



# Cardrona Indicative Business Case

Wastewater and Water  
Supply Servicing  
Options

June 2015

Document Title:

Cardrona Indicative Business Case

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QUEENSTOWN LAKES DISTRICT COUNCIL

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Executive Summary

Cardrona Wastewater and Water Supply Servicing Options

|   |  |  |            |                         |                 |                       |            |      |            |                   |  |  |  |
|---|--|--|------------|-------------------------|-----------------|-----------------------|------------|------|------------|-------------------|--|--|--|
| Strategic Case:   |  | Economic Case:   |            |                         |                 |                       |            |      |            | Financial Case:   |  |  |  |
| Need to Invest  |  | Determine Potential Value for Money  |            |                         |                 |                       |            |      |            | Financial Costing |  |  |  |
| - There was an outbreak of acute gastroenteritis at Cardrona late in Aug/Sep 2012 involving 53 recognised cases.  |  | Wastewater Options   |            | 0                       | 1               | 2                     | 3a         | 3b   | 4          | 5                 |  |  |  |
| - Two water supplies were found to contain the same <i>Norovirus</i> strain as that detected in faecal specimens from cases.  |  | Description  | Do Nothing | Baxter2009              | SBR             | SBR at MCS            | SBR at MCS | CVP  | Baxter/CVP |                   |  |  |  |
| - Environmental sampling found evidence of <i>Norovirus</i> in the surface discharge from at least one wastewater system and also the Cardrona River downstream of the village. |  | Appraisal period (years)   | 30         | 30                      | 30              | 30                    | 30         | 30   | 30         |                   |  |  |  |
| - There is evidence that the contamination from sewerage has been occurring for some time.  |  | Capital costs (\$m)  | 12.0       | 1.0                     | 7.1             | 8.5                   | 10.6       | 9.8  | 10.8       |                   |  |  |  |
| - There was a large outbreak in 2006 at the Cardrona Alpine Resort, also caused by <i>Norovirus</i> contamination of the water supply.  |  | Whole of Life Costs (\$m)  | 27.8       | 2.6                     | 7.7             | 18.1                  | 23.0       | 12.4 | 13.4       |                   |  |  |  |
|   |  | Cost-Benefit Analysis of (monetary benefits and costs at the Public Sector Discount Rate)  |            |                         |                 |                       |            |      |            |                   |  |  |  |
|   |  | Net Present Value of Benefits (\$m)  | 0.0        | 0.9                     | 12.5            | 11.5                  | 16.2       | 17.3 | 17.0       |                   |  |  |  |
|   |  | Net Present Costs (\$m)  | 14.7       | 1.6                     | 7.5             | 11.0                  | 13.8       | 10.2 | 9.5        |                   |  |  |  |
|   |  | Benefit Cost Ratio   | 0.0        | 0.6                     | 1.7             | 1.0                   | 1.2        | 1.7  | 1.8        |                   |  |  |  |
|   |  | Net Present Value (NPV, \$m)   | -14.7      | -0.6                    | 5.0             | 0.5                   | 2.5        | 7.0  | 7.5        |                   |  |  |  |
|   |  | Multi-criteria Analysis (ranking of non-monetary benefits and costs, if any)   |            |                         |                 |                       |            |      |            |                   |  |  |  |
|   |  | Objective 1  | N/A        | N/A                     | N/A             | N/A                   | N/A        | N/A  | N/A        |                   |  |  |  |
|   |  | Objective 2  | Partial    | Partial                 | Yes             | Yes                   | Yes        | Yes  | Yes        |                   |  |  |  |
|   |  | Objective 3  | No         | Partial                 | Partial         | Yes                   | Yes        | Yes  | Yes        |                   |  |  |  |
|   |  | Objective 4  | No         | Partial                 | Partial         | Yes                   | Yes        | Yes  | Yes        |                   |  |  |  |
|   |  | Costs per DE (Capex+Opex, \$k/DE)  |            | 21.8                    | 25.1            | 16.3                  | 11.3       | 9.8  | 10.7       |                   |  |  |  |
|   |  | Preferred Option:  |            |                         |                 |                       |            |      | Preferred  |                   |  |  |  |
|   |  | The Preferred Option: (Wastewater Option 5 - Baxter/CVP) + (Water Supply Option 1 - Purchase Village Supply)   |            |                         |                 |                       |            |      |            |                   |  |  |  |
|   |  | Is to purchase the Baxter2009 WWTP as soon as possible and progress the development of the Cardrona Valley Pipeline ready for construction in 2019/20. It delivers on all objectives and satisfies those that wish to have immediate action but avoids the costly upgrades for as long as possible. Value for money is confirmed as it has the highest NPV and the second lowest costs per dwelling equivalent. Purchasing the village water supply will help deliver on all objectives over time (once wastewater disposal is removed from the village), satisfies those that wish to have immediate action and avoids the costly upgrades of finding a new water source. |            |                         |                 |                       |            |      |            |                   |  |  |  |
|   |  | Water Supply Options   |            | 0                       | 1               | 2                     | 3          |      |            |                   |  |  |  |
|   |  | Description  | Do Nothing | Purchase Village Supply | New Bore Supply | Supply + Reticulation |            |      |            |                   |  |  |  |
|   |  | Whole of Life Costs (\$m)  | 10.0       | 1.1                     | 2.6             | 3.0                   |            |      |            |                   |  |  |  |
|   |  | Net Present Value (NPV, \$m)   | -3.8       | 0.6                     | 0.3             | 0.0                   |            |      |            |                   |  |  |  |
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|   |  |  |            |                         |                 |                       |            |      |            |                   |  |  |  |
|   |  |  |            |                         |                 |                       |            |      |            |                   |  |  |  |
|   |  |  |            |                         |                 |                       |            |      |            |                   |  |  |  |
|   |  |  |            |                         |                 |                       |            |      |            |                   |  |  |  |
|   |  |  |            |                         |                 |                       |            |      |            |                   |  |  |  |
|   |  |  |            |                         |                 |                       |            |      |            |                   |  |  |  |



## 1 Introduction

This business case seeks formal approval to invest:

- up to \$10.8m in the years 2015/16 to 2019/20 to address wastewater issues in Cardrona.
- up to \$407k in the years 2015/16 to 2016/17 to address water supply issues in Cardrona.

This business case follows the Treasury Better Business Cases guidance and is organised around the five case model. It has been co-ordinated by Rationale Limited, and builds on the Cardrona Water and Wastewater Servicing Options report provided by Harrison Grierson and engagement at the following stakeholder workshops:

Table 1: Stakeholder Workshops

| Date                    | Workshop  |
|-------------------------|---|
| <b>24 February 2015</b> | Objectives and options workshop (internal stakeholders) |
| <b>18 March 2015</b>    | Long-list options workshop (internal stakeholders)      |
| <b>23 April 2015</b>    | Long-list options workshop (external stakeholders)      |
| <b>14 May 2015</b>      | Short-listed options workshop (external stakeholders)   |

The key stakeholders involved in the workshops are listed below.

Table 2: Key Stakeholders

| Internal Stakeholders                     | External Stakeholders                           |
|---|---|
| Lyal Cocks (Councillor)                   | Lyal Cocks, Ulrich Glasner, Rob Darby (QLDC)    |
| Ulrich Glasner (Chief Engineer)           | Blyth Adams (CVVRS)                             |
| Rob Darby (Asset Performance Team Leader) | Derek Bell, Janine Kruger (Public Health South) |
| Peter Hansby (GM Infrastructure)          | Andrew Spencer, Chris Morton (MCS).             |
| Ash Deshpande (H&G)                       | Cade Thornton (Cardrona Hotel)                  |
| Tom Lucas (Rationale)                     | Simon Beardmore, Duane Calvert (ORC)            |
|   | Grant Railton (Baxter2009)                      |
|   | Kathy Lynn (Brooklynn)                          |
|   | Jamie Young, Leanne Young (Benbrae)             |
|   | Erik Barnes (CAR)                               |

## 2 Strategic Case

### 2.1 Strategic Context

The key aims of the organisation are to have high performing infrastructure and services that:

- meet current and future user needs, and are fit for purpose
- are cost effectively and efficiently managed on a full life-cycle basis
- are affordable for the district.

The core responsibilities of the organisation are:

- To improve, promote, and protect public health within its district (Health Act 1956).

- To cause all proper steps to be taken to secure the abatement of any nuisance, or any conditions likely to be injurious to health (Health Act 1956).
- To assess, from a public health perspective, the adequacy of water and other sanitary services available to communities (LGA 2002).

Analysis of the current and anticipated operating environments has identified the following key issues for the organisation:

1. The current ad-hoc nature of development has caused significant risk to public health;
2. There is the potential for significant growth in Cardrona;
3. Addressing these factors poses a significant affordability issue for the Cardrona community.

Relevant organisational policies, strategies and goals are:

- Cardrona 2020 (2003) - To provide for the cost-effective reticulation of water and sewerage as the population increases and this becomes more economically viable.
- Water and Sewerage Schemes – Small Communities (2004) - Sewerage and water need to be funded by the community that benefit.
- Growth Management Strategy (2007) - Infrastructure is provided in a way that supports high quality development located in the right places while adhering to the principles of sustainable development and ensuring that the environmental qualities of the district are protected.
- 3 Waters Strategy (2011) - We will manage risk and be able to adapt to a variety of future scenarios for climate change and population growth.
- 2015 – 2045 Infrastructure Strategy (2015) – To rationalise the number of wastewater treatment plants in the district to achieve better environmental and economic outcomes.

The investment proposal aligns to the above direction by enabling development, protecting public health and the environment and at the same time optimising value for money.

## 2.2 The Need for Investment

A workshop was held on 24 February 2015 with key internal stakeholders to gain a better understanding of investment drivers and the need to invest in change. The internal stakeholders identified and agreed the following key problems that need to be addressed:

- Water contamination (Norovirus outbreak).
- Wastewater treatment plants (WWTP's) failing (Benbrae) and requiring resource consent renewal (Cardrona Alpine Resort (CAR) + Hotel + Baxter2009).
- Growth is restricted.

There was an outbreak of acute gastroenteritis at Cardrona late in Aug/Sep 2012 involving 53 recognised cases. Two water supplies were found to contain the same Norovirus strain as that detected in faecal specimens from cases. Environmental sampling found evidence of Norovirus in the surface discharge from at least one wastewater system and also the Cardrona River downstream of the village. There is evidence that the contamination from sewerage has been occurring for some time. There was also a large outbreak in 2006 at the Cardrona Alpine Resort, also caused by Norovirus contamination of the water supply.

There are numerous issues with existing wastewater treatment and disposal systems in Cardrona.

- Benbrae: Good treatment system, but issues exist with waterlogging in the discharge field.
- Hotel: Poor system and poor disposal system.
- Baxter2009: Suitable system and disposal area however this system has not been loaded to its design specifications so its performance under load conditions is unproven.

The lack of 3-waters infrastructure in Cardrona is considered to be holding back development of the community. In particular the reliance on individual septic tanks (with their associated space requirements),

or the financial hurdle of installing private wastewater treatment systems is restricting development in the Rural Visitor Zone (RVZ).

The following levels of potential development have been assumed for this project. With greater densities allowed in the two zones there is the chance that development could be much greater than this.

Table 3: Future Development Assumptions

| Zone                                   | Current Rating Units (SUIPs) | Future Dwellings |
|--|------------------------------|------------------|
| Rural Visitor Zone (RVZ)               | 65 (plus 35 vacant)          | 192              |
| Mt Cardrona Station Special Zone (MCS) | 8                            | 500              |

## 2.3 The Case for Change

Internal stakeholders identified four investment objectives for this investment proposal at a workshop on 24 February 2015. The case for change is summarised below for each of these investment objectives.

| Objective 1                | To have zero illness attributable to a communal water supply by 2016.   |
|----------------------------|---|
| Existing arrangements      | Two private bores located in the centre of the village. The main community supply has a new chlorine dosing pump and UV unit installed. The UV unit is not an accredited system with the NZDWS.   |
| Business Needs             | A secure water supply source and treatment solution that significantly reduces the risk of future outbreaks.  |
| Scope                      | A core requirement is to improve the existing treatment and management to comply with NZDWS. A more desirable solution would include finding a more secure water supply source.   |
| Benefits                   | Residents, visitors and businesses will benefit from reduced illness meaning less days off sick and less loss of revenue. Reputation as a tourist destination will be maintained.   |
| Risks                      | Not reaching agreement on the management of the water supply schemes.<br>Ongoing contamination from the disposal of wastewater in the village.<br>Not being able to transfer an existing water take to a new location and/or entity.<br>Not finding a new secure water supply source. |
| Constraints & dependencies | Existing water takes are currently over-allocated in the Cardrona Valley. Success is greatly improved if wastewater disposal ceases in and around the village.  |

|                                       |  |
|---------------------------------------|--|
| <b>Objective 2</b>                    | <b>To have zero illness attributable to a communal wastewater scheme by 2017.</b>  |
| <b>Existing arrangements</b>          | Three private treatment plants and disposal fields located in and around the village. Baxter2009 is acting as a community supply. The remainder of the village are operating on septic tanks. Cardrona Alpine Resort is keen to get their wastewater off the mountain. |
| <b>Business Needs</b>                 | Wastewater disposal that does not pose a significant risk to public health.  |
| <b>Scope</b>                          | A core requirement is to improve the existing treatment and disposal systems. A more desirable solution would include consolidating the number of plants and disposal fields and locating these away from any potable water takes.                                     |
| <b>Benefits</b>                       | Residents, visitors and businesses will benefit from reduced illness meaning less days off sick and less loss of revenue. Reputation as a tourist destination will be maintained.  |
| <b>Risks</b>                          | Not reaching agreement on the management of the wastewater schemes.<br>ORC may impose stringent discharge standards.<br>Community objection to location of treatment plants.<br>Not finding acceptable funding arrangements.   |
| <b>Constraints &amp; dependencies</b> | Success is greatly improved if potable water takes are moved upstream of any wastewater disposal fields.   |

|                                       |  |
|---------------------------------------|--|
| <b>Objective 3</b>                    | <b>To ensure all properties have access to a legal wastewater treatment and disposal system by 2020.</b>   |
| <b>Existing arrangements</b>          | The Hotel's wastewater disposal consent expires in 2016 and Baxter2009's consent expires in 2019. The remainder of the village are operating on septic tanks. Cardrona Alpine Resort currently have a 5 year consent for wastewater disposal.                            |
| <b>Business Needs</b>                 | Consented wastewater disposal system/s for the existing and future communities.  |
| <b>Scope</b>                          | A core requirement is to service the existing community. A more desirable solution would include consolidating the number of plants and disposal fields and incorporating the wider Cardrona Valley community.   |
| <b>Benefits</b>                       | Ratepayers will benefit by avoiding any enforcement costs imposed on them by the ORC for not complying with the ORC Water Plan. Residents, visitors, businesses and wildlife will benefit from the improved management of water quality in the Cardrona River catchment. |
| <b>Risks</b>                          | Not reaching agreement on the management of the wastewater schemes.<br>ORC may impose stringent discharge standards.<br>Community objection to location of treatment plants.<br>Not finding acceptable funding arrangements.   |
| <b>Constraints &amp; dependencies</b> | The Hotel's consent expires in 2016 and Baxter2009's consent expires in 2019. Cardrona Alpine Resort currently have a 5 year consent for wastewater disposal.  |



|                                       |   |
|---------------------------------------|---|
| <b>Objective 4</b>                    | <b>To ensure no development, that is permitted under current zoning, is inhibited by a lack of 3-waters infrastructure from 2017.</b>   |
| <b>Existing arrangements</b>          | Under current Rural Visitor Zone rules there is no minimum lot size but lack of access to a community wastewater scheme means developments are limited through having to provide wastewater treatment and disposal solutions. |
| <b>Business Needs</b>                 | Access to suitable 3-waters infrastructure for all residential and visitor zoned land that enables the zone to be fully developed.  |
| <b>Scope</b>                          | A core requirement is to service the existing Rural Visitor Zone. A more desirable solution would include both the Mt Cardrona Special Zone and the Cardrona Alpine Resort.   |
| <b>Benefits</b>                       | Ratepayers will benefit by being able to fully realise the value of their property investment.  |
| <b>Risks</b>                          | Not reaching agreement on the management of the wastewater schemes.<br>ORC may impose stringent discharge standards.<br>Community objection to location of treatment plants.<br>Not finding acceptable funding arrangements.  |
| <b>Constraints &amp; dependencies</b> |   |

### 3 Economic Case

#### 3.1 Critical Success Factors

In addition to the investment objectives, the following assessment criteria will be used for screening the options.

| <b>Generic Critical Success Factors</b> | <b>Broad Description</b>  | <b>Proposal-Specific Critical Success Factors</b>                            |
|---|---|--|
| <b>Strategic fit and business needs</b> | How well the option meets the agreed investment objectives, related business needs and service requirements, and integrates with other strategies, programmes and projects.                   | Alignment with District Plan, 30yr Infrastructure Strategy & Regional Plans. |
| <b>Potential value for money</b>        | How well the option optimises value for money (i.e. the optimal mix of potential benefits, costs and risks).  | Right solution, right time at the right price.                               |
| <b>Supplier capacity and capability</b> | How well the option matches the ability of potential suppliers to deliver the required services, and is likely to result in a sustainable arrangement that optimises value for money.         | Is it a sustainable arrangement (external).                                  |
| <b>Potential affordability</b>          | How well the option can be met from likely available funding, and matches other funding constraints.  | Are there no funding constraints.  |
| <b>Potential achievability</b>          | How well the option is likely to be delivered given the organisations ability to respond to the changes required, and matches the level of available skills required for successful delivery. | Ability and skills to deliver (internal).                                    |

### 3.2 Identify Short-listed Options

Within the potential scope of this proposal, the following long-list options for providing the identified services were identified by key stakeholders:

| Dimension                        | Description  | Options within each Dimension   |
|----------------------------------|--|---|
| <b>Scale, scope and location</b> | <i>In relation to the proposal, what levels of service (supply) and coverage (user) are possible? For example, by levels of functionality, geographic coverage, population/user base, etc.</i> | <ul style="list-style-type: none"> <li>• <i>status quo</i>....Do nothing</li> <li>• Wastewater only</li> <li>• Water supply only</li> <li>• Wastewater and water supply</li> </ul>  |
|                                  | <i>Scale and location</i>  | <ul style="list-style-type: none"> <li>• <i>status quo</i>....Existing communal schemes only</li> <li>• Rural Visitor Zone only</li> <li>• Current "Village"</li> <li>• Village + Mt Cardrona Stn (MCS)</li> <li>• Village + Cardrona Alpine Resort (CAR)</li> <li>• Village + MCS + CAR</li> </ul> |
| <b>Service solution</b>          | <i>How can services be provided? For example, alternative processes, mixes of enablers, etc.</i>   | <ul style="list-style-type: none"> <li>• <i>status quo</i>....Do nothing</li> <li>• Assist in management of existing schemes</li> <li>• Purchase existing schemes</li> <li>• Build new local infrastructure</li> <li>• Send wastewater to Wanaka</li> </ul>   |
| <b>Service delivery</b>          | <i>Who can help us to deliver the services? Eg in-house or out-sourced or alternative partnering arrangements.</i>   | <ul style="list-style-type: none"> <li>• In-house design</li> <li>• Out-sourced design</li> <li>• Alliancing / partnership design</li> </ul>  |
| <b>Implementation</b>            | <i>When can services be delivered? Including choices about the pace of change. Eg big bang, phased, modular.</i>   | <ul style="list-style-type: none"> <li>• Deferred</li> <li>• Just in time (just too late)</li> <li>• Phased</li> <li>• Now, big bang</li> </ul>   |
| <b>Funding</b>                   | <i>How can it be funded? Including choices of funders and possible arrangements. For example, capital or operating, privately or Crown funded, user charging.</i>                              | <ul style="list-style-type: none"> <li>• Targeted</li> <li>• Ward based</li> <li>• 3<sup>rd</sup> Party</li> </ul>  |

The full long-list options assessment is shown in Appendix A.

On the basis of the initial assessment of the long-list options (by dimension), the following short-listed options were selected for further economic analysis:

- Option 0: Status quo or do nothing (retained as a baseline comparator).

- Option 1: Do minimum - Purchase an existing wastewater scheme to service the Rural Visitor Zone only.
- Option 2: Less Ambitious - Purchase existing wastewater and water supply schemes to service the Cardrona Village.
- Option 3: Intermediate – New WWTP and water supply source and treatment to service the Cardrona Village and Mt Cardrona Station.
- Option 4: More Ambitious – Cardrona Valley Pipeline and new water supply source and treatment to service the Cardrona Village, Mt Cardrona Station and Cardrona Alpine Resort.

At the key stakeholder workshops on 23 April 2015 and 14 May 2015 it was evident that there was the desire for an immediate solution as well as a longer term solution. This resulted in a number of hybrid options being investigated with the following option being considered for inclusion.

- Option 5: Hybrid – Cardrona Valley Pipeline, with purchase of existing schemes in the interim.

### 3.3 Economic Analysis

For the purposes of the analysis the following assumptions have been made:

- In the status quo or do nothing option growth will happen but will incur significant costs for connecting to existing infrastructure or building new infrastructure (i.e. capital costs of \$12m are assumed in the do nothing option to enable development).
- Each option is assessed in relation to the status quo or do nothing option.
- Avoiding or replacing the status quo or do nothing costs is considered as a benefit in the analysis (i.e. option 1 has capital costs of \$1.0m different to the do nothing option but only provides benefits, such as avoiding do nothing costs, of \$0.9m).
- The uplift in property values once the infrastructure barriers to development are removed is included as a key benefit in the analysis. This is estimated at \$25/m<sup>2</sup>.
- The lost revenue from sick days is considered in the analysis.
- The residual value of long life assets is considered as a benefit in the analysis.

The wastewater flows used in the analysis are shown in Appendix B.

To make the analysis easier to follow the wastewater and water supply options have been separated out in the economic analysis. These are summarised in the following tables.

Table 4: Wastewater Options Cost Benefit Analysis

| Wastewater Options  | 0          | 1          | 2       | 3a         | 3b         | 4    | 5          |
|---|------------|------------|---------|------------|------------|------|------------|
| Description   | Do Nothing | Baxter2009 | SBR     | SBR at MCS | SBR at MCS | CVP  | Baxter/CVP |
| Appraisal period (years)  | 30         | 30         | 30      | 30         | 30         | 30   | 30         |
| Capital costs (\$m)   | 12.0       | 1.0        | 7.1     | 8.5        | 10.6       | 9.8  | 10.8       |
| Whole of Life Costs (\$m)   | 27.8       | 2.6        | 7.7     | 18.1       | 23.0       | 12.4 | 13.4       |
| Cost-Benefit Analysis of (monetary benefits and costs at the Public Sector Discount Rate) |            |            |         |            |            |      |            |
| Net Present Value of Benefits (\$m)   | 0.0        | 0.9        | 12.5    | 11.5       | 16.2       | 17.3 | 17.0       |
| Net Present Costs (\$m)   | 14.7       | 1.6        | 7.5     | 11.0       | 13.8       | 10.2 | 9.5        |
| Benefit Cost Ratio  | 0.0        | 0.6        | 1.7     | 1.0        | 1.2        | 1.7  | 1.8        |
| Net Present Value (NPV, \$m)  | -14.7      | -0.6       | 5.0     | 0.5        | 2.5        | 7.0  | 7.5        |
| Multi-criteria Analysis (ranking of non-monetary benefits and costs, if any)              |            |            |         |            |            |      |            |
| Objective 1   | Partial    | Partial    | Partial | Yes        | Yes        | Yes  | Partial    |
| Objective 2   | Partial    | Partial    | Yes     | Yes        | Yes        | Yes  | Yes        |
| Objective 3   | No         | Partial    | Partial | Yes        | Yes        | Yes  | Yes        |
| Objective 4   | No         | Partial    | Partial | Yes        | Yes        | Yes  | Yes        |
| Costs per DE (Capex+Opex, \$k/DE)   |            | 21.8       | 25.1    | 16.3       | 11.3       | 9.8  | 10.7       |
| Preferred Option:   |            |            |         |            |            |      | Preferred  |

Table 5: Water Supply Options Cost Benefit Analysis

| Water Supply Options  | 0          | 1                       | 2             | 3                     |
|---|------------|-------------------------|---------------|-----------------------|
| Description   | Do Nothing | Purchase Village Supply | New Headworks | Headworks + Trunkmain |
| Appraisal period (years)  | 30         | 30                      | 30            | 30                    |
| Capital costs (\$m)   | 1.6        | 0.4                     | 1.1           | 1.5                   |
| Whole of Life Costs (\$m)   | 10.0       | 1.1                     | 2.6           | 3.0                   |
| Cost-Benefit Analysis of (monetary benefits and costs at the Public Sector Discount Rate) |            |                         |               |                       |
| Net Present Value of Benefits (\$m)   | 0.0        | 1.7                     | 2.0           | 2.0                   |
| Net Present Costs (\$m)   | 3.8        | 1.0                     | 1.7           | 2.0                   |
| Benefit Cost Ratio  | 0.0        | 1.6                     | 1.2           | 1.0                   |
| Net Present Value (NPV, \$m)  | -3.8       | 0.6                     | 0.3           | 0.0                   |
| Multi-criteria Analysis (ranking of non-monetary benefits and costs, if any)              |            |                         |               |                       |
| Objective 1   | Partial    | Partial                 | Yes           | Yes                   |
| Objective 2   | Partial    | Partial                 | Partial       | Partial               |
| Objective 3   | N/A        | N/A                     | N/A           | N/A                   |
| Objective 4   | No         | Partial                 | Partial       | Partial               |
| Costs per DE (Capex+Opex, \$k/DE)   |            | 0.8                     | 2.0           | 2.6                   |
| Preferred Option:   |            | Preferred               |               |                       |

The preferred wastewater option is option 5 because it delivers on all objectives and satisfies those that wish to have immediate action but avoids the costly upgrades for as long as possible. Value for money is confirmed as it has the highest NPV and the second lowest costs per dwelling equivalent (DE).

The other wastewater short-listed options were rejected because they either did not deliver all the benefits sought or the costs were considered too high.

The preferred water supply option is option 1 because it will help deliver on all objectives over time (once wastewater disposal is removed from the village), satisfies those that wish to have immediate action and avoids the costly upgrades of finding new water source. Value for money is confirmed as it has the highest NPV and the lowest costs per dwelling equivalent (DE).

The other short-listed options were rejected because they did not deliver good value for money.

### 3.4 The Preferred Option

Wastewater Option 5 - Baxter/CVP + Water Supply Option 1 - Purchase Village Supply.

Phase 1 - purchase the Baxter2009 wastewater treatment plant and disposal field along with the village water supply as soon as possible and progress the development of the Cardrona Valley Pipeline ready for construction in 2019/20.

It is assumed that the schemes will need minor upgrades to comply with the drinking water standards and their consent conditions. It has also been assumed that the Hotel would be connected to Baxter2009 but the existing septic tanks would not be connected until the village is fully reticulated for the Cardrona Valley Pipeline.

Phase 2 – fully reticulate the village by gravity down to Mt Cardrona Station and build the Cardrona Valley Pipeline to Wanaka.

It ensures that immediate action is taken to address the public health risks and remove barriers to development, with around 15 to 17 dwellings being able to connect immediately. This will give council and the community further time to develop and assess the Cardrona Valley Pipeline before committing to this significant investment.

## 4 Commercial Case

The procurement strategy is to negotiate sale and purchase agreements with Baxter2009 and Cardrona Water Supply Limited, engage QLDC's 3-waters operations and maintenance contractor to run these schemes and use professional services providers to further develop the preferred solution. This should facilitate immediate improvements while the longer term solution is further developed.

The required services are:

1. Establish investment requirements to bring existing schemes up to Council standards. Could be done by QLDC's operations and maintenance contractor.
2. Concept design for the preferred solution. This includes both reticulation of the village and the Cardrona Valley Pipeline.
3. Legal agreements for land access issues.
4. Private developer agreements with Mt Cardrona Station and the Cardrona Alpine Resort need to be drawn up to agree funding and delivery options for the preferred solution.
5. Detailed design of the final solution.

There are significant risks around delivering the preferred solution and further work should be completed to assess how best these risks could be apportioned between the parties involved.



## 5 Financial Case

The proposed funding arrangements are to offer residents/ratepayers the choice between a lump sum contribution and a targeted rate for their contribution to the new scheme. Annual rates would also be payable to cover the operating, interest, depreciation and overhead costs. There may be opportunities to share costs with the wider Wanaka ward and/or defer the funding of depreciation until the initial scheme loans are repaid to help with affordability. It is noted that this would be contrary to the direction received from LTP submissions.

The financial analysis model and the associated methodology is very preliminary and is only intended to indicate the potential funding implications. It has not allowed for any lump sum contributions or future development contributions to help offset the interest costs, other than an initial contribution from Cardrona Alpine Resort.

The financial analysis of the preferred option demonstrates that it is affordable but is very close to the assumed limits of affordability. A capital contribution of less than \$10k per dwelling equivalent is considered affordable. The estimated annual costs though are high at nearly \$2800 per dwelling equivalent, assuming 100% debt funding. It will therefore be necessary to take the final funding proposal to the community for an indication of support.

Table 6: Wastewater and Water Supply Financial Analysis

| (\$000)                    | 2015/<br>16 | 2016/<br>17 | 2017/<br>18 | 2018/<br>19 | 2019/<br>20 | 2020/<br>21 | 2021/<br>22 | 2022/<br>23 | 2023/<br>24 | 2024/<br>25 | Total 10<br>yr |
|----------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|----------------|
| Capital expenditure        | 580         | 858         | 0           | 750         | 9,043       | 0           | 0           | 0           | 0           | 0           | 11,231         |
| Operating expenditure      | 0           | 106         | 106         | 106         | 106         | 142         | 142         | 142         | 142         | 142         | 1,135          |
| Interest                   | 38          | 93          | 93          | 142         | 431         | 431         | 431         | 431         | 431         | 431         | 2,953          |
| Depreciation               | 10          | 24          | 24          | 36          | 187         | 187         | 187         | 187         | 187         | 187         | 1,217          |
| Overheads                  | 60          | 60          | 60          | 60          | 60          | 60          | 60          | 60          | 60          | 60          | 600            |
| Total expenditure          | 687         | 1,142       | 284         | 1,095       | 9,827       | 820         | 820         | 820         | 820         | 820         | 17,136         |
| Revenue                    | 0           | 0           | 0           | 0           | 4,600       | 0           | 0           | 0           | 0           | 0           | 4,600          |
| Capital required           | 580         | 858         | 0           | 750         | 4,442       | 0           | 0           | 0           | 0           | 0           | 6,631          |
| Operating required         | 107         | 284         | 284         | 345         | 785         | 820         | 820         | 820         | 820         | 820         | 5,905          |
| Operating required (\$/DE) | 883         | 1,978       | 1,813       | 1,834       | 2,756       | 2,642       | 2,466       | 2,312       | 2,177       | 2,056       | 16,262         |

The following table highlights the capital expenditure changes required to the current long term plan (LTP) to progress this project further.

Table 7: 10-Year Plan Capital Expenditure

| Current LTP          | 2015/<br>16 | 2016/<br>17 | 2017/<br>18 | 2018/<br>19 | 2019/<br>20 | 2020/<br>21 | 2021/<br>22 | 2022/<br>23 | 2023/<br>24 | 2024/<br>25 | Total 10<br>yr |
|----------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|----------------|
| Wastewater (\$000)   |             | 418         | 3,496       |             |             |             |             |             |             |             | 3,914          |
| Water Supply (\$000) |             | 165         |             |             |             |             |             |             |             |             | 165            |
| Current LTP Total    | 0           | 583         | 3,496       | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 4,079          |
| Required             |             |             |             |             |             |             |             |             |             |             |                |
| Wastewater (\$000)   | 339         | 692         | 0           | 750         | 9,043       | 0           | 0           | 0           | 0           | 0           | 10,824         |

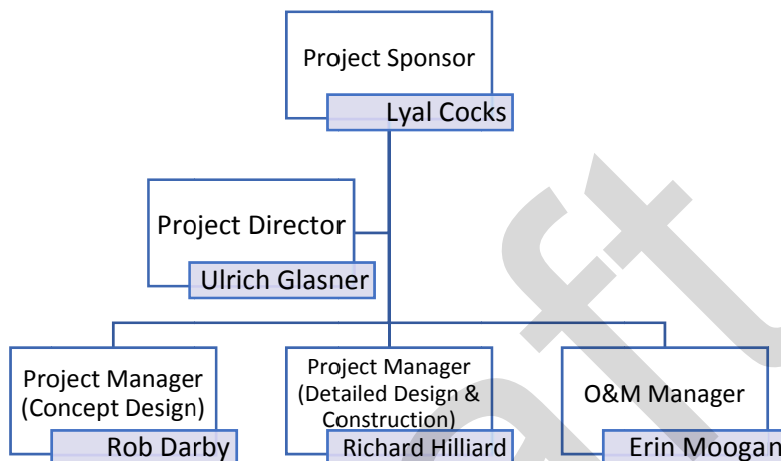
|                      |     |     |   |     |       |   |   |   |   |   |        |
|----------------------|-----|-----|---|-----|-------|---|---|---|---|---|--------|
| Water Supply (\$000) | 241 | 166 | 0 | 0   | 0     | 0 | 0 | 0 | 0 | 0 | 407    |
| Required Total       | 580 | 858 | 0 | 750 | 9,043 | 0 | 0 | 0 | 0 | 0 | 11,231 |

## 6 Management Case

In the event that this investment proposal receives formal approval, a project will be established to deliver the required services and will be managed using the QLDC project management methodology.

The relevant project management and governance arrangements are proposed to be as follows:

Figure 1: Project Roles and Responsibilities



With the uncertainty of growth and the risk of not reaching agreement with key funding contributors, it is proposed to follow a structured gateway process to ensure the decision to proceed is carefully considered at each gateway.

The following timeline is proposed to progress this project forward.

Table 8: Key Milestones

| Key Date             | Milestone                                  |
|----------------------|--|
| <b>30-Jun-15</b>     | Indicative Business Case completed         |
|                      | Gateway 1                                  |
| <b>Aug-15</b>        | Sale & Purchase Agreements completed       |
| <b>Dec-15</b>        | Detailed Business Case completed           |
|                      | Gateway 2                                  |
| <b>Jan-16</b>        | RFP for Phase 1 Detailed Design            |
| <b>May-16</b>        | RFT for Phase 1 Implementation             |
|                      | Gateway 3                                  |
| <b>Jul-16</b>        | Contract signed for Phase 1 Implementation |
| <b>Jul to Nov-16</b> | Phase 1 Implementation                     |
| <b>May-17</b>        | Vote for indication of support             |
|                      | Gateway 4                                  |
| <b>Jul-18</b>        | RFP for Phase 2 Detailed Design            |

|                         |  |
|-------------------------|--|
| <b>Jan-19</b>           | RFT for Phase 2 Implementation             |
|                         | Gateway 5                                  |
| <b>Jul-19</b>           | Contract signed for Phase 2 Implementation |
| <b>Jul-19 to Jun 20</b> | Phase 2 Implementation                     |

## 7 Next Steps

This business case seeks formal approval from Council to progress the implementation of the preferred option through:

1. Entering into a sale and purchase agreement with Baxter2009.
2. Entering into a sale and purchase agreement with Cardrona Water Supply Limited.
3. Begin negotiations with Mt Cardrona Station and Cardrona Alpine Resort to agree delivery options and funding arrangements.
4. Continue to develop the detailed business case and concept design for the Cardrona Valley Pipeline.
5. Take the detailed business case to the community for consultation and indication of support.

Appendix A – Long list options assessment

|  |   |                      |                      |                           |                         |                                |                      |                                |  |                     |   |                                |   |                                       |                                 |                              |                                       |                          |   |                    |                                 |   |                              |           |                      |   |            |                       |
|--|---|----------------------|----------------------|---------------------------|-------------------------|--------------------------------|----------------------|--------------------------------|--|---------------------|---|--------------------------------|---|---------------------------------------|---------------------------------|------------------------------|---------------------------------------|--------------------------|---|--------------------|---------------------------------|---|------------------------------|-----------|----------------------|---|------------|-----------------------|
| Cardrona Servicing Options   |   |                      |                      |                           |                         |                                |                      |                                |  |                     |   |                                |   |                                       |                                 |                              |                                       |                          |   |                    |                                 |   |                              |           |                      |   |            |                       |
| Long-list Options Assessment   |   |                      |                      |                           |                         |                                |                      |                                |  |                     |   |                                |   |                                       |                                 |                              |                                       |                          |   |                    |                                 |   |                              |           |                      |   |            |                       |
|  | Activity  |                      |                      |                           | Scope Options (What)    |                                |                      |                                |  |                     | Service Solution Options (How)  |                                |   |                                       |                                 |                              |                                       |                          | Service Delivery Options (Who)  |                    |                                 | Implementation Options (When)   |                              |           |                      | Funding Options   |            |                       |
|  | SC-1  | SC-2                 | SC-3                 | SC-4                      | SC-5                    | SC-6                           | SC-7                 | SC-8                           | SC-9                                   | SC-10               | SS-1  | SS-2                           | SS-3  | SS-4                                  | SS-5                            | SS-6                         | SS-7                                  | SS-8                     | SD-1  | SD-2               | SD-3                            | IM-1  | IM-2                         | IM-3      | IM-4                 | FU-1  | FU-2       | FU-2                  |
| Description of Option:   | Status Quo - Do Nothing   | Water supply only    | Wastewater only      | Water supply & wastewater | Rural Visitor Zone only | Existing communal schemes only | Current "Village"    | Village + Mt Cardrona Sn (MCS) | Village + Cardrona Alpine Resort (CAR) | Village + MCS + CAR | Assist in water supply management   | Purchase water supply scheme/s | Purchase scheme/s + new water supply source | New water supply source and treatment | Assist in wastewater management | Purchase wastewater scheme/s | New wastewater treatment plant (WWTP) | Cardrona Valley Pipeline | In-house Design   | Out-sourced Design | Alliancing / partnership Design | Deferred  | Just in time (just too late) | Phased    | Now, big bang        | Targeted  | Ward based | 3rd party             |
| Investment Objectives  |   |                      |                      |                           |                         |                                |                      |                                |  |                     |   |                                |   |                                       |                                 |                              |                                       |                          |   |                    |                                 |   |                              |           |                      |   |            |                       |
| To have zero illness attributable to a communal water supply by 2016.  | Partial <sup>1</sup>  | Yes                  | Partial <sup>1</sup> | Yes                       | Partial <sup>1</sup>    | Yes                            | Yes                  | Yes                            | Yes                                    | Yes                 | Partial <sup>1</sup>  | Partial <sup>1</sup>           | Yes   | Yes                                   | Partial <sup>1</sup>            | Partial <sup>1</sup>         | Partial <sup>1</sup>                  | Partial <sup>1</sup>     | Yes   | Yes                | Yes                             | Partial   | Partial                      | Yes       | Yes                  | Yes   | Yes        | Partial <sup>10</sup> |
| To have zero illness attributable to a communal wastewater scheme by 2017.   | Partial <sup>1</sup>  | Partial <sup>1</sup> | Yes                  | Yes                       | Partial <sup>1</sup>    | Yes                            | Yes                  | Yes                            | Yes                                    | Yes                 | Partial <sup>1</sup>  | Partial <sup>1</sup>           | Partial <sup>1</sup>                        | Partial <sup>1</sup>                  | Yes                             | Yes                          | Yes                                   | Yes                      | Yes   | Yes                | Yes                             | Partial   | Partial                      | Yes       | Yes                  | Yes   | Yes        | Partial <sup>10</sup> |
| To ensure all properties have access to a legal wastewater treatment and disposal system by 2020.  | No <sup>1</sup>   | No <sup>1</sup>      | Yes                  | Yes                       | Partial <sup>1</sup>    | Partial <sup>1</sup>           | Partial <sup>1</sup> | Yes                            | Partial <sup>1</sup>                   | Yes                 | No <sup>1</sup>   | No <sup>1</sup>                | No <sup>1</sup>                             | No <sup>1</sup>                       | Yes                             | Yes                          | Yes                                   | Yes                      | Yes   | Yes                | Yes                             | Partial   | Yes                          | Yes       | Yes                  | Yes   | Yes        | Partial <sup>10</sup> |
| To ensure no development, that is permitted under current zoning, is inhibited by a lack of 3-water infrastructure from 2017.                        | No <sup>1</sup>   | No <sup>1</sup>      | Partial <sup>1</sup> | Yes                       | Partial <sup>1</sup>    | No <sup>1</sup>                | Partial <sup>1</sup> | Yes                            | Partial <sup>1</sup>                   | Yes                 | No <sup>1</sup>   | Partial <sup>1</sup>           | Yes   | Yes                                   | No <sup>1</sup>                 | Partial <sup>1</sup>         | Yes                                   | Yes                      | Yes   | Yes                | Yes                             | No <sup>1</sup>   | Partial                      | Partial   | Yes                  | Yes   | Yes        | Partial <sup>10</sup> |
| Critical Success Factors (as these CSFs are crucial (not desirable) any options that score a 'no' are automatically discounted from further analysis |   |                      |                      |                           |                         |                                |                      |                                |  |                     |   |                                |   |                                       |                                 |                              |                                       |                          |   |                    |                                 |   |                              |           |                      |   |            |                       |
| Strategic fit and business needs - Alignment with District Plan, 30yr Infrastructure Strategy & Regional Plans                                       | No <sup>1</sup>   | No <sup>1</sup>      | Partial <sup>1</sup> | Yes                       | Partial <sup>1</sup>    | No <sup>1</sup>                | Partial <sup>1</sup> | Yes                            | Partial <sup>1</sup>                   | Yes                 | No <sup>1</sup>   | Partial <sup>1</sup>           | Yes   | Yes                                   | No <sup>1</sup>                 | Partial <sup>1</sup>         | Partial <sup>1</sup>                  | Yes                      |   | Yes                | Partial                         | No <sup>1</sup>   | Yes                          | Yes       | Partial <sup>1</sup> | Yes   | Partial    | No <sup>11</sup>      |
| Potential value for money - right solution, right time at the right price  |   |                      | Partial              | Partial                   | Partial                 |                                | Partial              | Partial                        | Partial                                | Partial             |   | Partial                        | Partial                                     | Partial                               |                                 | Partial                      | Partial                               | Partial                  |   | Partial            | Yes                             |   | Partial                      | Partial   | Partial              | Partial   | Yes        |                       |
| Supplier capacity and capability - is it a sustainable arrangement (external)  |   |                      | Yes                  | Yes                       | Yes                     |                                | Yes                  | Yes                            | Yes                                    | Yes                 |   | Yes                            | Yes   | Yes                                   |                                 | Yes                          | Yes                                   | Partial <sup>1</sup>     |   | Yes                | Partial                         |   | Yes                          | Yes       | Yes                  | Yes   | Yes        |                       |
| Potential affordability - are there no funding constraints   |   |                      | Partial              | Partial                   | Partial                 |                                | Partial              | Partial                        | Partial                                | Partial             |   | Yes                            | Partial                                     | Partial                               |                                 | Yes                          | Partial                               | Partial                  |   | Partial            | Yes                             |   | Partial                      | Yes       | Partial              | Partial   | Yes        |                       |
| Potential achievability - ability and skills to deliver (internal)   |   |                      | Partial              | Partial                   | Yes                     |                                | Yes                  | Yes                            | Yes                                    | Yes                 |   | Yes                            | Yes   | Yes                                   |                                 | Yes                          | Yes                                   | Yes                      | No  | Yes                | Partial                         |   | Yes                          | Yes       | Yes                  | Yes   | Yes        |                       |
| Summary of Advantages and Disadvantages:   |   |                      |                      |                           |                         |                                |                      |                                |  |                     |   |                                |   |                                       |                                 |                              |                                       |                          |   |                    |                                 |   |                              |           |                      |   |            |                       |
| Overall Assessment:  | Continued for VFM   | Discount             | Possible             | Preferred                 | Possible                | Discount                       | Possible             | Preferred                      | Possible                               | Preferred           | Discount  | Possible                       | Possible                                    | Preferred                             | Discount                        | Possible                     | Preferred <sup>1</sup>                | Preferred <sup>1</sup>   | Discount  | Preferred          | Possible                        | Discount  | Possible                     | Preferred | Possible             | Possible  | Preferred  | Discount              |
| Short-listed options:  |   |                      |                      |                           |                         |                                |                      |                                |  |                     |   |                                |   |                                       |                                 |                              |                                       |                          |   |                    |                                 |   |                              |           |                      |   |            |                       |
| Do Nothing   | Status Quo - Do Nothing   |                      |                      |                           |                         |                                |                      |                                |  |                     | Status Quo - Do Nothing   |                                |   |                                       |                                 |                              |                                       |                          | Status Quo - Do Nothing   |                    |                                 | Status Quo - Do Nothing   |                              |           |                      | Status Quo - Do Nothing   |            |                       |
| Baxter2009   | Wastewater - Rural Visitor Zone only  |                      |                      |                           |                         |                                |                      |                                |  |                     | Purchase wastewater scheme/s  |                                |   |                                       |                                 |                              |                                       |                          | Out-sourced Design  |                    |                                 | Just in time (just too late)  |                              |           |                      | Targeted  |            |                       |
| Baxter2009/Bembrae and SBR   | Water supply & wastewater - Village   |                      |                      |                           |                         |                                |                      |                                |  |                     | Purchase water supply scheme/s & Purchase wastewater scheme/s   |                                |   |                                       |                                 |                              |                                       |                          | Out-sourced Design  |                    |                                 | Phased  |                              |           |                      | Targeted  |            |                       |
| SBR at Mt Cardrona Station   | Water supply & wastewater - Village + MCS   |                      |                      |                           |                         |                                |                      |                                |  |                     | New water supply source and treatment & New WWTP  |                                |   |                                       |                                 |                              |                                       |                          | Out-sourced Design  |                    |                                 | Phased  |                              |           |                      | Targeted  |            |                       |
| Cardrona Valley Pipeline   | Water supply & wastewater - Village + MCS + CAR   |                      |                      |                           |                         |                                |                      |                                |  |                     | New water supply source and treatment & Cardrona Valley Pipeline  |                                |   |                                       |                                 |                              |                                       |                          | Alliancing / partnership Design   |                    |                                 | Now, big bang   |                              |           |                      | Ward based  |            |                       |
|  | Notes   |                      |                      |                           |                         |                                |                      |                                |  |                     | Notes   |                                |   |                                       |                                 |                              |                                       |                          | Notes   |                    |                                 | Notes   |                              |           |                      | Notes   |            |                       |
|  | 1. Baxter 2009 services more than one development. Council is best placed to co-ordinate these consent renewals, therefore this objective is not guaranteed.  |                      |                      |                           |                         |                                |                      |                                |  |                     | 1. Baxter 2009 services more than one development. Council is best placed to co-ordinate these consent renewals, therefore this objective is not guaranteed.  |                                |   |                                       |                                 |                              |                                       |                          | 1. Baxter 2009 services more than one development. Council is best placed to co-ordinate these consent renewals, therefore this objective       |                    |                                 | 1. Baxter 2009 services more than one development. Council is best placed to co-ordinate these consent renewals, therefore this objective       |                              |           |                      | 1. Baxter 2009 services more than one development. Council is best placed to co-ordinate these consent renewals, therefore this objective       |            |                       |
|  | 2. Development is currently restricted in the RVZ by a lack of 3-water infrastructure (particularly wastewater), therefore this option will not deliver on this objective.  |                      |                      |                           |                         |                                |                      |                                |  |                     | 2. Development is currently restricted in the RVZ by a lack of 3-water infrastructure (particularly wastewater), therefore this option will not deliver on this objective.  |                                |   |                                       |                                 |                              |                                       |                          | 2. Development is currently restricted in the RVZ by a lack of 3-water infrastructure (particularly wastewater), therefore this option will not |                    |                                 | 2. Development is currently restricted in the RVZ by a lack of 3-water infrastructure (particularly wastewater), therefore this option will not |                              |           |                      | 2. Development is currently restricted in the RVZ by a lack of 3-water infrastructure (particularly wastewater), therefore this option will not |            |                       |
|  | 3. Since development is being restricted by a lack of 3-water infrastructure this option is not delivering on the following objectives and enabling the current district plan zonings.  |                      |                      |                           |                         |                                |                      |                                |  |                     | 3. Since development is being restricted by a lack of 3-water infrastructure this option is not delivering on the following objectives and enabling the current district plan zonings.  |                                |   |                                       |                                 |                              |                                       |                          | 3. Since development is being restricted by a lack of 3-water infrastructure this option is not delivering on the following objectives and      |                    |                                 | 3. Since development is being restricted by a lack of 3-water infrastructure this option is not delivering on the following objectives and      |                              |           |                      | 3. Since development is being restricted by a lack of 3-water infrastructure this option is not delivering on the following objectives and      |            |                       |
|  | Cardrona 2020 (2003) - To provide for the cost-effective reticulation of water and sewerage as the population increases and this becomes more economically viable.  |                      |                      |                           |                         |                                |                      |                                |  |                     | Cardrona 2020 (2003) - To provide for the cost-effective reticulation of water and sewerage as the population increases and this becomes more economically viable.  |                                |   |                                       |                                 |                              |                                       |                          | Cardrona 2020 (2003) - To provide for the cost-effective reticulation of water and sewerage as the population increases and this becomes        |                    |                                 | Cardrona 2020 (2003) - To provide for the cost-effective reticulation of water and sewerage as the population increases and this becomes        |                              |           |                      | Cardrona 2020 (2003) - To provide for the cost-effective reticulation of water and sewerage as the population increases and this becomes        |            |                       |
|  | Growth Management Strategy (2007) - Infrastructure is provided in a way that supports high quality development located in the right places while adhering to the principles of sustainable development and ensuring that the environmental qualities of the district are protected. |                      |                      |                           |                         |                                |                      |                                |  |                     | Growth Management Strategy (2007) - Infrastructure is provided in a way that supports high quality development located in the right places while adhering to the principles of sustainable development and ensuring that the environmental qualities of the district are protected. |                                |   |                                       |                                 |                              |                                       |                          | Growth Management Strategy (2007) - Infrastructure is provided in a way that supports high quality development located in the right places      |                    |                                 | Growth Management Strategy (2007) - Infrastructure is provided in a way that supports high quality development located in the right places      |                              |           |                      | Growth Management Strategy (2007) - Infrastructure is provided in a way that supports high quality development located in the right places      |            |                       |
|  | 3 Waters Strategy (2011) - We will manage risk and be able to adapt to a variety of future scenarios for climate change and population growth.  |                      |                      |                           |                         |                                |                      |                                |  |                     | 3 Waters Strategy (2011) - We will manage risk and be able to adapt to a variety of future scenarios for climate change and population growth.  |                                |   |                                       |                                 |                              |                                       |                          | 3 Waters Strategy (2011) - We will manage risk and be able to adapt to a variety of future scenarios for climate change and population          |                    |                                 | 3 Waters Strategy (2011) - We will manage risk and be able to adapt to a variety of future scenarios for climate change and population          |                              |           |                      | 3 Waters Strategy (2011) - We will manage risk and be able to adapt to a variety of future scenarios for climate change and population          |            |                       |
|  | 4. This objective/CSF may be achieved under this option but council will have limited influence to ensure that it is achieved.  |                      |                      |                           |                         |                                |                      |                                |  |                     | 4. This objective/CSF may be achieved under this option but council will have limited influence to ensure that it is achieved.  |                                |   |                                       |                                 |                              |                                       |                          | 4. This objective/CSF may be achieved under this option but council will have limited influence to ensure that it is achieved.                  |                    |                                 | 4. This objective/CSF may be achieved under this option but council will have limited influence to ensure that it is achieved.                  |                              |           |                      | 4. This objective/CSF may be achieved under this option but council will have limited influence to ensure that it is achieved.                  |            |                       |
|  | 5. This objective/CSF may be achieved under this option but council will have limited influence to ensure that it is achieved. Especially with regard to enabling the Mt Cardrona Station zone.   |                      |                      |                           |                         |                                |                      |                                |  |                     | 5. This objective/CSF may be achieved under this option but council will have limited influence to ensure that it is achieved. Especially with regard to enabling the Mt Cardrona Station zone.   |                                |   |                                       |                                 |                              |                                       |                          | 5. This objective/CSF may be achieved under this option but council will have limited influence to ensure that it is achieved. Especially with  |                    |                                 | 5. This objective/CSF may be achieved under this option but council will have limited influence to ensure that it is achieved. Especially with  |                              |           |                      | 5. This objective/CSF may be achieved under this option but council will have limited influence to ensure that it is achieved. Especially with  |            |                       |
|  | 6. At this stage it is difficult to separate these options due to the strategic advantages of the CVP being off-set by its design risk.   |                      |                      |                           |                         |                                |                      |                                |  |                     | 6. At this stage it is difficult to separate these options due to the strategic advantages of the CVP being off-set by its design risk.   |                                |   |                                       |                                 |                              |                                       |                          | 6. At this stage it is difficult to separate these options due to the strategic advantages of the CVP being off-set by its design risk.         |                    |                                 | 6. At this stage it is difficult to separate these options due to the strategic advantages of the CVP being off-set by its design risk.         |                              |           |                      | 6. At this stage it is difficult to separate these options due to the strategic advantages of the CVP being off-set by its design risk.         |            |                       |
|  | 7. There is a real risk that designers will be reluctant to take on the design risk associated with this option.  |                      |                      |                           |                         |                                |                      |                                |  |                     | 7. There is a real risk that designers will be reluctant to take on the design risk associated with this option.  |                                |   |                                       |                                 |                              |                                       |                          | 7. There is a real risk that designers will be reluctant to take on the design risk associated with this option.                                |                    |                                 | 7. There is a real risk that designers will be reluctant to take on the design risk associated with this option.                                |                              |           |                      | 7. There is a real risk that designers will be reluctant to take on the design risk associated with this option.                                |            |                       |
|  | 8. By purchasing the schemes council can ensure spare capacity is made available to enable development. The quantum of spare capacity however is unknown.   |                      |                      |                           |                         |                                |                      |                                |  |                     | 8. By purchasing the schemes council can ensure spare capacity is made available to enable development. The quantum of spare capacity however is unknown.   |                                |   |                                       |                                 |                              |                                       |                          | 8. By purchasing the schemes council can ensure spare capacity is made available to enable development. The quantum of spare capacity           |                    |                                 | 8. By purchasing the schemes council can ensure spare capacity is made available to enable development. The quantum of spare capacity           |                              |           |                      | 8. By purchasing the schemes council can ensure spare capacity is made available to enable development. The quantum of spare capacity           |            |                       |
|  | 9. Big bang does not align with the current 3-waters strategy regarding flexibility and ability to adapt to future scenarios, i.e. no growth.   |                      |                      |                           |                         |                                |                      |                                |  |                     | 9. Big bang does not align with the current 3-waters strategy regarding flexibility and ability to adapt to future scenarios, i.e. no growth.   |                                |   |                                       |                                 |                              |                                       |                          | 9. Big bang does not align with the current 3-waters strategy regarding flexibility and ability to adapt to future scenarios, i.e. no growth.   |                    |                                 | 9. Big bang does not align with the current 3-waters strategy regarding flexibility and ability to adapt to future scenarios, i.e. no growth.   |                              |           |                      | 9. Big bang does not align with the current 3-waters strategy regarding flexibility and ability to adapt to future scenarios, i.e. no growth.   |            |                       |
|  | 10. By not having complete control council can not guarantee objectives will be met.  |                      |                      |                           |                         |                                |                      |                                |  |                     | 10. By not having complete control council can not guarantee objectives will be met.  |                                |   |                                       |                                 |                              |                                       |                          | 10. By not having complete control council can not guarantee objectives will be met.  |                    |                                 | 10. By not having complete control council can not guarantee objectives will be met.  |                              |           |                      | 10. By not having complete control council can not guarantee objectives will be met.  |            |                       |
|  | 11. Due to several different parties potentially being involved it would be against current funding policy to leave this to a 3rd Party.  |                      |                      |                           |                         |                                |                      |                                |  |                     | 11. Due to several different parties potentially being involved it would be against current funding policy to leave this to a 3rd Party.  |                                |   |                                       |                                 |                              |                                       |                          | 11. Due to several different parties potentially being involved it would be against current funding policy to leave this to a 3rd Party.        |                    |                                 | 11. Due to several different parties potentially being involved it would be against current funding policy to leave this to a 3rd Party.        |                              |           |                      | 11. Due to several different parties potentially being involved it would be against current funding policy to leave this to a 3rd Party.        |            |                       |

| Cardrona Wastewater Options, Flow Assumptions |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|---|--|------------------|----------------|------|-------------|--------------------------|------|--------------------|------|--|------|--------|--------|--|--|--|--|--|--|--|--|
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
| CURRENT                                       |  |                  | Total - RVZ+RG |      |             | Rural Visitor Zone (RVZ) |      | Rural General (RG) |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  | Est. Pop       | PDWF | Flow/capita | Est. Pop                 | PDWF | Est. Pop           | PDWF |  | PDWF | Pop.   | Dw.    |  |  |  |  |  |  |  |  |
|   |  |                  |                | m3/d | l/c/d       |                          | m3/d |                    | m3/d |  | m3/d | Equiv. | Equiv. |  |  |  |  |  |  |  |  |
|   |  | Cardrona Village | Baxter         | 53   | 13.1        | 248                      |      | 10.5               |      |  | 34   | 170    | 49     |  |  |  |  |  |  |  |  |
|   |  |                  | Benbrae        | 75   | 13.9        | 185                      |      | 13.0               |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  | Hotel          | 60   | 10.8        | 180                      |      | 10.8               |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  | Other          | 66   | 13.4        | 202                      |      | 12.5               |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  | 254            | 51.2 | 201         | 236                      | 47.0 | 18                 | 4    |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |
|   |  |                  |                |      |             |                          |      |                    |      |  |      |        |        |  |  |  |  |  |  |  |  |

## Appendix B – Flow Projections