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

Tables

1 Executive summary

This report aims 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.

This analysis concentrates on the main features of each of the Council's four short-listed schemes. It compares them in terms of relative costs and benefits and with regard to affordability for the Masterton community, and against a base case of 'do nothing'. However, one option must be chosen that reaches the Masterton District Council's performance criteria for sewerage treatment and disposal of wastewater.

Options that maintain the existing ponds tend to entail less expense. But the more expensive schemes perform significantly better in the assessment. In particular, better performance is expected with regard to river discharge issues, community perception, health and natural hazards and consenting risks.

BERL's assessment supports Beca's and the Masterton District Council's view that the extra benefits arising from the new ponds outweigh the extra costs they imply, given issues of performance, affordability and rating comparability with other districts.

The remainder of the report is organised as follows.

Section 2 discusses the main costs and benefits associated with each of the four schemes, based on analysis in the Beca report. The main benefits from an upgrade are evaluated in terms of both quantitative and qualitative performance dimensions, and each option is graded according to its relative performance. There are several areas in which the benefits of the more expensive schemes (requiring new or expanded infrastructure) are 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.

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 marginally more deprived (relative to New Zealand averages) 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.

With affordability one of the main concerns, this analysis supports the Masterton District Council's preferred scheme, which is based around building new ponds. However, it is the highest cost of the four shortlisted schemes. That scheme would take Masterton's total rates

to the middle of the comparator range in dollar terms. The sewerage component, in dollar terms, would remain within the range for that component as compared to other regions but would be above the average. The cheaper schemes leave both the total rates and the sewerage component at the lower end of the range of the comparator regions.

These options do not suggest an affordability problem relative to other districts in dollar or percentage of income terms. It is acknowledged that Masterton has relatively low incomes and higher relative levels of deprivation. In addition, as incomes in the region are expected to be flat over the forecast period or grow just below the national trend, affordability is not expected to improve.

In section 4 we conclude that the more expensive of the four options in this report, namely the new ponds scheme (option 2b), does not raise serious affordability issues for the Masterton community. Compared to the existing ponds options, the new pond scheme would:

- deliver substantial performance benefits
- leave the District's total and sewerage component of rates comparable with other districts (including some with similar levels of relative deprivation) in dollar terms
- put the proportion of income spent on total rates at the lower end of the comparator range and the proportion due to sewerage rates towards the middle of the range.

Therefore, we concur with the Masterton District Council's conclusion that the new pond option should be chosen. If a less expensive scheme, such as the ones using existing ponds, were desired, then less funding would be required but the lower level of performance and future flexibility should be considered.

An appendix in section 7 provides background information from BERL's previous report, with updated rating figures where relevant. The background appendices include information on trends in disposable income, the fit with the Wairarapa Economic Development Strategy 2005-2025, a community investment overview and a review of equitable rating principles.

2 The four options

2.1 Background

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. These were then narrowed down based on their associated costs and benefits

Beca Carter Hollings & Ferner Ltd (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.

The report updates an earlier affordability assessment BERL completed in 2006 (reference #4419). This report examines a refined set of four short-listed options following additional land purchases. It draws on the Beca report "Masterton Wastewater Upgrade Project: Review of Pond and Irrigation Area Options Incorporating Additional Land" (January 2008).[1]

2.2 Description

The four projects are summarised as (for more detail, go to the Beca report):

- Existing ponds (option 1a) – upgrade the existing oxidation ponds with maturation cells; part time land disposal, and lease newly purchased land.[2]
- Existing ponds (option 1b) – as for 1a, but with newly purchased land used for additional irrigation meaning lower discharge to river than under option 1a.
- New ponds (option 2a) – construct new, larger oxidation ponds and maturation cells, and part time land disposal on original site with partial use of new land.
- New ponds (option 2b) – construct new, larger oxidation ponds and maturation cells, and part time land disposal on original site plus phased in use of new land.

[1] It updates a 2005 report "Masterton Wastewater Upgrade Project: Technical Report on Recommended Scheme".

2 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.

2.3 Costs

Costs are estimated for each of the four options, based on a net present value (NPV) basis. The analysis in this report is based on the GST inclusive mid-point NPV. This value includes operation and maintenance costs plus erosion protection works where relevant.[3]

Table 2.1 Cost comparison of wastewater upgrade options

Option ($M), GST excl	1A (AEE)	1B	2A	2B
Capital cost estimate mid point	16.6	21.5	31.94	34.43
Land purchase costs (incl in capital)	5.65	5.65	5.65	5.65
Land lease returns (incl in capital)	-1.11	-0.4	-0.26	-0.26
Erosion protection works (incl in capital)	3.2	3.2	0.3	0.3
Operation and maintenance	3.5	4.4	5.6	5.7
Net Present Value				
- range	19.7 to 20.4	25.5 to 26.2	31.0 to 32.9	33.5 to 35.4
- mid-point, GST excl	20.0	25.9	31.9	34.4
- mid-point, GST incl	22.6	29.1	35.9	38.7

The costs for the existing pond options vary by $6.5m, from $22.6m to $29.1m. The difference reflects the increased land required for additional irrigation under option 1b. The difference between options 1a and 2a (the cheaper of the new ponds options) is $13.4m. This difference mainly reflects the capital and operating costs of the new ponds, and forgone revenue from leased land. The cost difference between the new pond options is smaller at $2.8m, from $35.9m to $38.7. The higher cost of option 2b reflects the additional irrigation work it would require.

The cost estimates for the new ponds are less certain than the existing ponds. The cost estimates for the new pond options have a range of $1.9m, while the range for the existing pond options is $700,000. This may expose the Council to greater uncertainty around the total cost of the upgrade.

2.4 Benefits

Beca assessed the benefits of each of the proposed scheme using a range of measures including asset value and engineering design, effluent discharge and qualitative dimensions.

Below, we reproduce Beca's comparative matrix on qualitative performance for the four options examined in this report. In Table 2.2, a higher score represents better performance, with a scale from -2 (negative) to 2 (positive).

Table 2.2 Beca's qualitative comparison of options 1A, 1B and 2B

Option	Current WWTP	1A	1B	2A	2B
Health risks	-2	1	1	2	2
Nutrients to river	-2	1	2	1	2
Leakage from ponds	0	0	0	2	2
Discharge to river – quantity	-2	1	2	1	2
Discharge to river – frequency	-2	1	2	1	2
Perceived Amenity Effects	-2	0	-1	0	-1
Community perception	-2	0	1	1.5	2
Maori Values	-2	-1	0	-1	0
Natural Hazards	-2	1	1	2	2
Consenting Risk	NA	-1	0	1	2
Score total (no weighting)	-16	3	8	10.5	15

The current water treatment facility is regarded as relatively poor. All four upgrade options are evaluated as qualitatively better than the existing system. Option 2b is ranked highest, and performs as well or better than the other options on all dimensions bar one. It has lower leakage, lower risks to health and lower risks from natural hazards and consenting processes than the other options. Options 1b, 2a and 2b had positive overall perceptions in the community's eyes, but options 1b and 2b were ranked poorly for perceived amenity effects. Options 1a and 2a had poor ratings in terms of Maori values.

Beca's reports have detailed comparative tables on the quantitative performance dimensions. The following table on quantitative performance is based on Tables 5.2 and 5.3 from Beca's (2008) review for the four options examined in this report.

[3] Beca estimates a cost "in the order of $3.2m" for erosion protection for schemes that retain the existing ponds. An allowance of $300,000 is made for new pond options for border strip planting.

Table 2.3 Performance comparison of options 1A, 1B, 2A and 2B

Option	1A	1B	2A	2B
Storage volume (m^3)	275,000	275,000	275,000	275,000
Effluent irrigation area (ha)	75	158	75	127
Annual average plant inflows (m^3/day)	15,500	15,500	15,500	15,500
Maximum irrigation capacity (m^3/day)	7,500	15,700	7,500	12,700
Additional irrigation capacity in future (m^3/day)	8,300	0	5,300	0
Irrigation locations	91 ha site	91 ha site & 107 ha site	Part 91 ha site & part of 107 ha site	Part 91 ha site & 107 ha site
Asset life ponds (yrs)	50	50	100	100
Probable resource consent term (yrs)	20 to 30	20 to 30	35	35
Expected completion without appeals	Early 2010	Early 2011	Mid 2011	Mid 2011
Expected completion with appeals	Mid 2011	Mid 2011	Mid 2011	Mid 2011
Erosion by river risks	Moderate to Low	Moderate to Low	Very Low	Very Low
Flooding risks	Moderate	Moderate	Low	Low
Seismic risks	Moderate	Moderate	Low	Low
Effluent to land (mn m^3/year)	1.32	2.46	1.27	1.99
Effluent to river (mn m^3/year)	4.01	2.87	4.38	3.66
Effluent quality	Equivalent	Equivalent	Equivalent	Equivalent
Nutrient removal	Meets standards	Exceeds	Meets standards	Exceeds
Leakage from the ponds (mn m^3/year)	0.36	0.36	0.04	0.04
River + leakage from the ponds (mn m^3/year)	4.37	3.23	4.42	3.7
Surface water discharge location	Ruamahanga River	Ruamahanga River	Ruamahanga River	Ruamahanga River
Annual discharge – days to river and land (average)	204 to river / 318 to land	204 to river / 318 to land	204 to river / 318 to land	204 to river / 318 to land
Summer discharge – days to river and land (average)	30 to river / 162 to land	30 to river / 162 to land	30 to river / 162 to land	30 to river / 162 to land
Water quality at Wardells Bridge	Equivalent	Equivalent	Equivalent	Equivalent
Inflow and infiltration	Equivalent	Equivalent	Equivalent	Equivalent

Option 2b performs significantly better than the existing pond options 1a and 1b in terms of asset life, seismic and flooding risk, and reduced pond leakage. It has less effluent irrigation area than option 1b, and therefore has a higher effluent discharge to the Ruamahanga River. Option 2b has a greater irrigation capacity than option 2a, and therefore performs better in terms of leakage, discharge to the Ruamahanga River and nutrient removal.

2.5 Recommended scheme

Taking the quantitative and qualitative considerations noted above into account, Beca recommended option 2b. The increased benefits were considered to be sufficient to warrant the increase in costs of the new pond scheme.

The Masterton District Council unanimously preferred the option 2b. Although it is the more costly of the four options, the Council judges that the extra benefits and flexibility outweigh the costs.

Option 2b has the following components:

Benefits

- Reduced pond leakage.
- High land area available for irrigation meaning reduced discharges to river and
- reduced nutrient load to river.
- Threshold flow for discharge to the river could be increased.
- Capable of achieving river water quality targets by eliminating discharges during low flows.
- Further reduces health risks (regarded as minimal in any event under all options).
- Likely longer term consent (than option 1a).
- Reduced earthquake, flooding and erosion risks (by comparison to option 1a).
- Longer asset life for ponds.

Disadvantages/Risks

- High cost and cost estimate range.
- New ponds may be opposed by neighbours to the south.

3 The Masterton community

This section looks at affordability of each of the four 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 2031. 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 3.4% from 23,200 in 2006 to 22,400 in 2031. In the low case projections, the drop is starker at 2,700 or 12.1%.

Table 3.1 Projected population of Masterton, High, Medium and Low, 2001-2031

	2006	2011	2016	2021	2026	2031
High		23,700	24,200	24,400	24,600	24,500
Medium	23,200	23,300	23,300	23,200	22,900	22,400
Low		22,900	22,500	22,000	21,300	20,400

Table 3.2 Age and sex composition of Masterton population, Census 2006

Masterton District	Age group 0–14	15–29	30–49	50–64	65+	Total
Male	2,397	1,920	2,784	2,127	1,491	10,872
Female	2,418	1,851	3,144	2,163	1,869	11,754
Total	4,812	3,780	5,931	4,290	3,357	22,626

Table 3.3 Age composition of Masterton population, forecast to 2031

	Age group 0–14	15–39	40–64	65+	Total	Median Age
2006	4,900	6,600	7,800	3,900	23,200	40.3
2011	4,600	6,300	8,000	4,400	23,300	42.5
2016	4,400	6,100	7,700	5,100	23,300	44.6
2021	4,400	5,800	7,200	5,900	23,200	46.2
2026	4,100	5,500	6,600	6,600	22,900	47.7
2031	3,800	5,000	6,500	7,100	22,400	49.2

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 2031.

The median age rises noticeably over this period from 40.3 in 2006 to 49.2 in 2031. The number of people aged over 65 is expected to almost double from 3,900 to 7,100. This implies a reduction in wage earners. In turn, this aging profile 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 for urban residences within the Masterton District.[4] The incomes and rates are averages for the districts. For reference, the respective urban areas in the comparator districts are: Upper Hutt (Upper Hutt); Featherston/Greytown (South Wairarapa); Hawera (South Taranaki); Dannevirke (Tararua); Rotorua (Rotorua); Taupo (Taupo); Palmerston North (Palmerston North); Carterton (Carterton); Masterton (Masterton); and Cambridge (Waikato).

There were 8,889 households in the Masterton District according to the 2006 Census. The average household income in 2006 is estimated at $49,451 and the median income at $39,700. This compares with an average household income of $59,943 per household for New Zealand as a whole and median of $51,400. Masterton households receive relatively low incomes by nation-wide standards, with the median being 22.8% lower and the average 17.5% lower than in the rest of New Zealand in 2006.

The Masterton District had 11,405 rateable properties in 2006. The District rate take from these properties was relatively low in 2006 compared to the other districts examined. Indeed, amongst the ten districts examined, Masterton ratepayers had the lowest rates (in dollar terms) on average. For the Masterton District's 7,630 urban rate payers, rates were an average $1,243 per property.[5] This represents 2.51% of Masterton's estimated average household income in 2006, and 3.13% of the median household income, as shown in Table 3.4 below.

The nearby district of Carterton has a population of about 7,098 in 2006 (2,757 households). Its rates are $1,634 per ratepayer and account for 3.19% of average household income and

[4] The analysis examines District-wide average income levels throughout the report. The rating information concentrates primarily on urban residential rate payers in for the Masterton District and all rateable properties (urban and rural, residential and commercial) for other districts. This focus is consistent with the Masterton District Council's policy of charging urban ratepayers for sewerage services, while using available LGNZ data for other districts. The comparator districts were selected to contain urban areas that are broadly comparable to Masterton.

This approach is conservative and will tend to understate the relative affordability of the options compared with other districts. That is, sewerage rates divided across an entire district – as for the comparators - will be lower than when divided across urban, residential ratepayers only – as for the Masterton District.

[5] An appendix in section 6 examines the effect on rates per property if the upgrade cost is spread over a wider rating base including both urban residential and commercial properties.

3.74% of median income, both of which are slightly higher than in Masterton. Ratepayers in neighbouring South Wairarapa with a population of nearly 9,000 (and 5,864 rateable properties) pay $1,261. This equates to 2.36% of average household income and 2.88% of the median income in that District. The figures indicate that these three regions of the Wairarapa pay a very similar proportion of their income on rates. But all three are towards the lower end of the income range for the districts examined.

Looking specifically at the sewerage component of the rates bill, Masterton's charge of $171 is on the low side.[6] Only Palmerston North residents pay less for their sewerage services. South Wairarapa and Carterton pay $241 and $188 respectively. This component exceeds $418 in Dannevirke (Tararua), Upper Hutt and Cambridge (Waikato), which has the highest at $482. From this limited analysis it would suggest that Masterton residents are currently paying less for their sewerage services than the comparator districts.

Table 3.4 presents the estimated additional rates that would be charged under the four scheme options. It is ranked by rates as a percentage of median income.

Table 3.4 Average and median incomes and rates ($ and % of income) by district, 2006

	Income ($)		Rates ($)		Rates as % of:	
District	**Average**	**Median**	**Sewerage**	**Total**	**Average income**	**Median income**
Rotorua	55,777	47,600	479	2,347	4.21%	4.93%
South Taranaki	54,390	45,400	482	2,150	3.95%	4.74%
Palmerston North	56,172	47,800	159	1,910	3.40%	4.00%
Taupo	55,844	47,900	366	1,900	3.40%	3.97%
Carterton	51,193	43,700	241	1,634	3.19%	3.74%
Tararua	50,189	41,100	418	1,529	3.05%	3.72%
Waikato	63,041	56,300	443	1,934	3.07%	3.44%
Masterton	**49,451**	**39,700**	**169**	**1,243**	**2.51%**	**3.13%**
Upper Hutt	61,614	54,500	442	1,636	2.66%	3.00%
South Wairarapa	53,360	43,700	188	1,261	2.36%	2.88%
Masterton upgrade 1a	53,360	43,700	287	1,361	2.55%	3.11%
Masterton upgrade 1b	53,360	43,700	321	1,396	2.62%	3.19%
Masterton upgrade 2a	53,360	43,700	357	1,431	2.68%	3.28%
Masterton upgrade 2b	53,360	43,700	372	1,446	2.71%	3.31%

Option 2b lifts total rates by just over 16% to $1,466. This level is within the range of the District's neighbours, is less than the comparator's overall average ($1,720) and is below

[6] The sewerage component of rates in 2006 for Masterton is based on figures supplied by the Masterton District Council for the preparation of this report. For other districts, it is calculated as a proportion of total rates using figures gathered for BERL's 2006 affordability report. Dollar figures are based on total rates by district in 2006.

Districts such as Palmerston North ($1,910) and Cambridge (Waikato District), which pays the most, at $1,934.

In relative terms, adding in the cost of the preferred scheme moves Masterton's total rates up to higher shares of both average (2.92%) and median income (3.64%). The averages for all the comparator districts are 3.09% of average income and 3.63% of median income. This suggests that the increase is towards the middle of the affordable rates range.

The Council's preferred scheme (upgrade 2b) more than doubles the average sewerage rates component. Upgrade 2b would increase it by just over $200, taking it to an estimated $372. However, as noted above, the District has the second lowest level of sewerage rates of the districts examined. Therefore, although the increase is large in percentage terms, it keeps the sewerage costs within the range of the districts presented. It would be slightly above the comparators' average ($351) and the sewerage rates levels of its immediate neighbours in South Wairarapa ($188) and Carterton ($241).

Table 3.5 Sewerage rates as a percent of average and median income by district, 2006

	Sewerage Rates as a % of	
District	**Average income**	**Median income**
South Taranaki	0.89%	1.06%
Tararua	0.83%	1.02%
Rotorua	0.86%	1.01%
Upper Hutt	0.72%	0.81%
Waikato	0.70%	0.79%
Taupo	0.66%	0.76%
Carterton	0.47%	0.55%
South Wairarapa	0.35%	0.43%
Masterton	**0.34%**	**0.43%**
Palmerston North	0.28%	0.33%
Masterton upgrade 1a	0.54%	0.66%
Masterton upgrade 1b	0.60%	0.74%
Masterton upgrade 2a	0.67%	0.82%
Masterton upgrade 2b	0.70%	0.85%

As shown in Table 3.5, the sewerage component for option 2b goes up to 0.75% of average income (and 0.98% of median income), assuming that costs are spread across the District's urban, residential ratepayers. This is within the range for the districts shown (0.28% to 0.89% of average income), but is above the comparators' average (0.64% of average income).

The next most expensive scheme (upgrade 2a) takes Masterton's total rates bill per household to $1,431. This places it in the middle of the range compared to the other districts

examined. It would be relatively low as a share of income (3.64% of median income), fractionally above the average rate of the other districts. The sewerage component would be above the average of the comparator districts in both dollar and percentage of income terms, climbing to $357, or 0.94% of median income. These are within the comparator range.

The least expensive scheme (upgrade 1a) adds just over $118, taking the sewerage component to $241 and total rates to $1,361. This translates to 0.58% of average income and 0.72% of median income.

Masterton District Council's rates over recent years have increased annually by between 3% and 4%, although at a higher rate in the last two years following land purchases for the upgrade. 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 reduced as the share of income accounted for by these additional charges takes Masterton to the middle of the range. However, with the two less expensive schemes, costs are not substantially lower and leave Masterton within the range of what is paid in the other regions. The figures and comparisons in Table 3.4 and Table 3.5 suggest that additional costs to ratepayers of implementing the preferred scheme take rates and the sewerage component towards the middle to upper end of affordability. But these levels are still within the range for the districts represented.

Further comment is warranted about what affordability is being compared to. The base case assumes no upgrade. We understand that this is not an option for the Masterton District Council, and that funding for the upgrade has already begun to be factored into rates. Ratepayers will experience a smaller change in rates than the shift from the 'do nothing' base case to the option under consideration. The affordability impact that ratepayers will now experience is less than if there had been no land purchases (and corresponding rate increases that have occurred in the 2007 and 2008 rating years). However, the base case provides an anchor against which to compare the various upgrades, and can be used to benchmark the increase in dollar terms as well as the proportion of income.

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 NZDep2006 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 size 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 NZDep2006 measure.

The measure is derived from 2006 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 NZDep2006

District	Deprivation index NZDep 2006
Waikato	1,010.9
Upper Hutt	976.6
Palmerston North	997.2
Taupo	1,004.6
Rotorua	1,036.7
South Taranaki	1,017.4
South Wairarapa	974.5
Carterton	970.0
Tararua	1,008.0
Masterton	**1,013.0**

It can be seen from Table 3.6 that Masterton is slightly deprived on a national scale, with a NZDep2006 index of 1013.0. This puts it on a similar level to Waikato or South Taranaki. As shown in Table 3.4, South Taranaki ratepayers pay $482 for their sewerage, which is above the $372 that Masterton ratepayers would face under upgrade 2b with the new ponds. It is above the level paid by ratepayers for their sewerage in the less deprived areas of Carterton and South Wairarapa.

Figure 3.1 gives a represents Masterton's deprivation level plotted against average urban household rates compared to the other regions. Figure 3.2 plots the deprivation index for each district against the sewerage component of rates. All four options are within the range for both total rates and the sewerage component for the comparator districts.

Figure 3.1 illustrates the new ponds option 2b would leave Masterton's rates below most other districts of a similar level of deprivation. The two existing pond upgrade options would leave its rates at the bottom of the rates spectrum, with the exception of South Wairarapa, which has relatively low rates of $1,261 and a relatively low deprivation (index = 974.5).

Figure 3.2 shows that the sewerage component of rates would rise towards the middle of the range for other districts of similar deprivation. Three districts would have lower sewerage rates than under the upgrades: Palmerston North City, Carterton and South Wairarapa. These districts are also less deprived. Taupo's sewerage rates component would be slightly lower than Masterton's under option 2b, but this district also has slightly lower deprivation.

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

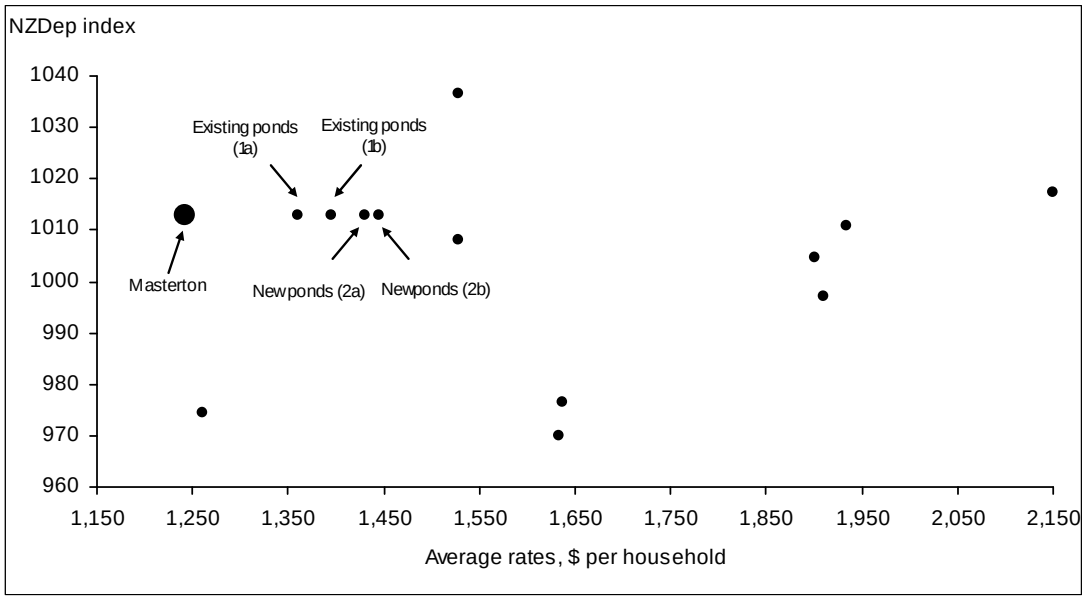
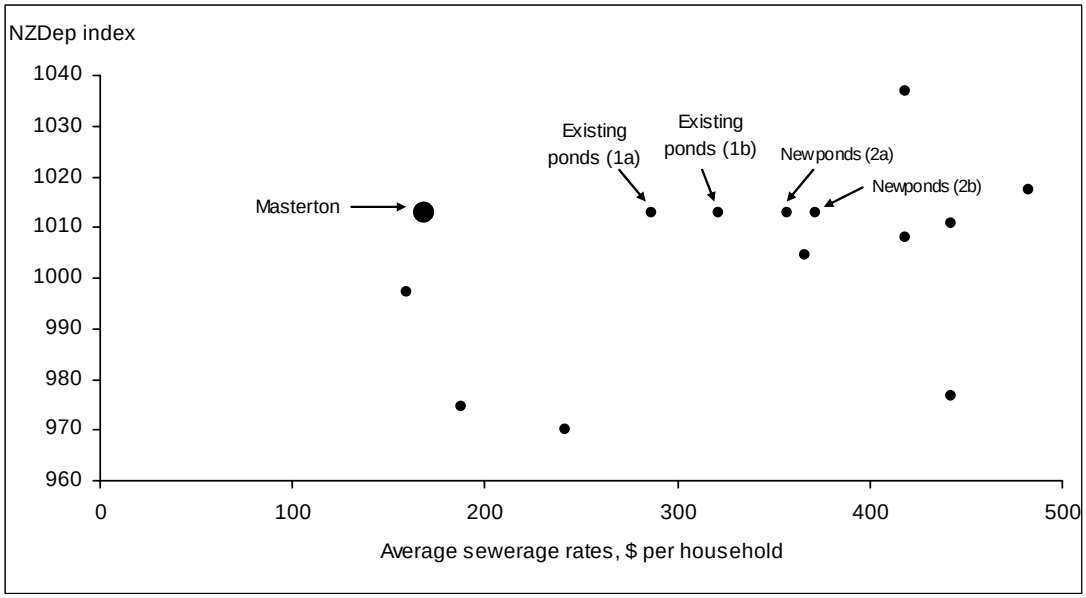


Figure 3.2: Sewerage rates and deprivation index for each district and the four Masterton upgrade options



4 Outcomes and affordability trade-off

4.1 Outcomes

The costs and benefits associated with the four 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 next most expensive scheme (option 1a) uses a combination of old oxidation ponds and new irrigation areas. The two more expensive schemes (options 2a and 2b) require construction of new oxidation ponds and, for the latter option, new irrigation areas. Costs then vary for each option according to the capital cost of the cost of upgrading or installing new ponds and how the newly purchased land is used.

All four of the short-listed schemes meet the requirements as determined by the set of evaluation criteria. The range of benefits from all four options considered is represented in section 2 and is detailed in the Beca report. The main benefits from choosing options 1b and 2b are with regard to reduced leakage, river discharge, health and natural hazard risks.

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". These ponds could last another 40 to 50 years, as they are the type of infrastructure which does not wear out. But they have lower capacity and without additional storage will result in greater discharge into the river than the more costly options. In addition, the new ponds option would double the likely asset life.

The information (taken from the Beca report) supports the Masterton District Council's view that the extra benefits arising from the new ponds outweigh the extra costs they incur. With regard to outcomes, all four meet the required criteria, but the highest cost upgrade offers the best ratio of benefits to costs.

4.2 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 four shortlisted sewerage schemes, total rates move to the middle of the

range compared to the other similar districts, but the upper-middle end of the range in terms of proportion of median income (as opposed to rates expressed in dollar terms).

The lowest cost scheme is still within the range, but at the low end. The other two schemes leave rates inside the range, and do not pose serious concerns about their affordability. Given one of the four schemes must be chosen, the appropriate affordability comparison is between the options rather than between the base 'do nothing' case and one of the upgrades. Furthermore, the 2007 and 2008 rates levels already have some movement factored in to fund the upgrade, so the actual change experienced by households will not be as great as from the base case presented. However, the base case provides an anchor and can be used to benchmark the increase in dollar terms as well as the proportion of income.

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, reflecting the composition of its population and economy. Rates as a percentage of income will rise slightly over the period before the impact of the new sewerage scheme. This indicates that the affordability of a sewerage upgrade is unlikely to improve over time, and may 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. If the project is 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 and the equity of cost/benefit burden.

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 charges are made in order to pay for the upgrade. These costs and benefits are measurable and should be considered. An additional issue is non-ratepayers who benefit from the scheme, such as visitors to the region for recreational purposes, and beneficiaries living in other regions. These impacts are more difficult to quantify but might be considered.

4.3 Concluding comments

Given the issues and affordability discussion above, the Masterton District Council should adopt option 2b. This option will deliver the best standard of infrastructure performance of the options considered, at a cost comparable to other districts and is affordable in relative income terms.

All four shortlisted options meet the current and future standards of infrastructure required. The two more expensive schemes have a greater impact on rates. But Masterton's total rates and sewerage component for both options lie in the range for the comparator districts.

The recommendation in favour of the more expensive option rests on argument that the greater benefits justify the extra cost. The value of these benefits is, to some degree, a subjective judgement and this analysis implicitly accepts these value judgements. Were a different set of values used, the conclusion could instead favour the lower cost scheme of using the existing ponds without additional irrigation land.

5 References

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

"Masterton Wastewater Upgrade Project: Technical Report on Recommended Scheme", prepared for Masterton District Council by Beca Carter Hollings & Ferner Ltd, June 2005.

"Masterton Wastewater Upgrade Project: Recommended Scheme - Summary Report", prepared for Masterton District Council by Beca Carter Hollings & Ferner Ltd, June 2005.

"Masterton Wastewater Upgrade Project: Review of Pond and Irrigation Area Options Incorporating Additional Land", Beca Carter Hollings & Ferner Ltd, January 2008.

Masterton District Council Annual Plan 2005/06.

John Harding Consulting, peer review, 23 June 2005.

"Quality of Life in a Region of Choice", Draft Wairarapa Economic Development Strategy 2005-2025, Draft for Consultation, prepared by Go Wairarapa, July 2005.

6 Appendix: Alternative rating base assumption

This appendix examines the effect on rates per property if the upgrade cost is spread over a wider rating base including both urban residential and commercial properties.

The Masterton District had 7,630 urban, residential households in 2006 and 580 commercial properties. The calculations below assume a differential multiplier of two for commercial properties.

Table 6.1 shows the rates for urban households under the various options and assuming a wider rating base. The upgrade figures spread the cost uniformly across both urban residential and commercial properties (at a rate of two times the charge applied to residential properties). The table does not show the average rates that would be paid by commercial properties, but focuses on the part paid by the average urban household in Masterton District. This allows comparison with the figures in the main report. This is reflected in the base case having the same levels and percentages per household as in the main report.

Table 6.1 Urban households rates ($ and % of income) for wider rating base, 2006

	Rates ($ per payer)		Rates as % of average income:		Rates as % of median income:	
District	**Sewerage**	**Total**	**Sewerage**	**Total**	**Sewerage**	**Total**
Masterton	**169**	**1,243**	**0.34%**	**2.51%**	**0.43%**	**3.13%**
Masterton upgrade 1a	271	1,346	0.55%	2.72%	0.68%	3.39%
Masterton upgrade 1b	301	1,375	0.61%	2.78%	0.76%	3.46%
Masterton upgrade 2a	332	1,407	0.67%	2.84%	0.84%	3.54%
Masterton upgrade 2b	345	1,419	0.70%	2.87%	0.87%	3.57%

Table 6.1 shows that the change in rates from the 2006 level would be lower for all four options. Rates would rise by $103, $132, $164 and $176 across the four options. This equates to a rates increase of $16 to $27 less for each option compared to the increase required with a narrower base of urban residential properties.

These lower changes reflect the assumption that the upgrade costs are spread across a wider rating base and the Council's current differential rating policy. Under this alternative assumption, household rates would remain below the average for the comparator districts in both dollar and percentage of income terms even for the most expensive option, upgrade 2b.

7 Appendix: Background information

7.1 Discretionary household incomes in Masterton, 2001-2005

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 for disposable income, 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.

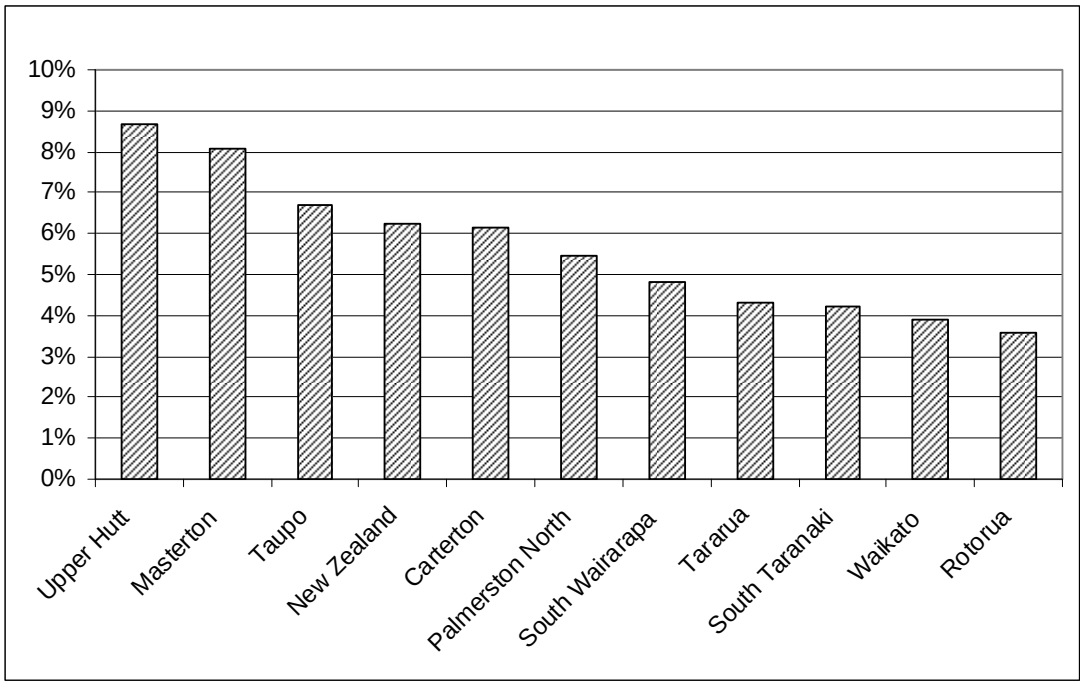
Figure 3.3 shows the average house sale prices for each of the comparator regions and New Zealand, on a six-monthly basis for the six-month period ending June 2001 to June 2005 (nine observations). An average of the rate of change in each period has been calculated and the regional and national averages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



7.2 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.

7.3 Fit 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.

7.4 Community investment overview

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

Section 3 showed that incomes in Masterton are low and that residents are slightly more deprived relative to the comparator districts. Masterton District Council rates in 2006 averaged $1,435 for all rateable properties and $1,243 for urban, residential ratepayers. These levels are 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 2006 averaged $1,243. Options 1a and 1b, based on keeping the existing ponds, would require the sewerage component of rates to increase by $105 and $136 (to $274 and $305). The new pond option adds $147 to each ratepayer's sewerage rates bill, lifting it to an average of $316. All four options would result in Masterton having the sewerage costs in the lower to middle 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

$105 to $147, all of which keep the costs within the range for surrounding councils. Therefore, based on keeping the costs within the range of the comparator regions, all four options are within the bounds of affordability, but with option 2b delivering substantially better performance on a range of qualitative indicators.

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. The preferred option (2b) takes rates as a share of median income to the upper-middle of the comparator group of districts. The existing pond options leave this ratio within the range of other councils, but not much lower than option 2b.

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 four, which is the one using the existing ponds. However, the more expensive options could deliver significantly greater benefits, with relatively little additional cost per ratepayer.

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 four 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 four 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. Spreading the burden over different ratepayer groups, such as urban ratepayers only rather than ratepayers across the District, would affect the relative burden.

7.5 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.

7.5.1 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 was $1.93m in total, and this is listed entirely in the urban costs. A very small component ($34,313) is listed under rural rates.

7.5.2 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 that 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.

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