecast increase in the number of households is in Waipukurau, which is expected to gain 325 by 2028 and a further 205 by 2048.

**Table 2 Current and forecast households in Central Hawkes Bay**

	2017	2028	2048	aapcc 2017- 2028	aapcc 2017- 2048
Waipukurau	2,040	2,295	2,500	1.4%	0.8%
Waipawa	1,015	1,080	1,175	0.8%	0.6%
Otane	250	310	340	2.4%	1.1%
<b>Sub-total main townships</b>	<b>3,305</b>	<b>3,685</b>	<b>4,015</b>	<b>1.3%</b>	<b>0.7%</b>
Coastal/Rural Townships	770	825	865	0.9%	0.5%
Porangahau Rural Township	95	120	150	2.6%	1.7%
Other Eastern District Rural Areas	80	150	160	7.9%	2.9%
Takapau Rural Township	215	220	245	0.2%	0.4%
Western District Rural Townships	820	850	925	0.4%	0.4%
Other Western District Rural Areas	275	310	340	1.3%	0.7%
Rest of district sub-total	2,255	<b>2,475</b>	<b>2,685</b>	<b>1.1%</b>	<b>0.6%</b>
<b>Combined total</b>	<b>5,560</b>	<b>6,160</b>	<b>6,700</b>	<b>1.2%</b>	<b>0.7%</b>

Source: NZIER drawing on CHBDC Long Term Plan and Economic Solutions (Table 3) data

The Productivity Commission report (2019) in its Figure 2.4 based on Statistics New Zealand forecasts, Central Hawkes Bay having negative population growth from 2018 to 2038, following a period of positive growth between 1996-2018. These forecasts are driven primarily by population age structure and reflect broader regional trends in population movement rather than expectations based on local economic factors.

## 3.2. Income, employment and housing costs

Income and employment statistics would normally be based on Census data, but because of the delays in release of 2018 Census data, we have estimated the incomes in 2018 by extrapolating from 2013 data using an NZIER in-house model. The results are summarised in Table 3.

Arithmetic means can be dragged up by a small number of relatively wealthy households living in the district’s rural areas beyond the reach of wastewater networks. To mitigate this risk, we use median incomes as our ‘average’ income to assess wastewater affordability. Waipukurau, Waipawa and Otane have average household incomes of \$53,470, \$50,708 and \$60,683, respectively (Table 3). These are lower than the rural areas of the Central Hawke’s Bay of Tikokino and Elsthorpe-Flemington, which have average household income over \$70,000. Conversely average household income appears very weak around Porangahau at just under \$37,000. The average income across all of Central Hawke’s Bay District is about \$61,000, about 56% of the national average.<sup>1</sup>

Two of the three townships requiring wastewater upgrades have unemployment rates higher than the national unemployment rate of 4.3 percent, as well as higher than the Hawke’s Bay regional unemployment rate of 4.8 percent. The unemployment rate is 2.5% in Waipukurau, 6.2% in Waipawa and 5.3% in Otane. Unemployment is lower at 2.3% in Elsthorpe-Flemington, but considerably higher in Porangahau at 12.5%.

The townships of Takapau, Porangahau and Te-Paerahi all have discharge resource consents for their wastewater treatment plants that expire in 2021. Funding has been set aside in the Long Term Plan (LTP) for upgrades and re-consenting, but based on the experience of this current project (for Waipukurau, Waipawa and Otane upgrades), this funding may not be adequate to reach an acceptable solution in these townships that meets expected future consent conditions and community aspirations.

**Table 3 Average household income, unemployment rate and housing costs 2018**

	Population	Household income <sup>2</sup>	Unemployment rate	Rent to income ratio
Waipukurau	4,220	\$53,470	2.5%	27%
Waipawa	2,160	\$50,708	6.2%	30%
Otane	630	\$60,683	5.3%	20%
Takapau	580	\$50,453	4.5%	27%
Tikokino	2,950	\$71,522	4.5%	22%
Porangahau	210	\$36,936	12.5%	20%
Elsthorpe-Flemington	3,390	\$70,856	2.3%	21%
<b>New Zealand</b>	<b>4,929,700</b>	<b>\$108,258</b>	<b>4.3%</b>	<b>20%</b>

Source: NZIER estimates

<sup>1</sup> Note that our estimates are lower than the average of \$82,100 (mean) or \$76,900 (median) household income in Central Hawke’s Bay, given in MBIE’s Regional Economic Activity Webtool. That however is a top down model that estimates regional growth in line with national average national growth, whereas our micro-simulation model is a bottom up model reflecting change in composition of industry and employment at the area unit level within territorial authorities.

<sup>2</sup> The appendix contains the methodology for how the household income and unemployment rate are estimated.

The average incomes of resident households are well below the regional and national averages, while Table 4 also indicates that rents as a proportion of income in the District is higher than the national average. The unemployment situation is more nuanced, as Waipukurau and Elsthorpe-Flemington have unemployment rates below the national average, and most other areas have unemployment a little above national average, with the notable exception of Porangahau which is well above. Taken together, these statistics suggest there is limited capacity to take on new costs for wastewater upgrades

One thing these estimates do not account for is the proportion of properties owned by people normally resident outside the District, who retain properties for their own use or short term holiday lets and whose ability to pay is independent of the local economy. However, it would take a sizeable proportion of such absentee owners to significantly reduce the costs borne by local residents for wastewater upgrades.

Another factor affecting the ability of local residents to bear further wastewater cost burden is that the Central Hawke's Bay's population is older than the majority of New Zealand, as illustrated in Figure 1. With 40 percent of their populations aged 40 years and older, the towns of Waipukurau, Waipawa and Otane have significantly older populations compared to New Zealand as a whole, where only 33 percent are older than 40. By 2038, 50 percent of the population in the three towns will be 40 years and older.

The Productivity Commission (2019) argues that, contrary to popular conception, retirees are not as income-constrained as young working age adults at the start of their careers, as older age groups on average have more accumulated savings to provide investment income and potential draw-down of funds. That may be true in terms of funds available in any one year, but that omits the importance of stage in the life-cycle. Older age groups have more funds to call on, but these have been accumulated through saving to cover the "dissaving" that occurs in providing income from drawdowns over retirement, when capacity for earning income from labour goes down and some household expenses go up (e.g. on health services).

Retired households may be able to find the money required to pay more for wastewater upgrades in the short term (although their savings are often in illiquid form, such as houses and long term Kiwisaver accounts) but they have less capability and time over which to make good the reduction in savings for their future. Young adults, in contrast, may struggle to meet extra payments in the short term but have a lot of years of spending and savings decisions ahead of them to recover from the short term imposition. They may be more sanguine about borrowing against expected rise in future income, or forgoing other spending to ease the short term pain.

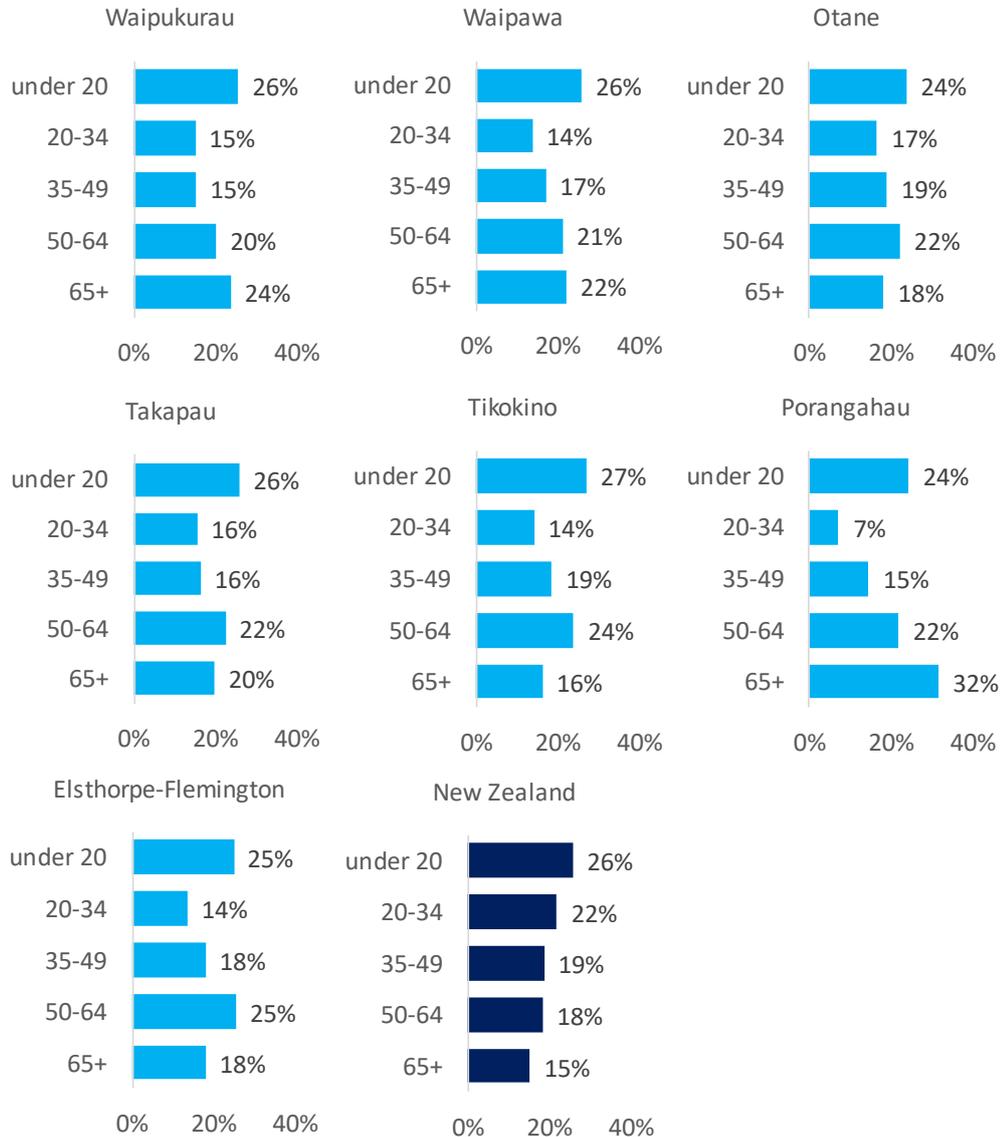
The British economist John Hicks once defined income as resources which can be consumed without being left worse off,<sup>3</sup> but asking retirees to draw down savings to pay for wastewater infrastructure that will outlast them and deliver services long after they need them, is likely to leave them feeling worse off and deprived of capacity for future consumption. For this reason, age distribution and the proportion of the population of 65 or older is still a useful marker of affordability challenges, as many of these individuals will be relatively income constrained even if asset rich, and will argue

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<sup>3</sup> JR Hicks (1939) *Value and Capital*, Oxford University Press

difficulty and possibly unfairness in being expected to pay for changes in infrastructure provision late in their earning careers.

**Figure 1 Age profile of the region**



Source: Statistics NZ

Figure 1 shows that all the statistical areas in Central Hawke’s Bay have proportions of the population of 65 years or old greater than the national average. This is particularly apparent for Waipukurau, Waipawa and Porangahau, which are all settlements likely to face large costs associated with wastewater upgrades as growing shares of residents enter retirement with reduced income capacity.

## 4. Wastewater treatment provision in Central Hawke's Bay District

### 4.1. The problem to be addressed

The most pressing wastewater issue that needs rectifying in the District is breaches of discharge consents by the Waipawa wastewater treatment plant. The Council has engaged Beca in partnership with Lowe Environmental Impact to investigate alternative possible solutions to address this issue. In a recent Memo<sup>4</sup> the potential solution had been whittled down to 7 scheme options. Out of these Beca with Central Hawke's Bay District Council and the community reference group narrowed the choice to between two preferred options, one with separate plant serving Waipawa/Otane and Waipukurau, and one with a single enlarged Waipawa plant combining the treatment from all townships.

**Table 4 Preferred options for the wastewater plant upgrades**

	Separate plant	Combination plant
Capital expenditure 2019 \$m	53.3	46.8
Capital expenditure PV \$m	42.6	38.5
Annual Operating expenditure in Year 1 \$m	0.1	0.1
Operating expenditure Present Value \$m	28.9	27.3
<b>30 year Net Present Value PV \$m</b>	<b>58.1</b>	<b>52.2</b>

Source: NZIER drawing on Beca Memo ref 3255239

To put this in perspective, the Council's wastewater infrastructure plan provides for spending of \$13.117 million over the 2018-2028 Long Term Plan, with annual amounts varying between \$0.6 million and \$3.2 million over that 10 year period. The costs of these upgrade options were unforeseen at the time of the Plan's finalisation, so they are additional to the Plan's provisions, apart from some small operational costs that would be saved in the existing network if the new upgrades were installed.<sup>5</sup> An allowance of \$2.1 million has been made in the capital programme of the Long Term Plan for minor improvements, but there is a substantial funding shortfall in the Plan to cover the investment needed to remediate these wastewater plant failings.

The District Council aims for a balanced budget in its Long Term Plan, with revenue matching or exceeding spending across the plan. It also uses its rates collection to smooth the burden of cost items over time so there are not large variations from year

<sup>4</sup> From John Crawford to Darren de Klerk, 12 June 2019, Ref 3255239

<sup>5</sup> These savings have been taken into account in the total project 30 year NPV in Table 4 above (Capex + Opex – Savings).

to year. It is also mindful that, despite population growth, the population is getting older and will have increasing shares of retirees on fixed incomes in future.

Apart from the wastewater plant and networks serving Waipukurau, Waipawa and Otane, there are three other small wastewater networks in the District, at Porangahau, Te Paerahi and Takapau. Wastewater plant and reticulation networks tend to exhibit substantial economies of scale, which makes them particularly burdensome for small communities with few clients across which to spread the costs.

The Council employs a harmonised uniform annual charge targeted on properties connected to its networks in order to reduce the burden on smaller communities: upgrade costs for a small community network are shared with those connected to larger networks. In this case that distribution would work in reverse, with smaller communities facing increase in charges for upgrade of plants serving larger communities. A small community facing large upgrade costs on its own plant is relieved by the upgrade costs being spread across a wider ratepayer pool; conversely, although it contributes to costs of other communities' network upgrades, its proportional share of those other communities' costs remains small.

The council normally uses targeted rates to sheet home the cost of facilities to those who benefit from them. It also uses development contributions to recover costs incurred to meet new demands from those who create those demands. The scale of the potential options for upgrading the wastewater plants at Waipukurau, Waipawa and Otane is substantial relative to the commitments already provided for in the Long Term Plan. There is a funding gap that needs to be filled, but also managed so that repayments of affected households are affordable and do not unduly impact on these residents' well-being.

Council is considering a number of ways to reduce the imposition on current ratepayers, such as taking on debt to spread the costs over future beneficiaries of the wastewater improvements, seeking government support through the Provincial Growth Fund, or entering into public/private partnerships such as Design-Build-Operate arrangements with private suppliers (see section 4.4 below).

## 4.2. Existing wastewater charges

The distribution of current rating revenues from wastewater-connected properties in Central Hawkes Bay District is summarised in Table 5. The figures come from CHBDC data for connected properties. We focus on residential properties for the three towns and for the rest of the District, as residential is the principal category for which affordability can be assessed from current payments and future liabilities. The figures for the towns of Waipukurau, Waipawa and Otane, are those which have a street address there, and they include those for which the ratepayer address may be out of town (as may be the case for rental property owners).

The table shows that residential properties account for 80% of the revenue gathered for wastewater services, the balance coming principally from a mix of commercial, industrial and official (public agency) properties and semi-rural lifestyle properties on the edge of town.

Figures 2-4 show the distribution of total rates paid by wastewater-connected residential ratepayers in the three towns. As the charge per connected property is

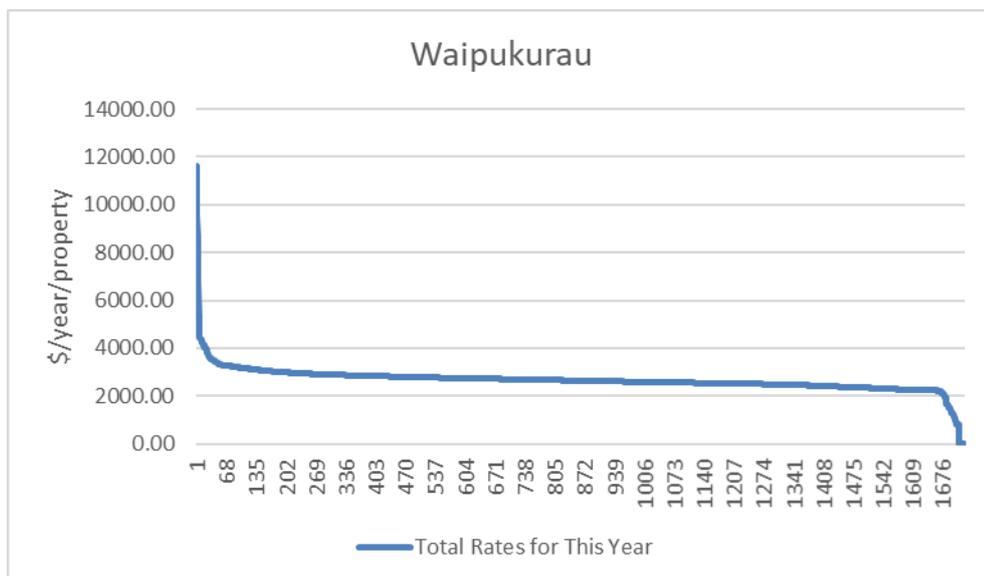
uniform apart from some differentiation by number of pans, Waipukurau, Waipawa and Otane all show a similar pattern, with a very few properties incurring high charge due to multi-unit rental properties, a broad range of properties hovering around the mean and a few paying markedly less than the mean.

**Table 5 Total and mean rates of wastewater connected properties**

	Ratepayers	Total Rates \$/year	Mean Rates \$/ratepayer
Waipukurau	1,724	4,586,058	2,660
Waipawa	780	2,092,695	2,683
Otane	243	550,111	2,264
Rest of Central Hawkes Bay	374	822,247	2,199
<b>Sub-total residential</b>	<b>3,121</b>	<b>8,051,111</b>	<b>2,580</b>
Official (public agency) properties	83	324,248	3,907
Lifestyle properties	64	188,768	2,950
Industrial properties	120	400,789	3,340
Commercial properties	151	717,193	4,750
<b>Sub-total non-residential</b>	<b>418</b>	<b>1,630,998</b>	<b>3,902</b>
<b>Total all connected properties</b>	<b>3,539</b>	<b>9,682,109</b>	<b>2,736</b>

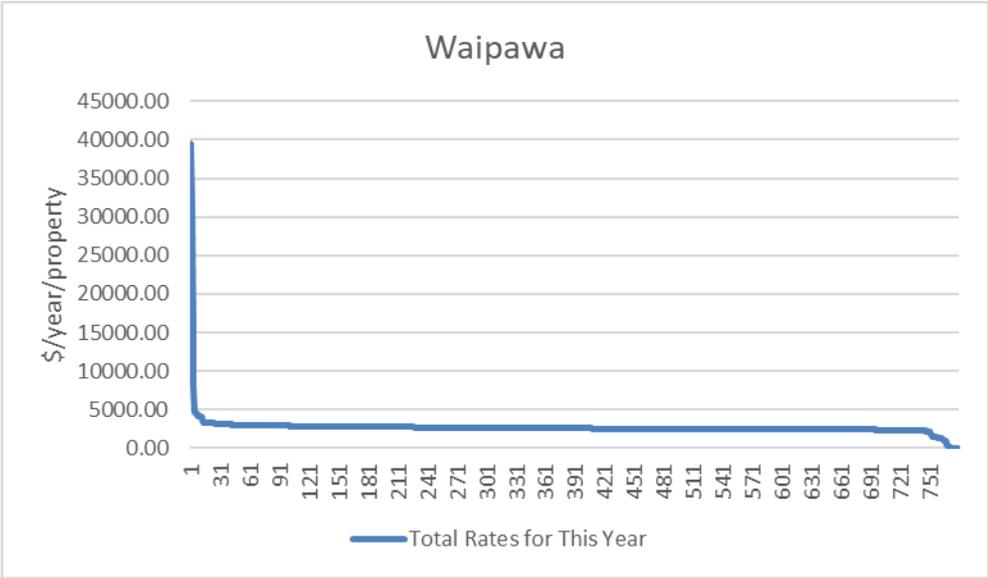
Source: NZIER drawing on CHBDC data

**Figure 2 Distribution of total rates in Waipukurau**



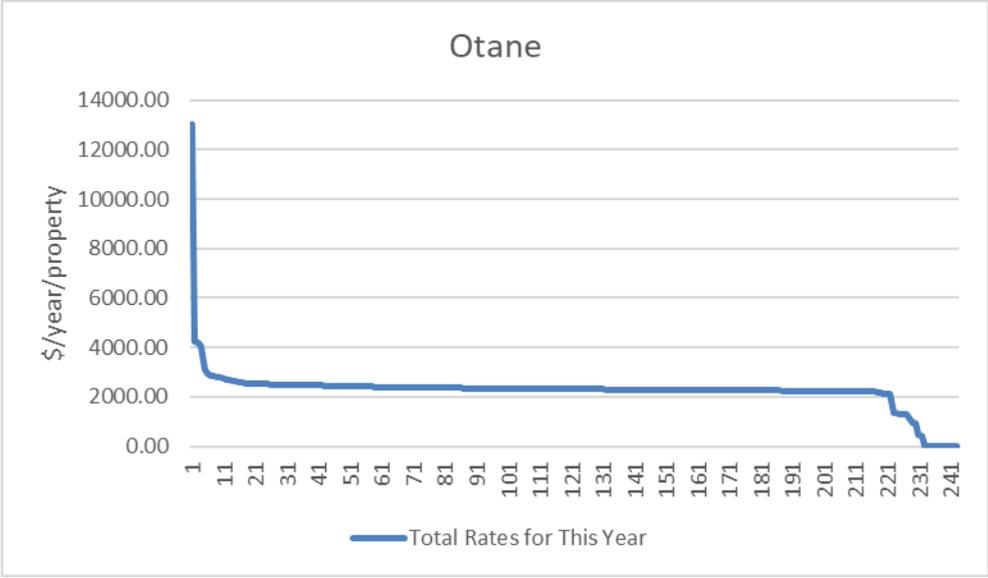
Source: NZIER drawing on CHBDC data

**Figure 3 Distribution of total rates in Waipawa**



Source: NZIER drawing on CHBDC data

**Figure 4 Distribution of total rates in Otane**



Source: NZIER drawing on CHBDC data

These mainly flat profiles of revenues mean an average charge per property in each township will be a reasonable representation of the burden across most properties.

### 4.3. Affordability impacts of proposed options

One way to assess the affordability impacts of the proposed options is to take the present value estimates of capital expenditure alone or total expenditure over the analysis period, amortise them and then calculate their impact on the current average rates faced by households in different areas (as in Table 5 above); and also their impact on the average household incomes in different areas (as in Table 3 above).

The results of that calculation are summarised in Table 6 below, which shows results for capital expenditure only of both the Separate and Combined plant options, over the first 10 years and over the full 30 years of the project’s analysis by Beca. The amortised costs would add annually on average around \$510 for the separate plant and \$622 for the combined plant in the first 10 years. The corresponding figures over 30 years average around \$543 for separate plant and \$490 for combined plant. This implies connected properties would face additions to annual rates of between 19% and 24%. These figures include GST of 15%, as this is charged on rates and represents money extracted from the district, depleting funds available for residents’ spending on other things affecting their well-being.<sup>6</sup>

**Table 6 Impact on resident households’ incomes of rate rises to cover capital costs**

Capital expenditures only		First 10 Years		Full 30 years	
		<i>Separate</i>	<i>Combined</i>	<i>Separate</i>	<i>Combined</i>
<b>Plant option</b>					
Capital spending	PV\$m	16.8	20.4	42.7	38.5
Amortised value	\$m/year	1.9	2.3	4.9	4.4
Average rate rise	Per property	20%	24%	21%	19%
Waipukurau	\$/year	526.70	641.85	559.92	505.55
Waipawa	\$/year	531.22	647.35	564.72	509.89
Otane	\$/year	448.23	546.23	476.51	430.24
Other CHB networks	\$/year	435.30	530.47	462.76	417.82
<b>Total residential</b>	<b>\$/year</b>	<b>510.77</b>	<b>622.43</b>	<b>542.98</b>	<b>490.26</b>
Public agency properties	\$/year	773.50	942.60	822.29	742.44
Lifestyle properties	\$/year	583.99	711.67	620.83	560.54
Industrial properties	\$/year	661.29	805.87	703.01	634.74
Commercial properties	\$/year	940.41	1,146.01	999.73	902.65
<b>Total non-residential</b>	<b>\$/year</b>	<b>772.57</b>	<b>941.47</b>	<b>821.30</b>	<b>741.55</b>

Source: NZIER estimates

<sup>6</sup> Note that GST would be payable on most other spending in the formal economy, so this assumption may overstate the loss to well-being. But GST is still a loss to residents if they would otherwise have used it on GST exempt spending (like rentals or capital repayments), saved it to spend on a foreign holiday or used it on informal trades with neighbours.

These results are driven by the characteristics of the plant upgrade options. Separate plant for Waipawa and Waipukurau would cost more in the long term than a single combined plant. But spending on separate plant is lower in the first 10 years than for the combined plant as separate plant incur a higher share of costs in the years 11-30.

Table 7 shows the corresponding cost increases per connected property of amortising the full additional costs of each project (both capital and operational costs) over the first 10 years and the full 30 years. This shows the average annual cost to be less over 30 years than over 10 years, because operating costs offset the variations in capital cost timing. Compared to current residential rates payments this would increase annual average payments by between 25% and 31%.

**Table 7 Impact on resident households' incomes of rate rises to cover total project costs**

Total project expenditures		First 10 Years		Full 30 years	
		<i>Separate</i>	<i>Combined</i>	<i>Separate</i>	<i>Combined</i>
<b>Plant option</b>					
Total project spending	PV\$m	26.5	33.0	58.2	51.1
Amortised value	\$m/year	3.0	3.8	6.6	5.8
Average rate rise	Per property	31%	39%	29%	25%
Waipukurau	\$/year	832.05	1,036.23	763.57	671.41
Waipawa	\$/year	839.19	1,045.11	770.12	677.17
Otane	\$/year	708.09	881.85	649.82	571.38
Other CHBD networks	\$/year	687.67	856.41	631.07	554.90
<b>Total residential</b>	<b>\$/year</b>	<b>806.88</b>	<b>1,004.88</b>	<b>740.47</b>	<b>651.10</b>
Public agency properties	\$/year	1,221.93	1,521.78	1,121.36	986.01
Lifestyle properties	\$/year	922.56	1,148.95	846.63	744.44
Industrial properties	\$/year	1,044.68	1,301.03	958.70	842.98
Commercial properties	\$/year	1,485.62	1,850.17	1,363.34	1,198.79
<b>Total non-residential</b>	<b>\$/year</b>	<b>1,220.46</b>	<b>1,519.95</b>	<b>1,120.01</b>	<b>984.83</b>

Source: NZIER estimates

These are substantial additions to the rates burden on some households. Rates paid by connected properties in Hawke's Bay are already a proportionately greater share of incomes than the national average share of rates in New Zealand (2.7%). The corresponding shares are 5% in Waipukurau, 5.3% in Waipawa, 3.7% in Otane, 6% in Porangahau and 4.4% in Takapau. The results above for capital expenditure alone would add between around 0.8% and 1.7% to rates' share of income of network-connected households, and for total project expenditures around 1.3% to 2.7%.<sup>7</sup>

<sup>7</sup> These percentage additions vary with each settlement's characteristics: Otane has the highest average household income and hence lowest percentage shares of additional charge; Porangahau has the lowest average income and highest

The potential increases in rates implied by the costs of these infrastructure upgrades are high by national standards. Statistics New Zealand's Household Expenditure Survey indicates that local authority rates comprised 3-3.6% of household incomes over the period 2007-2018, with an annual rate of increase of 4.5% compared to 2.7% annual increase in household incomes.

The Productivity Commission's report (2019) suggests a rather flatter relationship in its estimate of rates to Gross National Income (GNI) over the period since 2007 (in its Figure 3.1), but this is explicable by the different definitions used in their report. GNI is defined as gross domestic product, plus net receipts from abroad from compensation of employees, property income and net taxes less subsidies on production. Statistics New Zealand's Household income covers gross (pre-tax) total income from regular and recurring sources, including wages and salaries, receipts from self-employment, superannuation and government benefits, and also irregular sources. So, the GNI is an aggregate production-based figure covering income received by New Zealand entities from employment and investments in New Zealand and abroad. The Statistics New Zealand figures differ in being based on a survey of household units (namely owner occupied homes and holiday homes), and they include government transfer payments (such as pensions), so they will show different relative growth rates over time between household incomes and rates payments.

Although rates' share of household incomes has been relatively constant over the past 12 years, there has been critical public commentary about future increases in councils' long term plans. A Stuff New Zealand survey cited rate increases across the country in 2018/19 ranging from 2.5% in Auckland to 9.7% in Hamilton, with the all districts average around 5%, against a backdrop of 1.1% inflation.<sup>8</sup> Such commentary rarely analyses what drives rates increases, whether it be a backlog of infrastructure upgrades or new provision in anticipation of future growth, but it does indicate a level of rates increase at which at least some of the public are likely to get agitated. Rates' higher growth is on a smaller quantum of money than income growth, so the average dollar value of rates increases is smaller than the dollar value of increases in incomes.

As indicated in 2.3 above, economics has no strict rules about affordability, views on which depend on political as well as economic considerations. However, rate increases of 20% or more for a single infrastructure service upgrade (as in Tables 6 and 7) would mean CHBD's wastewater-connected ratepayers face rate increases far higher than those that trigger critical comment about rates levels and affordability at the national level. CHBD's increases also come on top of existing rates that are already above the national average to start with, at 3-6% of average household income. Affordability concerns and the potential flow on effect of reduced spending on other things in the district suggest it would be prudent for the Council to investigate Crown or regional council grants it might apply to for relief in providing capital funding for this project.

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percentage share of increased charge, and could see the amount they pay on rates and wastewater rise from 6% to 8.7% of their household incomes, depending on whether the separate or combined plant are implemented.

<sup>8</sup> <https://www.stuff.co.nz/national/politics/105458160/rate-rises-continually-outstrip-incomes-and-inflation--do-they-need-an-overhaul>; <https://www.stuff.co.nz/business/money/106621389/affordability-of-rates-worsens-new-figures-show>

## 4.4. What relief can external funds provide?

There will be some small relief in average ratepayer costs if growth in population and connected properties allows the fixed costs of upgrades to be spread more widely. To illustrate what relief might be provided by external funding towards the wastewater upgrades that does not need to be paid back by the connected ratepayers, Table 8 summarises the estimated impacts on average household charges of varying levels of external grant put towards either capital costs only or all costs (capital and operating).

This uses the same calculation framework as Tables 6 and 7 above, after deducting a share of the project costs that is funded externally. We assume external grants become available for 15%, 25%, 35% or at most 50% of the upgrade costs<sup>9</sup> and estimate the reduction of impact on household annual average rate liabilities for the different options, holding all other things constant. The results show that grants towards 50% of the project costs roughly halve the rise in average household payments on rates and wastewater charges, with proportionately lower reductions from smaller grants.

**Table 8 Rise in average household rates with varying external grants**

Total project expenditures	First 10 Years		Full 30 years	
	Separate	Combined	Separate	Combined
<b><u>Grant for capital only</u></b>				
Full cost to ratepayers	20%	24%	21%	19%
Grant for 15% capital	17%	21%	18%	16%
Grant for 25% capital	15%	18%	16%	14%
Grant for 35% capital	13%	16%	14%	12%
Grant for 50% capital	10%	12%	11%	10%
<b><u>Grant towards all costs</u></b>				
Full cost to ratepayers	31%	39%	29%	25%
Grant for 15% cost	27%	33%	24%	21%
Grant for 25% cost	23%	29%	22%	19%
Grant for 35% cost	20%	25%	19%	16%
Grant for 50% cost	16%	19%	14%	13%

Source: NZIER estimates

Regarding potential external fund sources, the government's Provincial Growth Fund is oriented towards roads and other connectivity infrastructure and excludes funding for water services. The Ministry for the Environment has a Freshwater Improvement

<sup>9</sup> Larger shares than 50% might arise if new Government funding has a Financial Assistance Rate as for roading, which varies inversely with councils' rating capacities. In that case higher impacts can be derived from Table 8: e.g. with reference to capital only for separate plant in the first 10 years, a 75% grant would reduce average rate rise from 20% with no grant to 5%, the 15% difference comprising 10% reduction from 50% grant (20%-10%) and 5% from 25% grant (20% - 15%).

Fund that might be accessible if the upgrades can be demonstrated to improve water quality in the region's rivers, but the amounts it offers are modest relative to the costs of these wastewater upgrades. The Three Waters Review announcements at the end of July 2019 hinted at new funding support for wastewater infrastructure later this year, but no details have been released as yet.

Other sources of external funding include the private sector, through public private partnerships (PPPs). These were also hinted at in the Productivity Commission report and the Three Waters Review announcement. PPPs cover a variety of arrangements with varying degrees of public and private involvement, and it is difficult to model these generically. They can reduce costs and risks around infrastructure projects by incorporating private specialist expertise in design and operation of infrastructure, while retaining a public sector involvement in finance on grounds that the public sector's borrowing costs are lower than the private sector's. These arguments are stronger for a national government with a wide spread of taxpayers than they are for a local councils such as CHBDC with a narrow ratepayer base.

**Figure 5 Variations in Public Private Partnerships**

Type	Function	Internal Control	Funding	Ownership
		Operation and Maintenance	Capital Investment	Asset Ownership
<b>Public Provision (non-PPP)</b>		Public	Public	Public
<b>Outsourced service contract</b>		Public/Private	Public	Public
<b>Management Contract</b>		Private	Public	Public
<b>Leasing Contract</b>		Private	Public	Public
<b>Concession on existing base</b>		Private	Private	Public
<b>Build, Operate, Transfer (BOT)</b>		Private	Private	Public/Private
<b>Privatised Divestiture</b>		Private	Private	Private

Source: NZIER drawing University of Melbourne

CHBDC's affordability challenge is driven by the capital upgrade costs, and leases or concessions offer ratepayers more relief on operating than on capital costs. There may be opportunities for local councils to co-ordinate or amalgamate their Three Waters supply management and contracting with suppliers, to improve the economies of scale and scope achieved by specialised skilled operatives deployed over a wider area than is possible within the current District council jurisdictions. CHBDC is already investigating such moves and they may provide some operational cost savings and maybe even capital savings over the long term. But they provide little relief to the affordability for ratepayers in meeting short term capital costs for wastewater facility upgrades to meet compliance.

Relief in meeting that short term capital challenge would most readily come from legislated changes leading to new funding availability, or from demonstration of external environmental benefit from the wastewater upgrades to improve eligibility for existing funding.

## 5. Conclusions

Rates payments in Central Hawkes Bay District are already a higher proportion of incomes than is usual in New Zealand, and the imposition of further liabilities for wastewater plant upgrades will exacerbate that distinction. Both the separate and the combined plant options require substantial additional capital expenditure over that which has been provided for in the Long Term Plan.

As wastewater treatment facilities are long-lived assets, a common means of lessening the cost on current ratepayers would be to fund the projects by borrowing, so that more of the long term costs are covered by repayments by future residents who also share the benefits of the facilities. To the extent that this reduces out of pocket expenses for current residents, it leaves them more funding for other spending, improving their well-being. It also indirectly improves incomes and well-being for all those involved in supplying the goods and services they purchase, relative to an option where more of the initial capital costs are borne in the short term.

The results in Table 6 and 7 above show how the timeframe of the analysis affects the net result. Over the first 10 years the present value costs of the separate plant at Waipawa and Waipukurau (which defer some components of upgrade beyond the first 10 years) are less than those of the combined plant at Waipawa. Choosing the separate plant provides short term relief on capital costs, but the combined plant has lower long term present value cost considering operating and capital costs.

Impacts on current residents are expected to reduce over time as the number of connected properties is forecast to increase. As shown in Table 2, the number of households is expected to increase by 600 (11%) between 2017 and 2028, 380 of them in the townships of Waipukurau, Waipawa and Otane. Impacts on local residents would also be lessened if some of those properties are acquired by those residing outside the district for short term holiday use, whose spending in the District is less affected by a fixed property charge such as wastewater charges than those spending most of their time there.

Both the combined and separate plant options pose challenges for affordability, as the upgrades involve sufficiently high cost to noticeably impact on incomes and spending in the District, and potentially detract from well-being. Offsetting this, the improvement in water quality should improve well-being in future, although it is unclear how large or valuable that benefit will be for the District.

Without quantifying and valuing that environmental benefit it is difficult to assess efficiency, beyond noting that it is efficient to choose the least costly means of achieving compliance with consents. The combined plant upgrade has lower cost in the long run, but the separate plant upgrades provide relief only in the first 10 years.

Economics has no definitive rules to determine what is affordable in provision of public services, and this is usually set by the political process. But this report shows that the affordability of these wastewater upgrades is challenging for CHBD's wastewater-connected residents whose existing rates are already above the national average share of household incomes and who face rate increases higher than the national average. The Council may find some savings in management arrangements, but new grants from the Crown, regional council or other sources would have the largest impact on capital funding for this project and provide the greatest relief on affordability pressures.

## 6. References

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Statistics New Zealand (2017) Household economic survey, Year Ending June 2017

Statistics New Zealand (2018) Household income and housing cost statistics, Year Ending June 2018

# Appendix A Methodology

## A.1 Calculation of figures

**Household income** has been calculated using NZIER GDP micro simulation model. This model creates detail GDP estimates for both regional and industry splits. From this we calculate household income growth by applying the industry GDP growth to the industry composition of the Central Hawke's Bay workforce. We take the average household income from Census 2013 (the most recent available) and apply the income growth to update the Census numbers to 2018.

**Unemployment rate** has been calculated by updating census 2013 unemployment rates. Census 2013 is used as a base for our employment estimates because it is the only data source with a large enough coverage to have good estimates at the required geographic detail (area units).

We updated census 2013 employment and working age population (WAP) numbers with job growth from business demography and population growth from population estimates.

These numbers are then aligned to the total numbers of employed, unemployed and working age population (WAP) in the Hawke's Bay region, using the December 2018 Household Labour Force Survey.

From here we assigned people not in the labour force to area unit based on labour participation rates and unemployed is assigned as a residual.

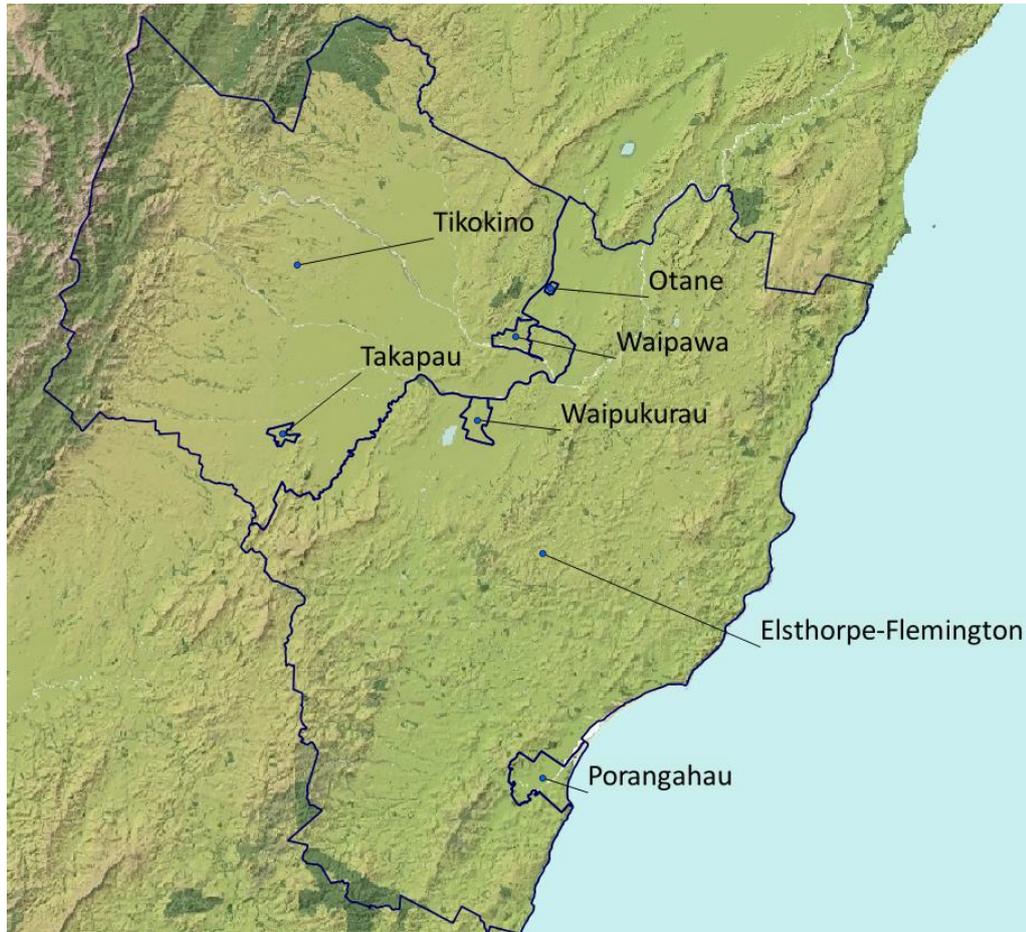
**Average rent** is calculated from MBIE's rental bond data, which uses all new rental bonds data from the tenancy bond database.

**Amortisation** is a way of converting a lump sum cost into a series of annual payments that can be divided among rate payers to derive an annual increment of average annual cost to be covered by rate increases. As with financial functions like PMT in Excel that return the periodic payment for a loan, the required variables are the size of principal, interest rate and term length. The amortised value is the annual payment at a constant level needed to pay off the capital of the project, and it includes interest repayments.

## A.2 Statistical areas used in the report

Statistics on population, income and employment in this report have been drawn from data from Statistics New Zealand's geographic area units, as illustrated in Figure 5.

**Figure 6 Geographic units of the Central Hawke's Bay**



Source: Statistics NZ