MEMORANDUM

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Date:	September 18, 2013
To:	Liisa Bloomfield, P.Eng
From:	Ehren Lee, P. Eng.; Brittney Dawney, EIT
File:	1564.0020.01
Subject:	**NARAMATA WATER DISTRIBUTION SYSTEM: TWINNING COST-BENEFIT STUDY**

1.0 PROJECT OVERVIEW

1.1 Project Rationale

The Regional District of Okanagan-Similkameen (RDOS) retained Urban Systems Limited to conduct a business case study for the proposed separation, or twinning, of the existing water distribution system in the community of Naramata, British Columbia. The twinning would result in a distribution system such that domestic potable water continues to be supplied from Okanagan Lake and irrigation water would be supplied from Naramata and Robinson Creeks, with the aim of optimizing the use of both sources to result in cost-savings for the RDOS.

The objective of the study was to determine if the proposed twinning program provides more benefits than cost, based primarily on pressing asset renewal needs.

The study was completed by comparing:

- the capital infrastructure costs required to complete the twinning,
- the annual costs required to eventually pay for replacement of the new infrastructure,
- the losses that may result from replacing existing assets (by being twinned) ahead of their scheduled end of service life, and
- the power savings from eliminating treatment and pumping needs for flows to select agricultural properties.

Net-present value analysis was used to incorporate interdependent costs and savings over the 45-year extent of the twinning initiative. This type of analysis provides decision-making support to assist the RDOS, in part through the Naramata Water System Advisory Committee, to determine its direction for twinning.

This letter report is in general accordance with the revised work program submitted to RDOS on January 23, 2013, and includes the following major sections:

- Background
- Information Sources and Methodology
- Cost-benefit analysis
- Recommendations

1.2 Background

Site

The community of Naramata is located on the eastern shore of Okanagan Lake, 16 kilometres (km) north of Penticton, and is home to approximately 1,647 year-round residents according to the 2011 census. Agriculture and tourism form the primary industries in Naramata, and are facilitated by a long growing season and the semi-arid climate of the Okanagan Valley.

Existing Distribution System

Water for the existing system was historically supplied by Robinson and Naramata Creeks, and Okanagan Lake; however, recent improvements to the system have added new treatment and distribution components, and the primary source is Okanagan Lake. The driving force behind the improvements was the need to eliminate the water quality advisories that were frequently seen in Naramata, and indeed, the community is now consistently serviced with clean, safe drinking water that meets provincial water quality expectations. However, this distribution system involves pumping and treatment (via ultraviolet [UV] radiation and chlorination) of both the irrigation and domestic water supply. Given that the irrigation water does not require the same extensive treatment of domestic water, and agricultural areas are generally at higher elevations, the community is pumping and treating large volumes of water every year.

Proposed System Upgrades

It has been proposed that the water distribution system is twinned such that domestic water continues to be supplied from Okanagan Lake, and irrigation water for properties at higher elevations would be supplied from Naramata and Robinson Creeks via gravity. Optimizing the use of both sources has the potential to produce savings in flow-dependent power costs associated with pumping and treating both the domestic and irrigation water supplies from Okanagan Lake. Twinning of the system would be completed in tandem with asset renewal to the extent possible so as to limit costs associated with new infrastructure. The balance of new infrastructure, replacing old mains, and saving power is the core of this cost-benefit analysis.

Twinning of the water distribution system was initially presented as an option in a 2002 report by Stantec titled *Summary Report on Alternatives for Water Supply.* It was initially assumed that the savings from reduced power costs associated with pumping and treatment would outweigh the additional infrastructure costs of dual pipes. Furthermore, only distribution lines at higher elevations would be twinned, which would maximize the power-related savings and minimize the cost of new infrastructure. The plan to twin was carried forward into 2008 and included in the *Naramata Water System Asset Management Plan* (Associated Engineering, 2008) or (2008 AMP).

As part of system separation, seven phases were proposed, including:

- Phase 1 – Arawana – North of Naramata Creek along Smethurst, North Naramata Road and King Road (Year 3 of 45 year initiative)
- Phase 2 – South – Immediately south of Naramata Creek along Arawana Road and North Naramata Road from DeBeek Road to Old Main Road (Year 6 of 45 year initiative)
- Phase 3 – South – Along Naramata Road from Old Main Road to the south end of the system. (Year 13 of 45 year initiative)
- Phase 4 – South – Along Gammon Road from Arawana Road to Gawne Road (Year 19 of 45 year initiative)
- Phase 5 – North – Along North Naramata, Languedoc Road, Gulch Road, Clarke Road and Partridge Road to Boothe Road. (Year 24 of 45 year initiative)
- Phase 6 – North – Along Boothe Road from Partridge Road to Mill Road, and Partridge Road and Salting Road. (Year 26 of 45 year initiative)
- Phase 7 – North – Along McKay Road, DeBeek Road and Hayman Road from Patterson Road to Old Main Road. (Year 44 of 45 year initiative)

The total amount of proposed infrastructure, which includes installing new mains and replacing existing mains, is 40,000 meters.

Although there is anticipated benefit of replacing existing assets while simultaneously twinning the system for additional power savings, further consideration to the scheduling of replacements is needed to prevent premature replacement of assets.

Local Twinning Example

Twinning of the local water distribution system is nearing completion in the town of Oliver, British Columbia. With a population of approximately 4,000, the town of Oliver is larger than Naramata; however, it is also located in the Okanagan Valley and the economy is built on the same industries. Twinning of the Oliver water distribution system has been completed in phases starting in 2007, and the final phase will be completed in 2013. The project was funded in part by the provincial and federal governments.

1.3 Project Understanding and Purpose

Project Understanding

It is our understanding that the objective of the study was to determine if the proposed twinning of the water distribution system is a financially sustainable endeavour. Completion of this study is an important step in ensuring long-term investment security for the RDOS and sufficient revenue for asset renewal. It follows that this will also help ensure the long-term sustainability of the system and customer satisfaction with the level of service provided.

Purpose

This study expands on the contents of the 2008 AMP to include all major components of the water distribution system, more informed power savings, and the impacts of population growth. The outcomes of the study will ultimately inform the *Asset Management Plan and Capital Plan Report*, which is part of the Naramata Water System Capital Plan & Development Cost Charge Review project currently being completed by Urban Systems. Further, determining whether to initiate the twinning program, with all of the associated capital costs, is fundamental to the long-term capital plan for the water system.

1.4 Scope of Work

The initial scope of work was detailed in the work program submitted to the RDOS on January 23, 2013, titled *Water Distribution System Cost-Benefit Review – Proposed Work Program.* Following further correspondence between the RDOS and Urban Systems, the work program was revised and re-submitted to the RDOS on the same day. The revised work program is available upon request.

1.5 Assumptions and Limitations

Financial models and decision-making support tools require inputs that inherently contain assumptions and limitations. For this study, we assumed the following:

- The twinning phases, capital costs and power costs from the 2008 Asset Management plan are reliable and applicable to this study.
- Population projections based on anticipated developments and define OCP-based growth rates reflect a reasonable future population.
- Inflation is not considered as a key input as it is assumed to affect all inputs similarly.
- Variability in power costs is expected but not planned for in the model. Any significant changes to power costs can trigger re-investigation of the cost benefit model.
- Asset renewal, costs of early replacement, service life estimates, and other key inputs into the 2008 and 2012 Asset Management Plan(s) (including updates) are based on information provided by the RDOS and industry best practice.
- All other inherent uncertainty.

2.0 KEY INPUTS TO THE COST-BENEFIT MODEL

There are four primary sources of information for the cost-benefit analysis:

- Water Demands: slight changes to water demands, whether domestic, commercial, institutional or agricultural, will impact the potential power savings from system separation.
- Population Growth: similar to above, increases to population impact water demands.
- Power Savings: previous studies into system separation explored potential power savings. Although these are estimates, they provide ball-park figures for the analysis and assist in decision making.
- Asset Management: asset renewal, service lives, and cost of replacement must be incorporated into decisions around infrastructure planning.

Because population growth, water demands and power savings are directly linked they are summarized together in the following section.

2.1 Power Savings, Water Demands, and Population Growth

For any water system the need for energy increases with demands: treating, pumping, distributing, and supplying water typically requires energy. For Naramata, when water is delivered for potable purposes, it is supplied by Okanagan Lake, treated to high standards, pumped up the valley, and distributed widely for various uses.

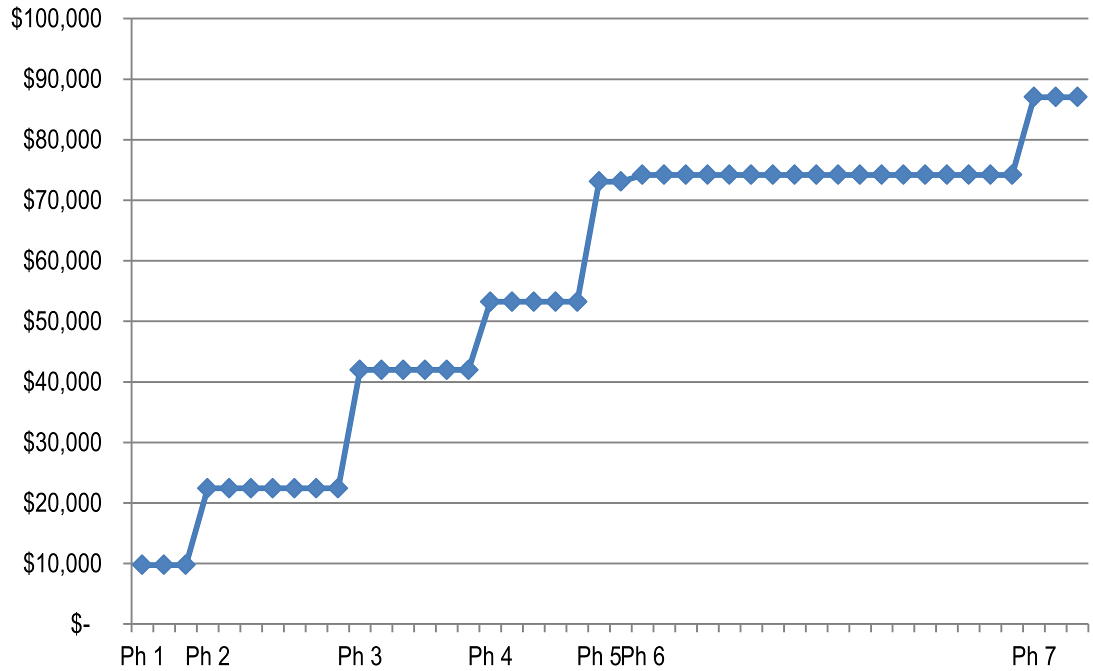
In a system separation context energy needs can be reduced if water supplied for non-potable purposes is not treated, thereby saving power costs at the plant. For Naramata, when water supplied for non-potable purposes comes from upper watershed sources, additional energy savings occur because power for treatment and pumping can be reduced or eliminated.

The proposed twinning approach for Naramata includes both power savings from treatment and from pumping.

In the 2008 AMP the system separation project was identified as part of an asset renewal and power savings initiative. It is assumed that as part of the study, power savings were estimated by supplying the properties involved in the twinning project by upper watershed sources. Therefore, power savings at each facility associated with delivering water to these customers was reduced for outdoor demands (e.g. irrigation) but stayed for indoor demands, which would still be from Okanagan Lake.

The result is a series of power savings increments, increasing over time along with the schedule of each of the seven phases. From 2008 to 2053, the proposed power savings increase from $9,765 from Phase 1, up to $87,000 from Phase 7. Sixty-four percent of the power savings come from agriculture flow separation (AE, 2008). The power savings are cumulative and graphed on Figure 1.

Figure 1 Annual Power Savings Over Seven Phases of Twinning



Ultimately, the power savings from twinning the system are notable and make up an important revenue (cost-savings) component of the cost-benefit analysis. Yet, it is important to note these are presumably high-level estimates for power savings based on a constant utility charge for the parcels affected by twinning. For example, an increase to utility charges or water demands would impact the annual savings.

Water demands for Naramata are discussed in the following section to further build the context around potential power savings for the twinning initiative.

High-Level Water Demand Breakdown

According to the *Naramata Water Conservation Plan* (RDOS, 2010), indoor and outdoor domestic water demands collectively account for 36.3% of total annual demand, while irrigation for agriculture accounts for 61.3% of total annual demand. The remaining 2.3% is attributed to non-account irrigation (i.e., parks and cemeteries) (0.3%) and system losses (2.0%).

Therefore, as each of these water use categories change, so too should the overall demand profile for Naramata. For example:

- If population increases, then domestic indoor and domestic outdoor demands will increase as well
- Agriculture demands would not likely increase linearly to growth, but instead, would be affected by changes in crop type, or irrigation equipment, or by new lands emerging from undeveloped to agricultural. There are no known lands to be converted to significant crops in the near future.

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- The Naramata Water Conservation Plan states that with meters installed, demand reductions may reach 16% to 33%. This suggests that conservation would limit the increases to demand per capita, but whether there is an overall net increase in demand is not known. Given the relative amount of demand for irrigation, reasonable conservation strategies for agriculture may result in a net-reduction in overall consumption even in the face of population growth.
- Seventy percent (70%) of peak demands in the summer stem from agriculture uses. Utility rates for power are higher during peak periods as well.

Overall, it appears that water demands will increase marginally with growth and likely decrease gradually over time with respect to agricultural reductions and local water conservation. Additional study is required to determine the full extent of the effect of each of these factors may have on potential power savings and the benefit of system separation.

The overall demand profile in Naramata may not change dramatically in the 5- to 10-year horizon, limiting the impact that population growth and water demands have on the cost-benefit study. The real impact water demands have on the cost-benefit model is from agriculture demands that do not change, but instead, are supplied from upper watershed sources.

Population Projections

Population projections for Naramata are characterized at a high level in the local OCP. To improve the detail of these estimates and to develop population projections for this study, RDOS staff summarized pending or anticipated developments (presumably consistent with the OCP) for the water system.

Table 2.1 outlines the 2011 base population and the growth estimates for both the year-round population scenario ("usual residents") and the inclusion of seasonal growth ("total residents"). Population growth expected in each development area was calculated by assuming 2.4 persons per household, which is the average for Naramata based on the 2011 census.

Table 1 Population Growth Estimates in Naramata, B.C.

	TOTAL RESIDENTS	USUAL RESIDENTS
Base population (2011)	-	1,647
Population Growth (2037)	700-820 (1.4% - 1.6%)	560-650 (1.2%-1.3%)

Population increases of 1.5% on average will increase overall flows in the future. However, the 1.5% is an average increase across the entire system and population increases in the area of system separation only relate directly to the cost benefit analysis. It was beyond the scope of this study to examine the specific implications to power savings from growth in the affected areas. This is an exercise that may be done as part of future financial analysis to adjust rates, if the twinning project is to proceed.

Summary of Water Demands and Power Savings for Cost-Benefit Analysis

Given projected population changes and how they affect water consumption, as well as the dynamic nature of agriculture demands (e.g. increases and decreases with climate and crops), it appears that the overall demand profile in Naramata may not change dramatically in the 5 to 10 year horizon.

The real impact water demands have on the cost-benefit model is from agriculture demands that do not change, but instead, are supplied from upper watershed sources as part of any proposed system separation(s) or are conserved outright. Therefore, the cost-benefit analysis for this study carries forward the previously adopted power savings estimates as seen in the graph in Section 2.1.

2.2 Asset Management

Water infrastructure is constructed, utilized, and decays until they must be renewed. Managing assets and their renewal is key to water system sustainability. With respect to system separation, one key question is whether the proposed twinning initiative benefits or hinders the existing and looming asset renewal needs in Naramata. This cost-benefit study looks directly at that question. This section explores the asset management context prior to summarizing the outputs of the cost-benefit model.

This section begins with a brief overview of existing reports plans related to asset management, specifically the 2008 AMP and the Urban Systems Asset Management Report as part of the DCC project (Urban, 2012).

2008 Asset Management Report

The 2008 AMP can be summarized in the following comments:

- The 2008 Report pertains exclusively to watermains 50mm in diameter and greater. The Plan does not include watermains less than 50mm in diameter, nor does it include plant facilities, pump stations, reservoirs and other water system elements that are necessary to ensure a sustainable asset management framework.
- The 2008 Plan appears to be summarized in Table E1, at the end of the appendices of the report. The report lays out renewal and rehabilitation costs for seven phases of twinning and eventual upgrades to existing mechanical facilities. The connection between service life and asset condition is not explicit, however, financial capabilities are included on the premise that twinning will occur.
- This cost-benefit study includes a comparison between the proposed infrastructure costs of the twinning initiative combined with the asset management analysis conducted as part of the DCC project.
- The AM Plan, once updated, should include all existing elements of the Naramata Water System, and should ultimately inform the new Capital Plan.

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2012 Asset Management Update

Urban Systems is currently executing the Naramata Water System Capital Plan & DCC Review project. The project consists of three key infrastructure components, including:

1. An update of the 2008 AMP and Capital Plan;
2. An update of the Development Cost Charge (DCC) Bylaw; and
3. A review of costs for required rights-of-way (ROWs).

The Asset Management Update in 2012 included the following analysis:

- Identification of all existing watermains, including the age of each main, using the 2009 Tangible Capital Asset Inventory (includes mains 50mm and smaller);
- Identification of the watermains associated with the proposed twinning program;
- Identification of all of the mechanical facilities, including the age of each facility, using the 2009 Tangible Capital Asset Inventory as well as research alongside RDOS staff;
- Identification of replacement costs for the various sizes of watermains and the different facilities using best practices in the Okanagan; and
- The development of an Asset Management Investment Plan (AMIP) using the watermain and facility information, and replacement costs noted above.

Key findings from the update include:

- The Naramata Water System has a 2012 replacement value of approximately $41.3 million with average remaining life of approximately 60%. Water mains and treatment facility assets represent the largest of the system's components with 2012 replacement values of $24.0 million and $10.4 million, respectively.
- The total average annual life cycle investment (AALCI) for renewal and twinning is $943,333 (2012 dollars) per year; this does not include operational savings due to twinning. The AALCI would reduce if twinning does not proceed.
- An AALCI of $943,333 is a 300% increase to AALCI from the 2008 Asset Management Plan of approximately $296,511, due to the addition of mechanical facilities and pipes less than 50mm in diameter.
- The combined costs for renewal and twinning over the next 25 years is approximately $30.0 million (2012 dollars). This amount breaks down as follows: $23.6 million for construction and $6.4 million for planning, design and construction administration.
- According to the Asset Management Investment Plan (AMIP), there is currently an infrastructure deficit (backlog) of $2,243,224. This is broken down as follows:

- $327,046 in water mains;
- $1,314,179 intakes and water supplies; and
- $602,000 in valving facilities (e.g. pressure control valves).
- *Note: Deficits relate to assets which have already been in service beyond their expected life, and some aspect of failure is expected.*

Current revenues to fund asset renewal are insufficient to cover the costs of existing deficits and proposed projects. Further, the 2008 AMP identified the need for an additional $70,000 to be recovered each year from customers in order to fund looming renewal needs. Because AALCI costs are set to increase beyond the scope of the 2008 Report (by approximately 300%) the need to increase revenues has been elevated, well beyond the level of $70,000 per year.

Also, scheduling for asset renewal requires careful balance because timing is crucial. Avoiding asset failure and the impacts to customers and the environment is key. However, it is important to not replace assets earlier than necessary, especially given that utility funds are finite and not easy to generate. Therefore, assets should be replaced as they **need** to, and early replacement should be avoided given the cost-savings to overall investment planning by extending the life of infrastructure. Part of the cost-benefit analysis for this study includes considering the opportunity-cost of replacing assets ahead of their scheduled service life. Although these figures are not directly reflective of cash-flow, they are important financial considerations in deciding to twin, or not. Overall, the integration of asset management and the proposed twinning phases was done by lining up the asset-IDs of the proposed twinning initiative with the service lives in the 2012 asset management update.

Asset Management Context Summary

Asset renewal is a requirement of any water system. For Naramata, there are existing deficits and looming expenditures in order to keep up to the renewal needs of the water system. Saving to fund replacements is critical while simultaneously ensuring that assets are in use as long as possible and informed by reliable condition assessments. In other words, the cost of replacing assets is expensive; therefore, maximizing their life is key to long-term financial sustainability.

Given the context that the cost of owning and maintaining existing infrastructure is so significant for the Naramata water system, any proposed infrastructure projects (e.g., twinning) must demonstrate a very clear positive business case.

3.0 COST-BENEFIT ANALYSIS

Traditional cost-benefit analyses can be conducted via qualitative and quantitative means. In other words, key statistics and financial figures are utilized where necessary and high-level discussion is also provided to encompass the entire context. For Naramata, the same approach was taken, with a methodology that suits the core question.

At issue is whether it is best to invest into system separation at this time or whether there are other infrastructure investments that would provide greater benefit to RDOS and the Naramata water system users. The costs and benefits of this issue are discussed below and summarized to conclude the technical memorandum

3.1 Net Present Value Analysis for Proposed Twinning

Net present value analysis is a form of cost-benefit which compares a series of costs and revenues for a given initiative, to not doing the project at all (or any other alternative). In other words, net present value includes an initial investment (such as starting the twinning project) and also includes the payments and revenues for the project over the life of the initiative based on a discount rate[1]. The discount rate incorporates the time-value of money allowing for quick comparison between 'implementing the project' and 'setting up a reserve account which grows at a nominal savings rate'.

For Naramata twinning, the initiative lasts 45 years, has an initial investment to start Phase 1 of the system separation, and includes a combination of savings (i.e., power) and costs (e.g. new infrastructure) over time.

By conducting net present value analysis, 45 years of costs and savings can be bottled down into one numerical figure in today's dollars. A large positive number suggests the investment has significant returns. A small positive number indicates the initiative has marginal returns. Negative numbers indicate the initiative will lose money in the long run.

Any of the inputs in the model have some level of inherent variability; therefore, it is important to understand the inputs. For Naramata twinning, there are four inputs:

1. **Cost savings:** power cost savings as shown in Section 2.1, over a 35 year period. *Annual savings as a result of providing non-potable water via gravity from upper watershed sources.*

2. **Costs incurred:** capital infrastructure costs (including engineering and contingencies) to design and construct seven phases of twinning (as shown in Section 1.3, over a 45 year period). *Capital investments that occur seven times over 45 years.*

3. **Costs incurred:** new annual investments required to fund the eventual replacement of dual assets (AALCI). *Annual costs as a result of providing non-potable water via gravity from upper watershed sources.*

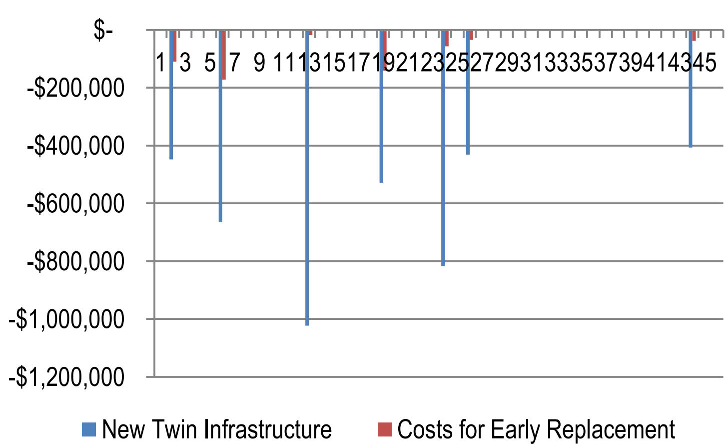
[1] *A discount rate of 1.56% was used based on the Municipal Finance Authority pooled investments Bond Fund.*

4. **Costs incurred**: opportunity cost of early renewal of assets (not taking advantage of asset-value that is already paid for). *Capital investments that occur seven times over 45 years.*

Illustrating the costs and savings over time provides the long-term view of the investment. Seeing the investment in its full term creates the full story behind the one number return, from net-present value analysis. For clarity, the annual costs and savings are illustrated on the first graph, and the capital costs are illustrated on the second graph.

Figure 2 Annual Costs and Savings over the 45 Year Twining Initiative

Figure 3 Capital Costs over the 45 Year Twining Initiative



Prior to presenting the results of the quantitative NPV analysis, it is important to consider qualitative considerations for costs and benefits in Naramata. These are discussed in the next section.

Qualitative Benefits and Costs

The net-present value analysis inputs are derived from factors of the twinning project that can be readily assigned a numerical figure. There are other social, economic, and environmental aspects of the twinning project that have not been included into the numerical analysis due to the effort required to distill these to quantifiable figures. For example, the twinning project in Naramata would also serve to impact the following:

- **Watershed Management**. Supplying non-potable flows from the upper watershed would require additional operations and management of the infrastructure and activities in the watershed to ensure reliable supply.
- **Greenhouse Gas Emissions.** Reduced pumping will result in a reduction in greenhouse gas emissions. Savings on **hydro**power are not typically a significant method of reducing GHGs, however they do support RDOS's ambitions for environmental sustainability.
- **System Capacity.** Twinning the system does increase the overall capacity of water supply in Naramata, for all major assets such as: pipes, pumps, reservoirs, and the treatment facility. This is not a core driver for the twinning project.
- **Fire Protection.** Utilizing non-potable water can reduce the water-cost of any fires in Naramata, however the net-benefit of this factor is considered low.
- **Irrigation Equipment**. Lowering the quality of water delivered to agriculture customers saves treatment and pumping costs. However, in the long run, years of delivering lower quality irrigation water through spray or drip equipment may impact the longevity of private water equipment. Similarly, no costs for additional treatment to the non-potable supply have been factored in, such as chlorination or clarification.
- **Water Licenses**. Using water licenses demonstrates ***the need*** for water licenses and helps to ensure active licenses for the system remain intact. License security is beyond the scope of this study and likely not an imminent issue, however, some thought to this topic is warranted.
- **Operational Costs.** Additional operational costs of staffing resources to flush and maintain twice the amount of infrastructure. A similar reduction in operational costs may also ensue as a result of reduced flows at the water treatment plant.
- **Infrastructure Deficits and Reserves**. It is important to re-iterate that there are likely imminent renewal projects that require funding throughout the Naramata water system. Selecting twinning over these projects would increase risk to the system and decrease reliability of service.

It is also important to note that each input into the analysis is variable. For example, a significant change in utility rates for power may yield a different net-present value analysis. Given the dynamic nature of each of this variables it is important the results of this study not be considered complete and final forever, but instead, worthy of re-investigation when an input into the model changes significantly.

Overall, the qualitative aspects of system separation are relatively balanced in that there are multiple disadvantages and multiple advantages. Additional review of the qualitative aspects could yield more detailed results, however the more investment dedicated here the less focused the projected remains on the core question of asset management and twinning. Therefore, any of the above qualitative factors are important but not on the same level as the financial challenges that face any rural water system addressing asset renewal.

These factors serve to round out the discussion on the net-present value analysis, which is the core of this study.

3.2 Net Present Value Analysis Numerical Results

The net-present value analysis was conducted to compare the merit of system separation, with all of its costs and savings, with a nominal investment reserve established to earn the Municipal Finance Authority pooled investments Bond Fund (1.56%).

Over the 45 year initiative, with annual savings and costs, and periodic capital investments, the net-present value analysis returns approximately -$3,330,000. In other words, embarking on the twinning project now constitutes a significant losing venture.

Two Alternative NPV Calculations

Two alternative scenarios were conducted for the NPV analysis to evaluate the impact of a) using full life cycle costing (i.e. apply 80 year term for the analysis) and b) subtracting the cost implications of replacing assets earlier than their scheduled need. In both scenarios, the NPV result is approximately -$2,800,000, which supports the finding that twinning in Naramata is not financially prudent under three reasonable scenarios.

4.0 RECOMMENDATIONS

Conducting the net-present value analysis is a decision support tool for whether to implement a system separation project. This study includes completing the net-present value analysis but it is also important to re-state what initiated the project review at this time. The Naramata water system, like any water system in BC, is aging and requires constant renewal in order to provide reliable levels of service to its customers. For Naramata, there are deficit-based projects that require condition assessments (at minimum) and potentially funding in order to repair failing infrastructure. Funding for asset renewal in Naramata will require increases to utility revenues, forcing new capital projects to be reviewed with added scrutiny.

The recommendation for twinning in Naramata is to hold the project at this time on account of a negative result of the net-present value analysis. Changes to key inputs such as power savings (i.e. utility rate increases) will warrant review of the cost-benefit of the project and may eventually provide greater savings than costs and be considered a beneficial project for Naramata. Further, looming asset renewal needs require focus on study and implementation in order to provide reliable levels of service for water customers of the RDOS.

On top of addressing asset renewal, it is important to expand on the potential for water conservation. With additional study and focused strategies, the Naramata water system may be able to achieve similar levels of power savings by achieving its targets for water conservation. Implementing the Okanagan Irrigation Management tool, as recommended in the Naramata Water Conservation Plan, is timely. By maximizing power savings through conservation, Naramata may achieve the intents of the twinning project, without building new infrastructure.