

Palmerston North Wastewater Best Practicable Option (BPO) Review

Comparative Cost Assessment
August 2021



Prepared for Palmerston North City Council by:



QUALITY STATEMENT

Project Details

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Executive Summary

This comparative cost assessment of the short list options has been undertaken to help inform the process of determining the BPO for the Palmerston North City wastewater management solution.

Considerable technical investigation has been undertaken to estimate costs for each option, including peer review. The costs used in this assessment are the most recent and up to date costs.

Banding - on NPV			Cost/Affordability
<\$350M	5		Lowest NPV range/most affordable
\$350 - \$450M	4		Second lowest NPV range
\$450 - \$550M	3		Medium NPV range
\$550 - \$650M	2		Higher NPV cost
>\$650M	1		High NPV cost/least affordable

Table 1 Band & Score Criteria

This assessment uses the Net Present

Values (NPV) over a 35-year operating period, to align with the 35-year resource consent duration to be sought.

An outline of the methodology used to undertake this assessment is provided in Section 3 of this Report. A score between 1 and 5 has been allocated to each option based on the cost and its position with \$100m bands ranging from <\$350m to >\$650m.

Option No.	Option Code and Title	Treatment Level ¹	Score
1	R2 (b) River Discharge with Enhanced Treatment	4	5
2	R2(b) River discharge with Enhanced Treatment, 75% ADWF to land at low River flow	4	3
3	Dual R+L(b) Two River discharge points with 75% ADWF to Land at low River flow	2	4
4	L+R (a) 97% of time to Land (inland)	1	2
5	L+R (b) 97% of time to Land (Coastal)	3	1
6	L+R (d-1) to land <80m ³ /s / 53% of the time to Land (inland)	2	3
7	L+R (d-2) to Land <62m ³ /s / 43% of the time to Land (inland)	2	4
8	L+R (e-1) to Land <80m ³ /s / 53% of the time to Land (coastal) TN = 35 mg/L	2	1
9	L+R (e-2) to Land <62m ³ /s / 43% of the time to Land (coastal) TN = 35 mg/L	2	1
10	O+L / Ocean with Land (coastal)	1	2
11	Ocean discharge	1	3

Table 2 Shortlist Options Scores

¹ Refer to Treatment Options Report and Shortlist Options Report, May 2021.

CONTENTS

1	Introduction	5
1.1	Overview of Assessment Process.....	5
1.2	Shortlist Options	5
1.3	Supporting Project Information	6
2	Comparative Costs.....	7
2.1	Overview & Key Aspects.....	7
2.2	Indicative Capital Cost Summary	7
3	Methodology for this Assessment	10
3.1	Classification Process.....	10
3.2	Scoring of the Net Present Value Cost	10
4	Overall Recommendation	11

List of tables

Table 1	Band & Score Criteria	3
Table 2	Shortlist Options Scores	3
Table 3	Options Description / Reference	6
Table 4:	Summary of Comparative Indicative Costs - June 2021 Basis.....	8
Table 5	Band & Score Criteria	10
Table 6:	Option Comparative Cost Scores.....	10

List of figures

Figure 1	BPO Assessment Process	5
Figure 2	NPV Split into Capital Costs (P50) and Operations & Maintenance (NPV)	9

1 Introduction

1.1 Overview of Assessment Process

A comparative cost assessment of the short list options has been undertaken to help inform the process of determining the Best Practicable Option (BPO) for the Palmerston North City wastewater management solution. Figure 1 below illustrates how the comparative cost assessment integrates with the other assessments and processes involved in determining the BPO.

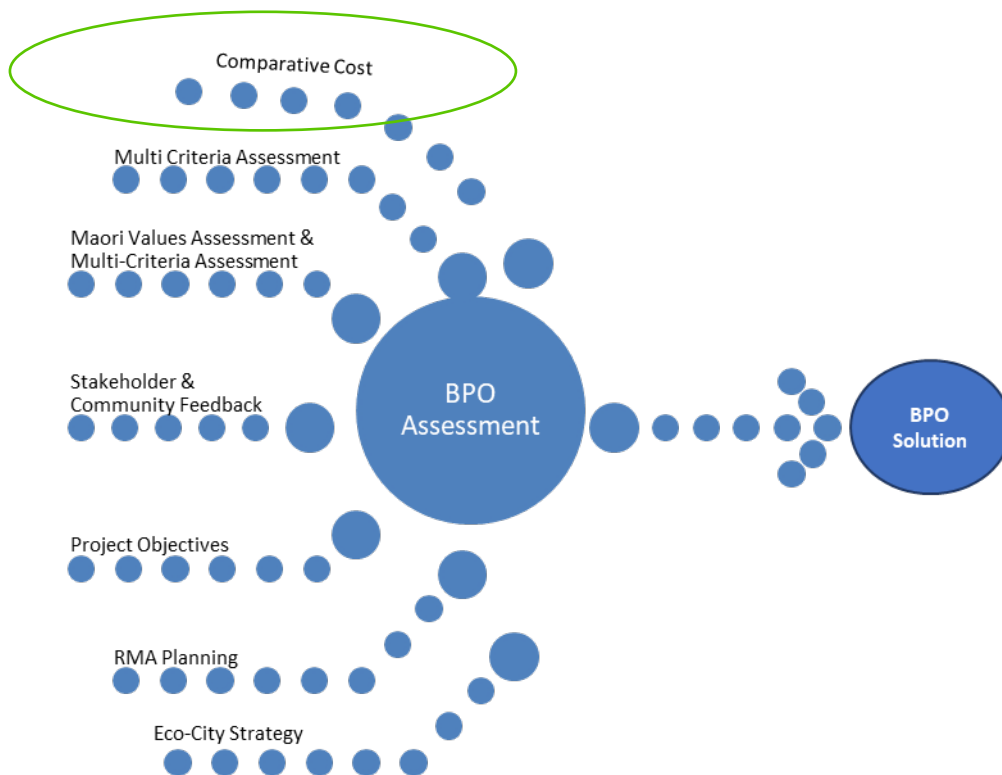


Figure 1 BPO Assessment Process

The comparative cost assessment considers how each of the Short List Options compares with each other on the basis of cost and affordability. The comparison uses the Net Present Value (NPV) for each option based on a 35-year operating period, to align with the maximum allowable resource consent duration under the Resource Management Act 1991. An outline of the methodology used to undertake this assessment is provided in Section 3 of this Report.

1.2 Shortlist Options

Table 3 lists the shortlisted options. Further details of the shortlist options are provided in the Shortlist Options Summary Report, July 2021.

Table 3 Options Description / Reference

Option No.	Option Summary Description
1	R2(b) River discharge with Enhanced Treatment
2	R2(b) River discharge with Enhanced Treatment, 75% ADWF to land at low River flow
3	Dual R+L(b) Two River discharge points with 75% ADWF to Land at low River flow
4	L+R (a) 97% of the time to Land (inland)
5	L+R (b) 97% of the time to Land (coastal)
6	L+R (d-1) to Land <80m³/s / 53% of the time to Land (inland)
7	L+R (d-2) to Land <62m³/s / 43% of the time to Land (inland)
8	L+R (e-1) to Land <80m³/s / 53% of the time to Land (coastal) TN = 35 mg/L
9	L+R (e-2) to Land <62m³/s / 43% of the time to Land (coastal) TN = 35 mg/L
10	O+L / Ocean with Land (coastal)
11	Ocean discharge

1.3 Supporting Project Information

The following technical documents, have been prepared to inform the shortlist options development and assessment process to date:

- Wastewater BPO – Engagement Feedback Report – June 2021 – Just Add Lime
- Wastewater BPO Treatment Options Report – September 2020
- Treatment Shortlist Addendum Report – March 2021
- Draft Carbon Footprint Assessment Report – May 2021
- Wastewater BPO MCA Comparative Assessment Report & Appendices – February 2021
- Wastewater BPO Shortlist Options Report – July 2021

2 Comparative Costs

2.1 Overview & Key Aspects

As the BPO Project has developed from the Long List to the Short List of Options, high level indicative comparative capital (to build), annual operating and maintenance, and Net Present Value (NPV) lifecycle costs have been further refined and developed. It has been stressed throughout the project that while these costs are high level and indicative, they allow for comparisons to be made between options. They also allow for indicative domestic/property rates and trade waste charges to be determined.

The most recent (July 2021) assessment of the costs is based on the November 2020 cost estimates adjusted on the basis of the following additional work:

1. Review of capital costs by Alta Consulting.
2. Review of land purchase costs by the Property Group following feedback at the comparative assessment workshops that the land values may no longer reflect the current market situation.
3. Revised population forecasts used by Palmerston North City Council (PNCC) in its 10-year plan process which required re-calculation of capital and operational costs due to the dependency of option scope and particularly land area on projected populations
4. Review of land application infrastructure construction cost rates.
5. Review of capital cost estimates leading to identification of some work items not previously included.
6. Review of electricity supply requirements for specific options leading some additional allowance for electrical network upgrades.

The July 2021 costs are summarised in Table 4 in Section 2.2 below.

Once a preferred/BPO option is identified the cost estimate will be further developed as that option is further developed and refined.

2.2 Indicative Capital Cost Summary

This high-level summary of the July 2021 cost assessment is included in Table 4. It is based on the updated population ("add popn") forecasts recently supplied by Palmerston North City Council and incorporates changes arising from the assessments listed in Section 2.1 above. Note Operation and Maintenance costs are for Y1 and do not include net income from land use activities.

The NPV shown is based on the P50 estimate. The P50 estimate represents a cost that is likely to be exceeded half of the time, i.e. it is estimated that the actual project cost has an equal chance of being under or over this value. The P95 estimate represents a cost that is likely to be exceeded in only 5% of the outcomes. The P95 is therefore a conservative estimate at this stage of the Project. Figure 2 shows the split between the P50 estimate and the Operations and Maintenance costs over the proposed 35-year consent duration. This includes income from any land application schemes. Note Option 4 includes an estimated income that balances the Operation and Maintenance costs, hence there are no NPV Operation and Maintenance costs for this option in the Figure.

Table 4: Summary of Comparative Indicative Costs - June 2021 Basis

Option No.	Option Code and Title	Treatment Level	NPV (P50, 35 year) \$ June 21 (add popn)	Base Capex Cost (no P&G, Professional Services, PNCC & Contingencies) June 21 (add popn)	P&G, Professional Services, PNCC & Contingencies \$M June 21 (add popn)	Capital Cost (P50 contingency) \$M June 21 (add popn)	Capital Cost (P95 contingency) \$M June 21 (add popn)	Year 1 Operating & Maintenance Costs \$M June 21 (add popn)	Income pa \$M Y26-30 pa for Coastal Land June 21 (add popn)	Land Application Land Area Total Gross ha June 21 (add popn)	Land Purchase (with Contingency) \$M June 21 (add popn)
1	R2 (b) River Discharge with Enhanced Treatment	4	\$337	\$120	\$121	\$241	\$269	\$6	\$0	0	\$3
2	R2(b) River discharge with Enhanced Treatment, 75% ADWF to land at low River flow	4	\$496	\$206	\$174	\$387	\$426	\$7	\$0.3	760	\$55
3	Dual R+L(b) Two River discharge points with 75% ADWF to Land at low River flow	2	\$419	\$177	\$141	\$318	\$356	\$6	\$0.3	870	\$61
4	L+R (a) 97% of time to Land (inland)	1	\$604	\$389	\$216	\$605	\$679	\$4	\$4.5	3760	\$249
5	L+R (b) 97% of time to Land (Coastal)	3	\$836	\$392	\$341	\$733	\$822	\$7	\$13	2570	\$81
6	L+R (d-1) to Land <80m ³ /s / 53% of the time to Land (inLand)	2	\$470	\$249	\$161	\$410	\$459	\$5	\$1.4	2000	\$136
7	L+R (d-2) to Land <62m ³ /s / 43% of the time to Land (inLand)	2	\$433	\$221	\$149	\$369	\$413	\$5	\$0.9	1640	\$112
8	L+R (e-1) to Land <80m ³ /s / 53% of the time to Land (coastal) TN = 35 mg/L	2	\$786	\$392	\$316	\$708	\$795	\$5	\$18	3640	\$115
9	L+R (e-2) to Land <62m ³ /s / 43% of the time to Land (coastal) TN = 35 mg/L	2	\$730	\$357	\$295	\$652	\$732	\$5	\$15	3010	\$95
10	O+L / Ocean with Land (coastal)	1	\$621	\$287	\$261	\$547	\$613	\$5	\$7	1470	\$49
11	Ocean discharge	1	\$480	\$201	\$201	\$406	\$455	\$5	\$0	0	\$1

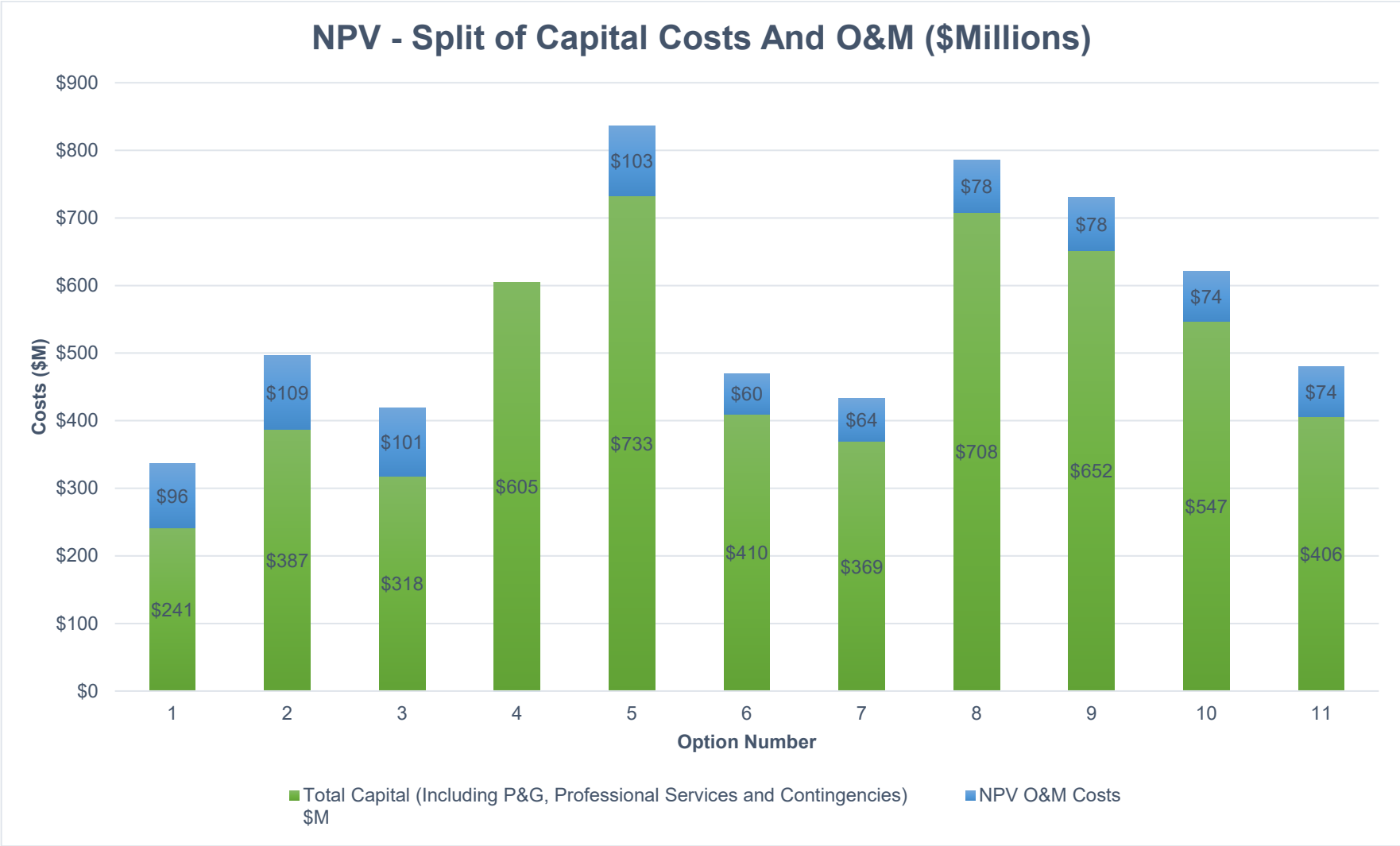


Figure 2 NPV Split into Capital Costs (P50) and Operations & Maintenance (NPV)

3 Methodology for this Assessment

3.1 Classification Process

The technical advisors determined that a Net Present Value (NPV) lifecycle cost over a 35-year operating and maintenance period should be used to compare the options. Based on the 1 to 5 scoring approach adopted for all the assessments in the overall BPO assessment (refer Figure 1) the NPV costs have been banded as shown in Table 5 below.

An NPV approach includes consideration of capital (to build), annual operating and maintenance costs, as well as renewal costs. Because of the discounting of future costs, the total capital cost still represents the largest portion of the NPV cost.

3.2 Scoring of the Net Present Value Cost

Table 5 sets out the suggested 1 to 5 banding/scoring of the NPV costs. Table 6 lists the allocated score applied to each shortlist option, based on the bands and scores set out in Table 5 and using the June 2021 updated growth forecast ("add popn"), NPV over 35 years and P50 cost estimates.

Table 5 Band & Score Criteria

Banding - on NPV			Cost/Affordability
<\$350M	5		Lowest NPV range/most affordable
\$350 - \$450M	4		Second lowest NPV range
\$450 - \$550M	3		Medium NPV range
\$550 - \$650M	2		Higher NPV cost
>\$650M	1		High NPV cost/least affordable

Table 6: Option Comparative Cost Scores

Option No.	Option Code and Title	Treatment Level	Band
1	R2 (b) River Discharge with Enhanced Treatment	4	5
2	R2(b) River discharge with Enhanced Treatment, 75% ADWF to Land at low River flow	4	3
3	Dual R+L(b) Two River discharge points with 75% ADWF to Land at low River flow	2	4
4	L+R (a) 97% of time to Land (inLand)	1	2
5	L+R (b) 97% of time to Land (Coastal)	3	1
6	L+R (d-1) to Land <80m ³ /s / 53% of the time to Land (inLand)	2	3
7	L+R (d-2) to Land <62m ³ /s / 43% of the time to Land (inLand)	2	4
8	L+R (e-1) to Land <80m ³ /s / 53% of the time to Land (coastal) TN = 35 mg/L	2	1
9	L+R (e-2) to Land <62m ³ /s / 43% of the time to Land (coastal) TN = 35 mg/L	2	1
10	O+L / ocean with Land (coastal)	1	2
11	Ocean discharge	1	3

4 Overall Recommendation

The technical advisors recommend an NPV cost calculated over a 35-year operating and maintenance period to align with the maximum 35-year consent duration be used to compare shortlist option costs in this assessment. The recommended costs are the July 2021 updated costs incorporating the most recent amendments for population growth rates, Land values and contingency provisions.

The technical advisors further recommend that the banding and scoring framework as set out in Table 5 be used for the Comparative Cost assessment.