Business and Economic
Research Limited

Report to:

Masterton District Council

AFFORDABILITY ASSESSMENT OF PROPOSED WASTEWATER SCHEMES

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Affordability Assessment of Proposed Wastewater Schemes

1 Executive summary

The objective of this research project is to provide a credible assessment of the economic and affordability issues around the options that the Masterton community have for upgrading the treatment and disposal of wastewater. One option must be chosen that reaches the Masterton District Council's performance criteria for sewerage treatment and disposal of wastewater.

There were14 potential schemes considered by the Masterton District Council. Of these, the most expensive incorporated full-time land-based disposal of waste. The Masterton District Council narrowed its choice of project from the initial 14 to three shortlisted schemes based on the costs and benefits associated with them. Beca then did a detailed report on these schemes to help the Masterton District Council come up with a preferred scheme. The report was entitled, "Masterton Urban Area Sewerage Infrastructure Upgrade Project Issues and Options Report" and released in November 2004.

We have looked at the main features of each of the three schemes and compared them in terms of relative costs and benefits, and with regard to affordability for the Masterton community, as well as options regarding charging schedules between parts of the community and over time.

Section 2 discusses the main costs and benefits associated with each of the three schemes, based on analysis in the Beca report. The main benefits from an upgrade are presented in an evaluation matrix and each option is graded according to how well it achieves each benefit. There are several areas in which the benefits of the more expensive schemes (requiring new infrastructure) are generally not significantly different to the benefits from the lowest cost scheme based on using the existing ponds. These include effluent quality, water quality, impact on groundwater and effluent discharge location.

There are some areas in which the more expensive schemes perform significantly better in the assessment, particularly with regard to flooding, erosion and seismic factors. However, the escalation of costs to achieve these benefits is substantial. BERL's assessment supports the Masterton District Council's view that the extra benefits arising from the new ponds and the hybrid schemes do not outweigh the extra costs they imply.

Section 3 profiles the Masterton community and assesses the affordability of each of the schemes for the ratepayers. Masterton residents are shown to have relatively low incomes and are slightly relatively deprived (in an economic sense) according to the Ministry of

Health's Index of Deprivation. Their sewerage rates are relatively low, while rates overall are comfortably within the range of comparator regions.

Masterton *needs* to get an upgrade and one of the options must be chosen. This report assesses the impact of the expected cost of each option on total rates per household and on the sewerage component of the rates. In this context, we also consider trends in disposable income (using house sale prices as a proxy) and refer to the Wairarapa Economic Development Strategy 2005-2025 for consistency.

With affordability one of the main concerns, this report agrees with Masterton District Council's preferred scheme, which is based around upgrading the existing ponds. It is the lowest cost of the three schemes shortlisted. The cost for the preferred scheme takes Masterton rates to the upper end of the rates bill range and within the range for sewerage rates, as compared to other regions. The other two schemes take both the total rates and the sewerage component outside the range of the regions used as comparators, which would suggest an affordability problem. Given the relatively low incomes and higher levels of deprivation, and the fact that incomes in the region are expected to be flat over the forecast period or grow just below the national trend, then affordability is not expected to improve.

Sections 4 and 5 address the issue of how to apply charges to the various types of ratepayers according to rural versus urban, residential versus commercial, and over what time period, with the aim of achieving the most equitable charging schedule possible.

We conclude that the two more expensive schemes discussed in this report, namely the hybrid and new ponds schemes, would raise serious affordability issues for the Masterton community. Furthermore, as the options were presented to us, and unless there are considerably greater benefits to justify the extra cost, we concur with the Masterton District Council's conclusion that the lowest cost of the three shortlisted schemes should be chosen. If a more expensive scheme, such as the ones using full-time land-based disposal of waste, were desired, then sources of funding for the additional costs would need to be investigated.

2 The three options

2.1 Description

An upgrade of the existing wastewater treatment process is expected to contribute towards achieving the Community Outcome listed as "Sustainable use of the environment" in the Masterton District Council Long-term Council Community Plan 2006-2016 (LTCCP). This was the driver from which a large range of options (14 schemes) was presented, and these were then narrowed down to the three discussed below.

Three projects are considered by Beca Carter Hollings & Ferner Ltd (Beca) in the report "Masterton Wastewater Upgrade Project: Technical Report on Recommended Scheme" (June 2005). The three projects are summarised as (for more detail, go to the report):

- Existing ponds (option 1a) – upgrade the existing oxidation ponds with maturation cells; part time land disposal*.
- Hybrid option (option 2a) – wastewater treatment provided by new oxidation ponds, with use made of one existing pond which is converted to maturation cells and part time land disposal.
- New ponds (option 6) – construct new oxidation ponds and maturation cells, and part time land disposal.

* part time land disposal refers to irrigation to the land when the river is below median or half median flow; disposal to the river when flows are above median or half median. Whether the part time land disposal happens at median or half median flow depends on the variation of the option chosen.

2.2 Costs

Costs are estimated for each of these three options under two scenarios of releasing the discharge into the river, namely when the river is at median flow or at half median flow. Under scenarios where the Council has to wait until the river is at median flow or higher before releasing discharge, this implies that larger ponds would be required to hold the discharge, and therefore costs escalate, compared to the scenarios where discharge is permitted when the river is at half the median flow or higher. The costs vary slightly for the existing ponds option under these two scenarios by just $0.3m, from $12.7m to $13.0m. However, for the other two options, the variation is significant. Under the hybrid option, costs

range from $18.6m to $26.6m, and the gap is even wider with new ponds, with costs ranging between $21.9m and $34.2m.

The Masterton District Council states that the first of these three options is the preferred scheme because it offers the best ratio of benefits to costs. This is the least costly of the schemes so is clearly the most affordable for the district's ratepayers. The Masterton District Council does not consider the extra benefits arising from the other two schemes to outweigh the extra costs they imply.

Beca concludes that "the existing ponds are performing well and are meeting all the treatment performance requirements of the interim consent".

2.3 Benefits

When the benefits from each proposed scheme were compared, Beca arrived at the following evaluation matrix. Note that the costs differ in the table to those stated above. The figures in the table are Beca estimates of capital cost only. The figures in section 2.2 are Masterton District Council figures and take other costs into account.

Scoring definition used in the table:

1. meets the required standard, or achieves an acceptable level of performance;
2. moderate enhancement compared with other schemes;
3. significant enhancement compared with other schemes.

A cost of $2.5m has been included for the erosion protection works for schemes that retain the existing ponds, which the Regional Council deems to be sufficient. With regard to flooding, the existing stopbank upstream of the existing ponds needs to be raised to provide a consistent level of flood protection. The standard of protection is the "100 year flood level plus 800mm free board".

Table 2.1: Beca's evaluation matrix for the shortlisted schemes

	Existing ponds			New ponds			Hybrid scheme		
Capital Cost ($m)	12.0	12.3	12.5	21.1	25.1	28.8	15.6	21.1	25.8
Trigger flow (1)	HM	HMM	M	HM	HMM	M	HM	HMM	M
Effluent quality	1	1	1	1	1	1	1	1	1
Water quality (2)	1	1	1	1	1	1	1	1	1
N&P removed (3)	3	3	3	2	2	2	1	2	2
Impact on groundwater	1	1	1	1		1	1	1	1
Erosion	1	1	1	3	3	3	2	2	2
Flooding	1	1	1	3	3	3	2	2	2
Seismic	1	1	1	3	3	3	2	2	2
No. days irrigation in summer	2	3	3	1	3	3	1	3	3
Inflow/infiltration	1	1	1	1	1	1	1	1	1
Effluent discharge location	1	1	1	1	1	1	1	1	1
Future proofing	1	1	1	1	1	1	1	1	1

Notes for Table 2.1: (1) HM is half median flow of the river and M is median flow. The HMM options indicate that median flow is proposed as the summer period trigger flow for a discharge to the Ruamahanga River; and a half median flow is proposed as the winter trigger flow. (2) Water quality as measured at Wardells Bridge. (3) N&P is nitrogen and phosphorus.

It can be seen from Table 2.1 that there are a few areas in which there would be significantly greater benefits from having new ponds, particularly with respect to flooding, erosion and seismic factors. The other schemes are sufficient in these areas. Another difference between the schemes is in the land area available due to irrigation method. For the new ponds option, there is less land available because of the land taken up by the new ponds, so this requires a greater number of days where a discharge to the river is required.

The increased benefits were considered to be insufficient to warrant the increase in costs of the hybrid and new pond schemes. There are also some significant disadvantages from having less land available with the hybrid and new pond options.

It should also be noted that additional benefits would be achieved with the far more expensive schemes which would use full-time land-based disposal of waste. However, these schemes were not considered in the shortlist because of the substantial costs involved in purchasing the land needed for this kind of disposal. According to Beca, about 850 hectares would be required to dispose of all the effluent during the winter months. At a land cost of $25,000 per hectare (for example), the cost of acquiring the land would exceed $21 million, and then capital investments would need to be made, adding further cost.[1]

2.4 Recommended scheme

Taking the above considerations into account, the scheme recommended by Beca has the following components, and the Masterton District Council agrees with this recommended scheme:

- Existing ponds retained and enhanced with extra maturation ponds in series;
- Irrigation to land at times when the river is below median flow in the summer, and below half median flow in the winter;
- Disposal to the river when flows are above median in the summer and half median in the winter;
- Storage in the ponds if irrigation and a river discharge are not permitted;
- Discharge point shifted from the Makoura Stream to a rock embankment diffuser;
- New sludge storage lagoons.

[1] There are also questions about the practicality of the option because of concerns about the suitability of the land in Masterton for this kind of scheme.

3 The Masterton community

This section looks at affordability of each of the three options for the Masterton community in terms of the ratepayers and income earners by assessing rates, income levels, population projections, the profile of the population and expected income out to 2026. It puts affordability for Masterton's residents into context by comparing with the situations in other similar districts.

3.1 Population

As can be seen in Table 3.1, the total population of Masterton District is not expected to increase over the next 20 years, except in the high growth scenario, and this would be by only 1,300 people or 5.6%. In fact, according to the medium scenario, it is expected to drop over the period by 4.7% from 23,200 in 2001 to 22,100 in 2026. In the low case projections, the drop is more stark at 3,500 or 15.1%.

Table 3.1: Projected population of Masterton District, High, Medium and Low, 2001 to 2026

	2001	2006	2011	2016	2021	2026
High		23,700	24,000	24,200	24,400	24,500
Medium	23,200	23,300	23,100	22,800	22,500	22,100
Low		22,800	22,300	21,500	20,700	19,700

Source: Census 2001, Statistics NZ projections

Table 3.2: Age and sex composition of Masterton population, Census 2001

Masterton District	0-14 years	15-29 years	30-49 years	50-64 years	over 65 years	Total
Male	2,649	1,899	3,039	1,854	1,521	10,962
Female	2,643	1,866	3,258	1,914	1,986	11,667
Total	5,292	3,765	6,297	3,768	3,507	22,629

Table 3.3: Age composition of Masterton population, forecast to 2026

	0-14 years	15-39 years	40-64 years	over 65 years	Total	Median Age
2001	5,400	6,900	7,300	3,600	23,200	37.7
2006	4,900	6,500	7,900	4,000	23,300	40.8
2011	4,400	6,100	8,200	4,500	23,100	43.6
2016	3,900	5,800	7,900	5,200	22,800	46.4
2021	3,700	5,600	7,400	5,900	22,500	48.7
2026	3,500	5,100	6,900	6,700	22,100	50.5

In addition to the contraction in total population in Masterton District, the projected pattern of the population by age group clearly shows an ageing population over the period to 2026. The median age rises dramatically over this period from 37.7 in 2001 to 50.5 in 2026. The number of people aged over 65 is expected to almost double from 3,600 to 6,700. This implies a reduction in wage earners, which in turn has implications for the affordability of the Masterton population to pay increased rates.

3.2 Household income and rates comparison

This section looks at the income and rates paid in selected districts and urban areas within those districts. The incomes are averages for the districts and the rates are averages for the urban areas. For simplicity, the analysis refers consistently to the districts. For reference the respective urban areas are: Upper Hutt (Upper Hutt); Featherston (South Wairarapa); Hawera (South Taranaki); Dannevirke (Tararua); Rotorua (Rotorua); Taupo (Taupo); Palmerston North (Palmerston North); Carterton (Carterton); Greytown (South Wairarapa); Masterton (Masterton); and Cambridge (Waikato).

In 2004/05, there were 9,260 households in Masterton District. The average household income in 2005 is estimated at $45,757 and the median income at $35,200. This compares with an average household income of $55,390 per household for New Zealand as a whole and median of $44,556. Masterton households receive relatively low incomes by nation-wide standards, with the median being a full 21.0% lower and the average 17.4% lower than in the rest of New Zealand.

According to the Masterton District Council's Final Report on the preferred scheme, Masterton households pay relatively low District Council rates in 2005/06, at an average $1,191 per average residential property, with only Tararua and South Wairarapa paying less. However, this represents 2.60% of Masterton's estimated average household income in 2005, and 3.38% of the median household income, as shown in Table 3.4 below.

Rates in the nearby district of Carterton, with a population of about 7,200 in 2004, are $1,239.00 and account for 2.60% of average household income, the same ratio as in Masterton, and slightly less in terms of the median income at 3.24%. Ratepayers in neighbouring South Wairarapa with a population of nearly 9,000 pay $1,286.00, which is 2.62% of average household income and 3.28% of the median income. Thus, it can be seen from these figures that these three regions of the Wairarapa pay a very similar proportion of their income on rates and all three are towards the upper end of the range for the districts presented.

Looking next at the sewerage component of the rates bill specifically, Masterton's charge of just $141.77 is very much on the low side, with only Palmerston North residents paying less for their sewerage services. Carterton and South Wairarapa pay $183.00 and $181.00 respectively. This component exceeds $300 in Dannevirke (Tararua), Upper Hutt and Cambridge (Waikato), which has the highest at $363.00. From this limited analysis it would suggest that Masterton residents are currently paying less for their sewerage services than the comparator districts.

In Table 3.4, the estimated additional rates that would be charged under the three scheme options from improving the sewerage system are presented. It can be seen that the Masterton District Council's preferred scheme (upgrade 1a: existing ponds) adds $143.34 to the annual sewerage rates component, taking it to $285.11. This keeps the sewerage costs within the range of the districts presented, and very close to that of South Taranaki at $282.00. This scheme takes the total rates bill to $1,334.47, which is also within the range and very close to the rates paid in Rotorua, and still less than in Palmerston North and Cambridge (Waikato), which pays the most, at $1,586.00.

Table 3.4: Average and median incomes and rates as a share of income by district, 2005

	Income ($)		Rates ($)		Rates as % of:	
District	**Average**	**Median**	**Sewerage**	**Total**	**Average income**	**Median income**
Upper Hutt	58,151	49,895	341.90	1,266.00	2.54	2.18
South Wairarapa	49,162	39,175	181.00	1,154.29	2.95	2.35
South Taranaki	54,232	42,447	282.00	1,257.00	2.96	2.32
Tararua	48,065	37,501	310.06	1,133.79	3.02	2.36
Rotorua	52,361	42,954	273.50	1,339.58	3.12	2.56
Taupo	50,102	41,569	250.46	1,299.18	3.13	2.59
Palmerston North	52,397	43,100	114.00	1,365.00	3.17	2.61
Carterton	47,709	38,223	183.00	1,239.00	3.24	2.60
South Wairarapa	49,162	39,175	181.00	1,286.00	3.28	2.62
Masterton	45,757	35,200	141.77	1,191.13	3.38	2.60
Waikato	56,414	46,194	363.00	1,586.00	3.43	2.81
Masterton upgrade 1a	45,757	35,200	285.11	1,334.47	3.79	2.92
Masterton upgrade 2a	45,757	35,200	391.67	1,441.03	4.09	3.15
Masterton upgrade 6	45,757	35,200	421.66	1,471.02	4.18	3.21

Table 3.5: Sewerage rates as a percentage of average and median income by district, 2005

	Sewerage rates as % of:	
District	**Average income**	**Median income**
Upper Hutt	0.69	0.59
South Wairarapa	0.46	0.37
South Taranaki	0.66	0.52
Tararua	0.83	0.65
Rotorua	0.64	0.52
Taupo	0.60	0.50
Palmerston North	0.26	0.22
Carterton	0.48	0.38
South Wairarapa	0.46	0.37
Masterton	0.40	0.31
Waikato	0.79	0.64
Masterton with upgrade 1a	0.81	0.62
Masterton with upgrade 2a	1.11	0.86
Masterton with upgrade 6	1.20	0.92

In relative terms, however, adding in the cost of the preferred scheme does result in Masterton's rates moving up to the highest share of both average and median income, to 2.92% and 3.79% respectively. This might suggest that this is the most that ratepayers can reasonably be expected to afford. As shown in Table 3.5, just the sewerage component goes up to 0.81% of average income and 0.62% of median income, which is within the range for the districts shown. This assumes that these costs are all borne by Masterton urban ratepayers.

The next most expensive scheme (upgrade 2a: the hybrid option) takes Masterton's total rates bill per household to $1,441.03, which is lower only than Cambridge, but as a share of income is far and away the highest. The sewerage component, rising to $391.67, higher than all of the other districts, goes to 1.11% of median income and 0.86% of average income, both of which are considerably outside the comparator range. The most expensive scheme (upgrade 6: new ponds) adds further to the costs, taking rates to $1,471.02, of which the sewerage component is $421.66, which translates to 1.20% of median income and 0.92% of average income.

Masterton District Council's rates over recent years have increased annually by between 3% and 4% and it is assumed that, excluding the wastewater scheme, this trend will continue. Therefore, the 'business-as-usual' rates forecast is for rates to rise in line with, or slightly ahead of, inflation. With incomes also assumed to rise in line with inflation, but with a falling

proportion of wage earners in the Masterton population, the cost to ratepayers is likely to increase slightly before the extra cost of the sewerage scheme is included.

With this rates and income projection in mind, affordability is stretched as the share of income accounted for by these additional charges takes Masterton to the top of the range. However, with the two more expensive schemes, costs are stretched significantly further and take Masterton very far outside the range of what is paid in the other regions. The figures and comparisons in Tables 3.4 and 3.5 suggest that additional costs to ratepayers of implementing the preferred scheme take rates and the sewerage component to the higher end, but are still within the range for the districts represented.

3.3 Index of Deprivation comparison

The comparability of the areas discussed in the previous sub-section can also be investigated using a measure of relative deprivation. The NZDep2001 Index of Deprivation is the Ministry of Health's measure of socioeconomic deprivation. The average for the country is assumed to be 1000, and the extent of variability of a region's index from the 1000 base shows its relative deprivation. Numbers above 1000 indicate higher levels of deprivation and numbers below 1000 indicate above average well-being according to the attributes included in the NZDep2001 measure. The measure is derived from 2001 Census data at the detailed meshblock level for all areas in New Zealand. The attributes included in the measure are: income, employment, (access to) communication, (access to) transport, support (from family members), qualifications, home ownership status, and living space.

Table 3.6: Deprivation Index NZDep2001

	Deprivation index
District	**NZDep 2001**
Upper Hutt	965.9
South Wairarapa	980.5
South Taranaki	1004.1
Tararua	995.1
Rotorua	1029.1
Taupo	1023.5
Palmerston North	991.6
Carterton	975.9
South Wairarapa	980.5
Masterton	**1004.8**
Waikato	1024.4

It can be seen from Table 3.6 that Masterton is relatively slightly deprived on a national scale, with a NZDep2001 index of 1004.8. This puts it on a similar level to South Taranaki.

As shown in Table 3.4, South Taranaki ratepayers pay $282.00 for their sewerage, which is comparable to the $285.11 that Masterton ratepayers would face under upgrade 1a using the existing ponds.

Figure 3.1 gives a spatial representation of Masterton's deprivation level plotted against average household rates compared to the other regions. This chart clearly illustrates how the existing ponds option would keep Masterton within the range of the other districts, while the other two upgrade options would make it an outlier, with the one exception of Cambridge (Waikato) which has relatively high rates of $1,586.00 and a relatively high deprivation index of 1024.4.

Figure 3.1: Rates and deprivation index for each district and for the three Masterton sewerage upgrade options

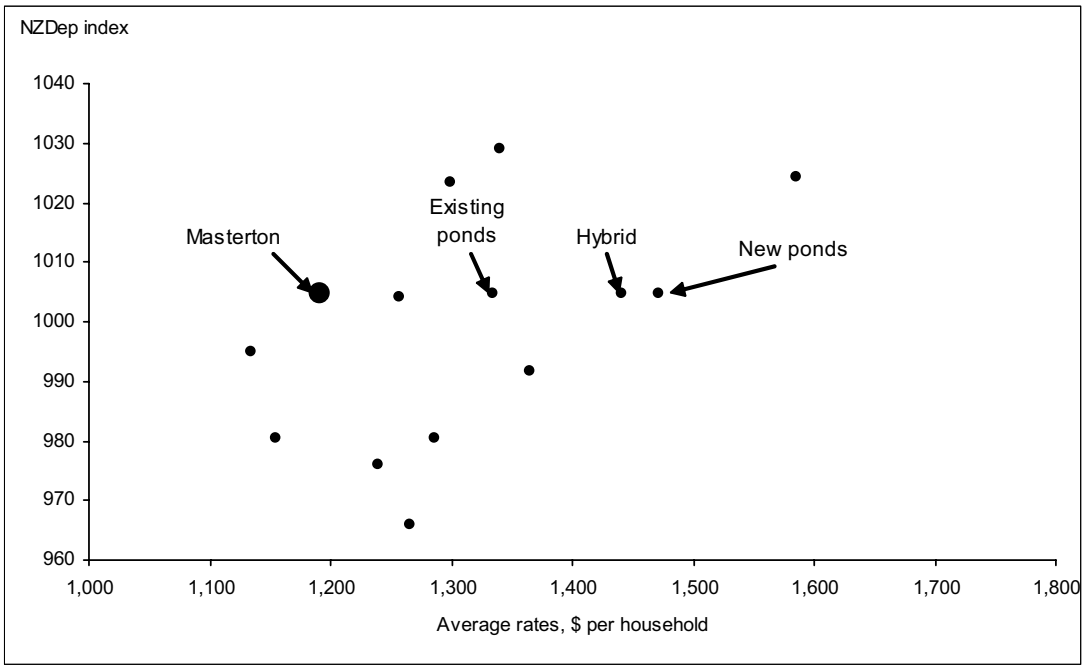
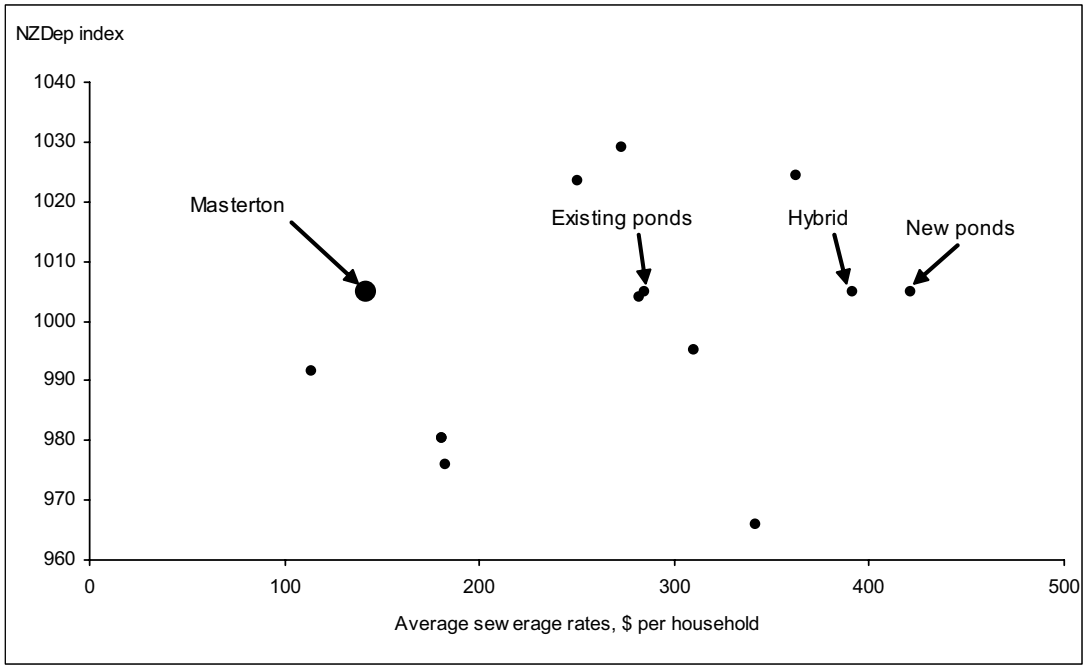


Figure 3.2 plots the deprivation index for each district against the sewerage component of rates. Once again, the existing ponds option may be considered to be within the range for these districts. The two more expensive schemes of the hybrid and the new ponds would put Masterton's sewerage rates as clear outliers.

Figure 3.2: Sewerage rates and deprivation index for each district and for the three Masterton sewerage upgrade options



3.4 Discretionary household incomes in Masterton

The level of discretionary income of a household will determine the affordability of any of the proposed schemes, as well as the affordability of the rest of the rates bill. Discretionary income is defined here as a household's disposable income after housing costs. There are no regional disposable or discretionary income series easily available. As a proxy we have compiled the trend in house sale prices since the start of 2001, since the largest single area of expenditure of any household will be to pay for the rent or mortgage on a property. The trend in house sale prices is used here as an indicator of housing costs incurred by households.

Figure 3.3 shows the average house sale prices for each of the comparator regions and New Zealand, on a six-monthly basis for the six-month period ending June 2001 to June 2005 (nine observations). An average of the rate of change in each period has been calculated and the regional and national averages are then ranked from the highest to lowest.

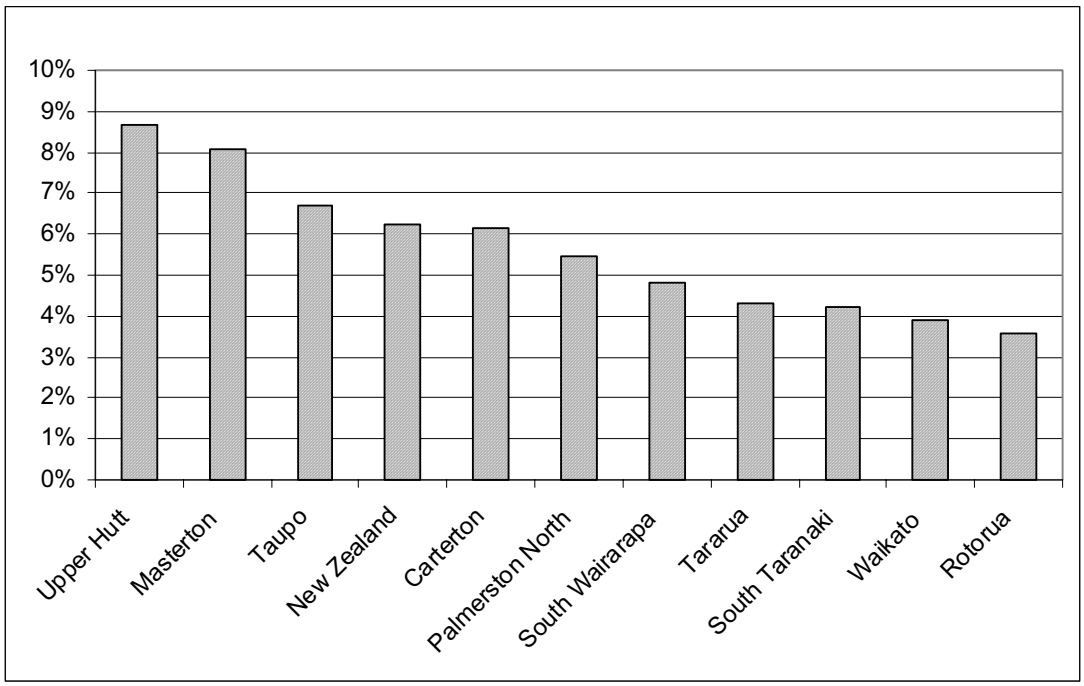
It can be seen that Masterton has experienced the second largest average increase in house sale prices over this period after Upper Hutt, compared to the selected comparator regions and New Zealand. The average six-monthly increase was 8.1%, compared to 6.3% for New

Zealand as a whole. Aside from Upper Hutt's 8.7% average, the other regions ranged between 6.7% (Taupo) to just 3.6% (Rotorua).

This overview of house sale prices as a proxy to housing costs in the approximation of discretionary income leads us to two conclusions. As shown in Figure 3.3, housing costs increased at a faster rate between January 2001 and June 2005 than in all but one of the areas shown and at a faster rate than in New Zealand, which would imply that households had less discretionary income to spend elsewhere. This therefore implies reduced affordability for other expenses. However, higher house values implies wealth effects, so house owners in Masterton have benefited over this period from rising house sale prices.

The conclusion to be drawn of the two implications from housing costs on discretionary incomes is ambiguous, since these impacts work in opposite directions with respect to affordability of the proposed wastewater schemes.

Figure 3.3: Average six-monthly percentage change in house sale prices, January 2001 to June 2005



3.5 The Wairarapa economy

The preceding sections demonstrate the relatively low income of residents of the Masterton district. This section provides an overview of the composition of the Wairarapa economy in terms of employment and GDP, and how this is expected to fare in future years.

The largest employer in the Wairarapa is the retail and distribution sector with 3,469 FTEs (23.9% of regional FTEs), and comprises 751 business units in 2005. However, the Wairarapa economy is dominated by the primary sector in terms of the combination of employment and numbers of business units, accounting for a similar number of FTEs at 3,455 (23.8% of regional total) in 2005 and 2,073 business units. The main industries within the primary sector are pastoral, forestry and wood processing sectors.

The third largest employer is the manufacturing and building sector with 3,176 FTEs (21.9%). Social services also employ a significant number of people at around 15.6%, and business services account for 10.7%. The smallest sector is recreation services, accounting for 4.1% of employment.

In terms of contribution to GDP, business services is the largest sector, with 23.6% of GDP, slightly higher than the 23.0% from the manufacturing and building sector and 21.0% from the primary sector.

Overall, agriculture is the biggest contributor to Wairarapa's GDP and will continue to be important. Forestry, tourism, education, health and government are all significant contributors too.

Out to 2011, employment growth in the Wairarapa region is expected to lag slightly behind the New Zealand average of 2.3% at about 2.0%, reaching 16,375 FTEs by 2011. Similarly, GDP and value added for the region are expected to be slightly less than the national average over this period, although still positive at nearly 3%. The growth of the region depends primarily on developments in agriculture and tourism. The forestry industry is expanding, and wood volumes from the Wairarapa are expected to double over the next 15 to 20 years. In addition, the industries which are population-based, such as health, education and construction, are expected to remain strong.

In conclusion, the number of jobs and incomes are expected to grow, but at a slower pace than in the rest of New Zealand over the next few years.

3.6 Consistency with the Wairarapa Economic Development Strategy 2005-2025

In 2005, Go Wairarapa reviewed the Wairarapa's existing Economic Development Strategy which covered the period 2002-2007. BERL provided economic advice and projections for this review, which has resulted in the Wairarapa Economic Development Strategy 2005-2025, entitled, "Quality of Life in a Region of Choice".

Central to the Strategy are goals regarding population and workforce. Specifically, it is envisaged that population increases by at least 10,000 people over the 20-year period, as people are attracted to the lifestyle. It should be noted, however, that, as stated in the Foreword of the Draft Strategy for Consultation, July 2005, "it is not a work plan and does not attempt to set out specific details of how things will be done".

In this report, we have used population figures provided by Statistics New Zealand, which are not consistent with the most optimistic population growth scenario put forward in the Strategy. Similarly, the projections of GDP presented in the Strategy are different from those provided by Statistics New Zealand. If the region's population and GDP did grow by the amount suggested in the Strategy, and in conjunction with the moderate growth in the economy as we expect (as discussed in section 3.4), then the affordability of the wastewater schemes is increased and does not alter the conclusions of this report. This of course depends on the degree of success of the Strategy.

4 Community investment overview

This section addresses affordability of the scheme with respect to Masterton's overall investment needs.

It has been shown in section 3 that incomes in Masterton are low and that residents are slightly more deprived relative to the comparator districts. Masterton District Council rates in 2005 averaged $1,191, which was also below the average of the comparators.

The Masterton District LTCCP 2005/06 sets out projects and areas of expenditure to be funded out of rates. Capital expenditure on projects related to Waste Services (including wastewater, stormwater and solid waste management) total $4.1m in 2006/07, rising to $11.7m in 2008/09. Of these totals, a projected $2.1m is required from rates in 2006/07, with $5.9m required in 2008/09.

We note that the LTCCP includes capital expenditure on the rural roading programme at $2.7m in 2006/07 and $2.8m in 2008/09. Capital spending for all Transport Services (including roads, streets and footpaths; parking control and Hood Aerodrome) is expected to require rates of $1.5m to $1.6m annually over the 2006/07 to 2008/09 period. There are no other major strategic project expenditures expected to exceed $1.0m planned out to 2012/13. Therefore, with the sewerage scheme the only major expenditure item on the horizon, there is unlikely to be any other significant upward pressure on rates.

However, there is an opportunity cost of the chosen wastewater scheme, in the sense that the funds used for the scheme will have an impact on the amount of funds available for the Masterton District Council's other projects. The cost of the chosen scheme will impact on what else the Council can afford to do. To a certain extent the impact depends on whether the Council chooses to fund the scheme at the expense of other potential projects or whether it chooses to raise rates so that these other schemes are not knocked out by the cost of the wastewater scheme.

Masterton District Council rates in 2005 averaged $1,191. According to Masterton District Council's report, option 1a based on keeping the existing ponds would require the sewerage component of rates to increase by $143.34 to $285.11, which is still in line with sewerage rates in surrounding councils. The hybrid option adds $249.90 to each household's sewerage rates bill, and the new ponds option adds $279.89. Both options would result in Masterton having the highest sewerage costs of the councils considered.

In assessing the costs it is worth stating again that one of these options *must* be chosen in order that Masterton has a sewerage system of sufficient capacity and standard, so there has to be an increase in rates by some degree. The estimated cost increase varies from $143.34, which keeps the costs within the range for surrounding councils, to $279.89, which would make it the highest cost of the councils considered. Therefore, based on keeping the costs within the range of the comparator regions, option 1a is the only possible solution of the three.

In summary, rates are currently relatively low in Masterton compared to the rest of New Zealand. Household incomes are also relatively low as noted in the previous section. Consequently, the rates as a ratio to household income are similar to the national average. Rates will need to rise by a significant amount with whatever sewerage scheme is chosen, if it is assumed that the Council does not choose to forgo any other projects. It has been shown that the lowest cost option takes rates as a share of income to the upper end of the comparator group of districts, and that the hybrid and new ponds schemes takes this ratio outside the range.

Considering that incomes are not relatively high in the Masterton area, this discussion of affordability would lend support to the lowest cost scheme of the three, which is the one using the existing ponds, unless it can be shown that the more expensive options deliver significantly greater benefits.

Another consideration regarding the overall costs of the sewerage scheme which will affect the amount each resident pays is the period over which the investment is assumed to be depreciated. The shorter the period, the higher the annual cost to ratepayers to recover the cost of the scheme.

According to Beca, many parts of these structures tend not to wear out because of their nature, for example, ponds can last for several decades and it is not appropriate to put a limited life on their productivity. The existing ponds are about 30 to 40 years old and engineers expect them to have another 40 to 50 year lifespan. Therefore, even estimating the life of new ponds at 40 to 50 years may be drastically underestimating how long these facilities will actually be functional.

The Masterton District Council will apply a 35-year period term. This might imply that any costs of the scheme should be met over a 35-year period. However, if this is the case, it should be borne in mind that this may be unfairly apportioning the cost of the upgrade on ratepayers during that 35-year period when in fact it is expected to provide benefits for a significantly longer period.

The figures provided to us in this report for the implied rates bill for each of the three shortlisted options are based on the assumption of a 25-year depreciation. If the decision were made to recover the costs of the investment over, say, 40 years, then the annual rates increase to households would be significantly less, and then all three options become more affordable. Therefore, in terms of setting rates, the Council needs to consider the most likely lifespan for the preferred scheme before allocating to ratepayers. The same can be said for spreading the burden over the District that would reduce the relative burden on the urban area.

Similarly, if a more expensive scheme were chosen, funding sources would need to be investigated in order to balance the greater benefits of such a scheme.

5 Principles of equitable funding

This section addresses the economic and social principles behind setting the rates to pay for the scheme. Specifically, these are the producer-pays and the beneficiary-pays principles.

5.1 The polluter-pays principle

The polluter-pays principle may be defined as the principle that those causing pollution should meet the costs of measures to reduce pollution according to the extent of either the damage done to society or the exceeding of a certain acceptable level (standard) of pollution.

The polluter-pays principle requires that both producers and consumers should pay the full social costs of their actions. Otherwise, there is a case of market failure, which means that the receiving environment is underpriced/undervalued, and the full costs to the polluter are not reflected in its output prices.

Within Masterton District

If this upgrade is designed exclusively for the urban area of Masterton's sewerage infrastructure, one consideration might be to charge the urban and rural users differentially. Taking an assessment of the benefit to urban residents and rural residents, rates may be set accordingly, or charged in total to urban residents. However, there is an argument that there is some benefit to rural residents too, from the wastewater upgrade. Also to some degree if only the urban area pays that area is subsidising rural non-point source polluters, perhaps in particular of nutrients who do not pay for their pollution. The need for the scheme is in part a result of what is already coming down the system from rural areas.

It should also be borne in mind that if the cost of this project is allocated in such a way that, for example, only urban ratepayers face the costs, then this sets in place a principle that should, for consistency of council policy, be applied across all council activities.

Commercial versus residential impacts of rates rises should be considered, according to the services received by each of these users of the sewerage system. As discussed in the Masterton District Council Annual Plan 2005/06, part of the sewerage upgrade project involves reviewing the current tradewaste management and charging system. As part of this process, Masterton District Council will be discussing the matter with Carterton and South Wairarapa District Councils. The Masterton District Council has recently adopted a trade waste bylaw with an associated charging regime. As noted in the LTCCP the Council

continues to work on upgrading the Masterton urban area sewerage infrastructure. Improvements will include an upgrade of the wastewater treatment process, improvements to effluent disposal, upgrading the reticulation network and managing the impact of trade wastes.

To quote the Annual Plan 2005/06, "the Council has determined that in general, public services provide more benefits to the urban non-residential sector (i.e. commercial) than to residential. A multiplier of 2.0 on each of the separate and targeted rates based on land and capital values will be applied".

Within the region

In this case, the polluter is the wastewater treatment plant operator, i.e. the Masterton District Council, which in turn is dealing with the pollution produced by commerce and residents in the region. However, Masterton is just one of three councils in the Wairarapa region, and all of these three, namely Masterton, Carterton and South Wairarapa, are users of the river. For example, in addition to the resident population, all have a dairying industry and this is a known polluter of waterways. It is important to weigh up the case for Masterton implementing a certain scheme, given the operations and impacts from the other two areas on the waterways.

Therefore, under the polluter-pays principle, it is necessary to distinguish between polluters within Masterton versus non-polluters and also between the areas within the Wairarapa in order to ensure an equitable share of the burden of costs of the wastewater system.

Within the region, there is currently a differential split between rural and urban residents for several of the Council's expenses, including the sewerage system and upgrade, as discussed in the Annual Plan.

Quoting from the Annual Plan 2005/06, "the Council has chosen to reduce the impact of the valuation changes on rural pastoral land". The allocation ratios for several categories of costs have been set "with the intention of more accurately reflecting usage of, or access to, Council services". However, although such costs as roading, various services (such as airport, civil defence, parks, libraries, etc.) and solid waste disposal (landfills, recycling, composting and rural transfer stations) have been allocated differentially between rural and urban users, the cost of the sewerage system has been set almost entirely against urban users. The sewerage rate and charge in 2005/06 is $1.93m in total, and this is listed entirely in the urban costs. A very small component ($34,313) is listed under rural rates.

5.2 The beneficiary-pays principle

Under the beneficiary-pays principle, there are a number of groups to be considered. These include those groups who were consulted, as well as others who use the river. Groups consulted included: Rangitane O Wairarapa, Ngati Kahungunu Ki Wairarapa, adjoining landowners, downstream users, South Wairarapa District Council, Carterton District Council, South Wairarapa Standing Committee, 'interested parties', commercial and industrial users, and environmental groups (Department of Conservation, Wellington Conservation Board, Fish & Game and Forest & Bird).

The beneficiaries which would be particularly difficult to quantify are those who use the river for recreation. They may be from Masterton District or the Wairarapa region or from elsewhere, but when they use the river for recreation purposes they are directly benefiting from the investment by the Masterton District Council in the wastewater system. These are benefits which should be acknowledged but are probably not quantifiable with any level of confidence. Even if the benefits were quantifiable, it is then questionable as to whether the Council would choose to charge people rates according to their benefits. This is not a principle currently used in setting rates, so there is the question as to whether it would be setting a precedent and have further implications.

A further issue to consider is that if these assets have a longer life than 25 years, and the Council charges ratepayers for the full cost over the initial 25 years only, then after those 25 years, people would be benefiting for no charge, which has equity implications. Similarly if the Council looks at obtaining these funds sooner by spreading the costs over a shorter period, then the inequity across generations is more pronounced. It is an issue which should be considered and addressed.

In summary, with regard to rural versus urban; commercial versus residential; beneficiary versus polluter; and the time period over which costs should be allocated; the Council may wish to consider the costs and benefits from the upgrade and split the charges accordingly over the coming years, or may continue with the ratios as they stand in 2005/06.

6 Outcomes and affordability trade-off

6.1 Outcomes

The costs and benefits associated with the three shortlisted options to upgrade Masterton's wastewater treatment process are discussed in section 2. The lowest cost scheme (option 1a) continues to use the existing, though upgraded, oxidation ponds with maturation cells; the most expensive scheme (option 6) requires construction of new oxidation ponds and maturation cells; and the middle-priced option (option 2a) is the hybrid scheme, which uses a combination of new oxidation ponds and one of the existing ponds converted to maturation cells. Costs then vary for each option according to whether disposal of discharge into the river is released at or above median flow, or at or above half median flow, the latter option being cheaper since less storage capacity is required.

All three of the short-listed schemes meet the requirements as determined by the set of evaluation criteria. The range of benefits from all three options considered are represented in Table 2.1 of section 2 and are detailed in the Beca report. The main benefits from choosing options 2a and 6 are with regard to flooding, erosion and seismic factors.

With regard to the existing ponds, Beca states that "the existing ponds are performing well and are meeting all the treatment performance requirements of the interim consent". Furthermore, they see no reason why these ponds would not last another 40 to 50 years, as they are the type of infrastructure which does not wear out. Building new ponds would be costly, as discussed in section 2.2.

The information (taken from the Beca report) supports the Masterton District Council's view that the extra benefits arising from the new ponds and the hybrid schemes do not outweigh the extra costs they incur. With regard to outcomes, all three meet the required criteria, and the lowest cost upgrade offers the best ratio of benefits to costs.

6.2 Affordability

With regard to affordability, there are four main considerations.

Firstly, the residents of Masterton have relatively low incomes compared to similar districts and have a relatively high index of deprivation. It can be concluded from the discussion in section 3 that rates in Masterton are currently relatively low compared to the other regions represented, and sewerage rates are also very low by these standards. With the additional cost of each of the three shortlisted sewerage schemes, rates move to the upper end of the

range compared to the other similar districts. The lowest cost scheme is still within the range, but at the high end. The other two schemes take rates outside the range, thereby raising serious concerns about their affordability.

The second consideration is the affordability over time. Rates (before the sewerage upgrade project) in Masterton are likely to rise over the next couple of decades. Incomes also rise but at a slower pace and by less than the average in the rest of New Zealand because of the composition of the population and its economy. Rates as a percentage of income will therefore rise slightly over the period before the new sewerage scheme is included. This indicates that the affordability of the sewerage scheme is not likely to improve over time, and if anything will deteriorate.

The third issue is the timescale over which the chosen project is depreciated and therefore the time period over which the costs are expected to be recovered. Discussions currently centre around a 25-year period, but if the project can reasonably be depreciated over a significantly longer period, say 40 or 50 years, then rates payments could be reduced proportionately. This improves the affordability of all of the schemes as well as the equity of apportioning costs and benefits.

The fourth main area to consider is the equity in setting rates, with regard to residential versus commercial users, rural versus urban users, and with regard to the time period over which it might be considered to be appropriate to make charges in order to pay for the upgrade. These costs and benefits are measurable and should be considered. There is the additional issue of non-ratepayers who benefit from the scheme, such as visitors to the region for recreational purposes, and beneficiaries living in other regions. These costs and benefits are more difficult to quantify but could be considered.

6.3 Concluding comments

Given the outcomes and affordability discussion above, the Masterton District Council should adopt option 1a which will keep the cost at its lowest level possible, and still meet the standards of infrastructure required.

All three shortlisted options meet the current and future standards of infrastructure required. The affordability issue raises concerns about the two more expensive schemes, which take Masterton's total rates and sewerage component far outside the range for the districts used as comparators. Unless there are considerably greater benefits to justify the extra cost, and we have not been shown evidence to that effect, then in the light of one scheme needing to

be chosen, the analysis would lean heavily in the favour of the lowest cost scheme, which is based on using the existing ponds.

If a more expensive scheme were chosen than any of the three shortlisted, funding sources would need to be investigated in order to balance the greater benefits of such a scheme.

7 References

"Masterton Urban Area Sewerage Infrastructure Upgrade Project Issues and Options", prepared for Masterton District Council by Beca Carter Hollings & Ferner Ltd, November 2004.

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