Final Report

VILLAGE OF VALEMOUNT

Water Metering Assessment

December 2012 / 0433.0045.01

Suite 200 – 286 St. Paul Street,
Kamloops, BC V2C 6G4

Contact: John Dumbrell

T: | 250.374.8311
jdumbrell@urbansystems.ca

urbansystems.ca

TABLE OF CONTENTS

APPENDICES

1.0 BACKGROUND

The Village of Valemount has been encouraging the wise use of the community's water resources for over 10 years. Early efforts included a water conservation education program, metering of selected commercial and institutional connections, and outdoor water restrictions between June and September. These program components were embedded within a thorough examination of the Village's efforts sponsored by the Columbia Basin Trust, and contained within the Village of Valemount Water Smart Action Plan (November 2010).

The Water Smart Action Plan set out a number of objectives which have direct relationships with metering as a means of measuring water use. These objectives include:

- Assessment of unaccounted-for water;
- Continuation of the metering program which the Village commenced in the mid-2000s;
- Review of water rates, including volume-based as well as flat rates.

In 2011, the Village decided to undertake a more thorough assessment of water metering. The purpose of this report is to present the results of this assessment. It contains the following sections:

- Section 2 – outlines the scope of the assessment;
- Section 3 – estimates the water savings which would result from a metering program;
- Section 4 – presents the economic cost : benefit component of the assessment;
- Section 5 – summarizes the other assessment components – environmental, social and utility operation;
- Section 6 – sets out the report's recommendations.

2.0 SCOPE OF THE ASSESSMENT

The scope of this assessment was derived through discussions between Village staff (Chief Administrative Officer and Public Works Superintendent) and John Dumbrell with Urban Systems. Key elements of the scope are described below:

- Establish Current Water Use – data made available by the Village through the Columbia Basin Trust's Water Smart initiative for the years 2006 (used as a surrogate for 2009 due to challenges with the 2009 data), 2010 and 2011 was used to establish current water use;

- Estimate Potential Water Savings – a key variable in this regard is the extent of intended water meter application. A universal metering program applying to all currently unmetered water service connections (residential, commercial and institutional) is contemplated in this assessment. Based upon this breadth of application, the Village's current water use profile, and experiences of other communities, estimates of savings were prepared;

- Determine Costs and Benefits – it was decided to utilize a multiple account evaluation technique to determine the costs and benefits of a universal metering program. The key accounts embrace economic, environmental, social and utility operations costs and benefits;

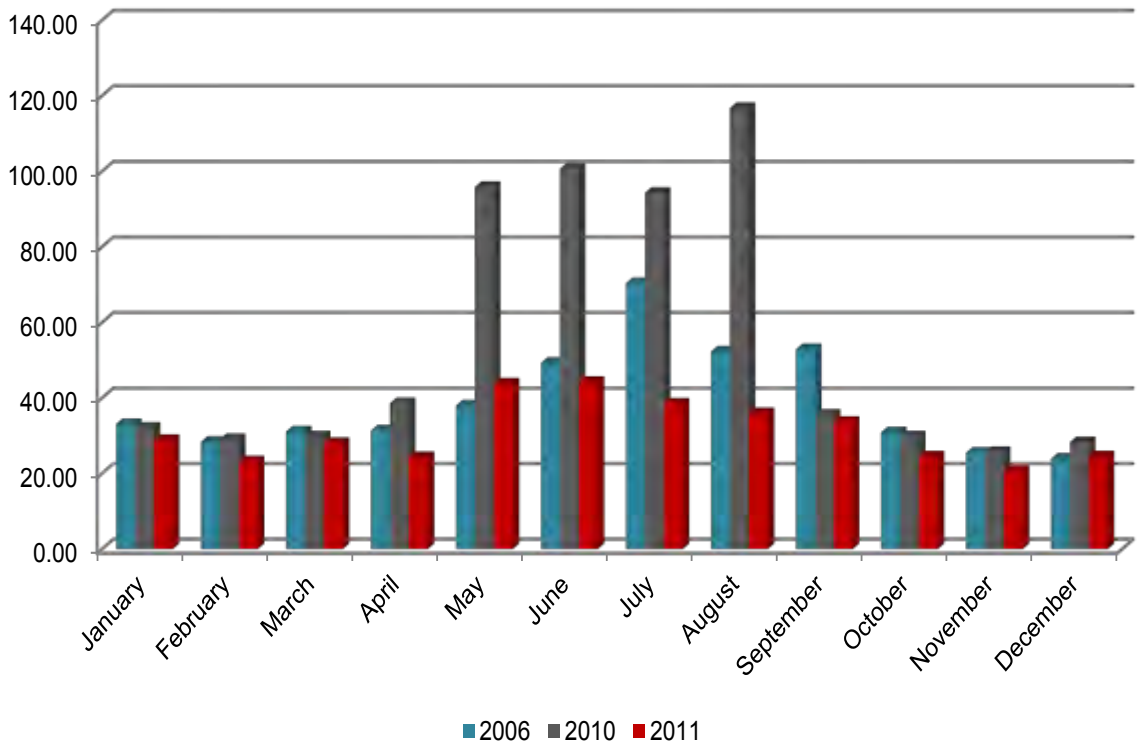
- Prepare Recommendations – based upon the assessment of costs and benefits, clear recommendations regarding the universal metering program are offered.

3.0 ESTIMATES OF WATER SAVINGS

3.1 Current Water Use

The Village has been compiling water use statistics for a number of years, and has begun to monitor these more closely as part of the Columbia Basin Trust (CBT) Water Smart initiative. Recently-published results are shown on the following figure.

Figure 1 – Monthly Metered Water Supply (ML)



There are some items of note with respect to the data in this figure:

- 2006 data was used as a surrogate for 2009, the 'base year' of the CBT Water Smart initiative, as there were challenges with the available 2009 data. This situation, along with a more detailed explanation, is more fully explored in the Village's Water Smart Action Plan (November 2010);
- 2010 data may also be questionable, due again to challenges in reading the bulk water supply meter;

- 2011 data is believed to be accurate. It should be noted, however, that the weather during the summer of 2011 was unusually cool and wet in Valemount, leading to lower-than-normal summer water use, particularly during the months of July and August.

It is also worth noting sewage generation rates in the context of this discussion of water use. Based upon historic Village cumulative sewage generation (measured at the sewage treatment plant) and population, an average of 700 litres per person per day is produced in Valemount.

3.2 Potential Savings

A number of sources of information were drawn upon in estimating potential water savings that could be achieved in Valemount through the introduction of a universal metering program. The first source is the Village's current water use profile, discussed above in Section 3.1. Second, the experiences of other communities who have moved from modest water conservation programs (comprising efforts such as public education and outdoor water restrictions) to universal metering were reviewed. These included the BC interior communities of Vernon and Kelowna who experienced peak water demand reductions of 29% and 27% and average demand reductions of 16% and 18% (respectively) when they moved to universal metering. Third, literature from sources including Environment Canada and the US Environmental Protection Agency (EPA) was consulted. Environment Canada's Municipal Water Use Report (2011) shows that municipalities similar in size to Valemount which are not metered have average residential consumption rates 40% higher than municipalities which are fully metered. Water conservation guidelines published by the US EPA indicate a 20% reduction in water use when communities move to universal metering. Taking the above into account, the following potential savings were estimated:

- 20% reduction of water demands which occur during the summer high use period;
- 10% reduction of water demands which occur throughout the year – this can be thought of as base water use, the bulk of which occurs within residences and other buildings;
- 10% reduction of sewage generation rates – this is linked directly to base water use inside residences and other buildings.

4.0 ECONOMIC COSTS AND BENEFITS OF METERING PROGRAM

4.1 Metering Program Costs

There are two elements of metering program costs. The first is the capital costs of the meters themselves, which are summarized below in Table 1.

Table 1 – Capital Cost of Metering Program

Meter Size	No. [1]	Supply and Install Costs per Meter [2]	Totals
19 mm and 25 mm	486	$ 600	$ 291,600
32 mm	2	$ 700	$ 1,400
50 mm	3	$ 1,500	$ 4,500
100 mm	3	$ 4,000	$ 12,000
150 mm	1	$ 8,000	$ 8,000
Residential Irrigation Change Allowance [3]	1	$ 40,000	$ 40,000
Sub-Total			**$ 357,500**
Reading System & Software [4]			$ 35,000
Sub-Total			**$ 392,500**
Contingency (10%)			$ 29,250
TOTAL			**$ 431,750**

Notes:

[1] Number of meters of various sizes obtained from Village records

[2] Supply and install costs include meter, register, wire, radio-frequency transmitter, isolation valve and other appurtenances; allowance also made for plumbing and carpentry modifications and public education.

[3] Allowance to replumb residential irrigation systems which divert from water connection between property line and inside of home where meter will be installed.

[4] This reading system and software assumes a fully automated meter reading system and compatible data transfer and billing software.

No allowance has been made for replacement cost of the meters, as the Village envisions this responsibility being taken on by property owners.

There are a number of approaches which could be taken by the Village to fund the $431,750 capital costs of the meters. These are summarized briefly below:

- ***Option 1*** – Village utility fully funds the capital costs. If this option were chosen, it is assumed that the Village would borrow the required funds rather than draw upon reserves (which were depleted with recent construction of the Village's water treatment plant) or pay through a large one-time rate increase;
- ***Option 2*** – Village utility funds 50% of the capital costs with the other 50% funded through senior government contributions;
- ***Option 3*** - Village utility funds 33% of the capital with the other 67% funded through senior government contributions;
- ***Option 4*** - Village utility funds none of the capital costs with 100% funded through senior government contributions.

The second element of cost is associated with operating the meters. An allowance of $15,000 has been provided during the first two years of the metering program to allow for activities such as establishing the meter roll (i.e. ensuring meter codes and property descriptions are properly reconciled), organizing utility billing, and trouble-shooting individual utility subscriber issues (such as high meter readings due to leaky toilets).

No on-going allowance has been made for operating costs as the time required to read meters via the automated remote-read system will be minor. Discussions with the Village's CAO and Public Works Superintendent indicate that there will be sufficient capacity within the existing staff complement to accommodate the collection and transmission of meter data, as well as preparation of water utility bills. In addition, staff will be able to undertake periodic reconciliation of individual meter readings with bulk supply.

4.2 Metering Program Financial Benefits

The financial benefits of universal metering programs can stem from reduced water consumption and sewage generation, which in turn can result in deferred capital expenditures and reduced operating costs.

Based upon the Village's water use profile, it is assumed that metering will result in a 20% reduction in water demands which occur during the summer high use period, and a 10% reduction in base water use throughout the year, which equates to a 10% reduction in sewage generation.

With respect to deferral of capital expenditures, the Village's Five Year Capital Plan does not include any water capital projects. There is a budget item of $400,000 for refurbishing a sewer lift station which is required due to its age and condition, and not due to the volume of sewer flows. There are therefore no capital projects which would be deferred through the water and sewer savings resulting from water metering.

The Village has been fortunate over the past five years to receive senior government grants to upgrade the sewer and water treatment plants. These facilities were designed and constructed to accommodate anticipated demands over a period of 20 years. In the case of the water treatment plant, this demand projection included a 20% reduction in water use, reflecting the Village's desire to implement additional water conservation measures. Given the fact that there is additional capacity built into the Village's water and sewer treatment plants to accommodate long-term needs, it is therefore difficult to place an economic value on deferring the potential need to upgrade these facilities beyond the 20 year time horizon.

Measurable operating cost savings are expected to result from the universal metering program. With respect to the water utility, the operating budget was analyzed to identify variable costs which would be impacted by reductions in water use. These include hydro ($25,000 budget in 2012) and purification and treatment ($24,000 in 2012 budget). Both of these are anticipated to be reduced by 20% in the initial year of the program. The 1:1 ratio of water savings to energy savings reflect the experience of other communities, including work our firm completed recently in Fort St. John and Pemberton. In subsequent years hydro cost reductions have been increased by 3% annually to reflect changing rates (a dynamic situation at the time of writing), and purification / treatment costs by 2% annually to reflect the nationally-forecast inflation rate.

There will also be sewer utility operating cost savings. Similar to water, the operating budget was reviewed to earmark variable costs which would be influenced by reductions in sewage generation. These include hydro ($30,000 budget in 2012) and treatment and disposal ($14,000 in 2012). Reductions of 10% in hydro costs are anticipated in the first year, and then inflated by 3% annually. Treatment and disposal costs are reduced by 5% to account for less energy used in the process. Other treatment costs would not be impacted as the organic load does not change. Assumptions for these inflation rates are the same as those used in the water utility forecast.

4.3 Summary of Economic Cost: Benefit Analysis

Table 2 provides a summary of the economic cost : benefit analyses which incorporate the approaches outlined in the previous two sections of this report. Appendix A contains the full versions of these analyses.

Table 2 – Summary of Economic Cost-Benefit Analysis

Option	Description	Net Benefit (Cost)	Pay-Back Period
1	Capital Cost Funded 100% By Village	($ 128,401)	25 years (estimate)
2	Capital Cost Funded 50% By Village	$ 103,599	6 years
3	Capital Cost Funded 33% By Village	$ 179,599	3 years
4	Capital Cost Funded 0% By Village	$ 333,599	Immediate

From an economic perspective, the results can be stated as follows:

- Option 1 wherein the capital costs of the universal metering program are funded fully by the Village has a net economic cost of over $128,401 over the 20 year projection period. It is estimated that a 25 year period would be required to achieve full pay-back;
- Options 2, 3 and 4 all result in net economic benefits over the 20 year projection period, and have very short pay-back periods of 6 years, 3 years and immediate respectively.

5.0 OTHER ASSESSMENT COMPONENTS – ENVIRONMENTAL, SOCIAL AND UTILITY OPERATIONS

5.1 Environmental Considerations

Reductions in water demands achieved through universal metering would result in a number of environmental benefits, including the following:

- Reductions in water withdrawal from Swift Creek, the Village's only source of water. Swift Creek has a limited supply, and also major environmental value as a salmon-bearing watercourse;
- Reductions in energy consumption for water and sewage pumping and treatment;
- Minimization of greenhouse gas (GHG) emissions due to reduced energy consumption.

5.2 Social Considerations

Implementation of a universal metering program carries with it a number of social implications. These include:

- Equity and fairness in levying charges to utility customers (assuming that the Village moves to a volume-based method of utility fees enabled through measuring volumes consumed with meters);
- Ability for individuals to influence the amount of their water bill through managing their behaviour;
- Disruption of people's privacy, and possibly living space, during meter installation. In the majority of cases meters will be installed inside people's homes, and in challenging situations may involve cutting through drywall, finished walls and so forth. In any instance, the importance of engaging the services of a highly-competent installer with excellent customer service skills cannot be overstated as fundamental to a successful water metering program (should the Village decide to proceed).

5.3 Utility Operations

Water use data for Valemount are currently available from only one source – the bulk water supply. Once it leaves this point, there is no way of tracking its use through the remainder of the water utility.

One of the implications of this is the inability for the Village to calculate how much water may be lost from water supply mains before it reaches utility customers. This challenge is especially pronounced in Valemount, where the sand foundation upon which the Village is constructed readily absorbs water, with little or no evidence appearing on the ground surface. The Village's Water Smart Action Plan estimates that 25% of the Village's water supply is not accounted for, and may be lost due to leakage (a situation not uncommon in other communities in the Columbia Basin and elsewhere). This issue has gained greater prominence in Valemount with the construction of new Village water treatment facilities, and the consequent increase in costs of water.

A universal water metering program would enable the Village to reconcile water supplied with water used, and to isolate, locate and remedy any leaks in the system. This could result in water use savings above those noted in Section 3 of this report, along with the consequent economic and environmental benefits described in Section 4 and prior portions of this Section.

Furthermore, a universal metering program would ensure that all utility customers are identified and being billed for their water use. This is another source of unaccounted-for water in some communities – customers that the utility owner is unaware of for a variety of reasons.

6.0 RECOMMENDATIONS

Following are the main recommendations based upon the analyses presented in this report:

- Proceed with universal metering program, provided a minimum of 50% of the required capital costs can be funded through senior government contributions;
- Consider the following sources of senior government contributions – Gas Tax Community Works Fund, Gas Tax application-based funds, BC Towns for Tomorrow program (if renewed), Federation of Canadian Municipalities Green Municipal Fund;
- Develop and implement public education program based upon the findings of this report to introduce rationale for metering to the community.

Appendix A

Detailed Cost – Benefit Analyses with Varying Levels of Village and Senior Government Funding

Water Metering Assessment Financial Cost:Benefit – 100% Funding Option

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Cost of Metering Program																				
- Capital [1]	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100
- Operating	$ 10,000	$ 5,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Total	$ 33,100	$ 28,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100	$ 23,100
Benefits (Savings) of Metering Program																				
- Purification and Treatment of Water [2]	$ 4,800	$ 4,896	$ 4,994	$ 5,094	$ 5,196	$ 5,300	$ 5,406	$ 5,514	$ 5,624	$ 5,736	$ 5,851	$ 5,968	$ 6,088	$ 6,209	$ 6,333	$ 6,460	$ 6,589	$ 6,721	$ 6,856	$ 6,993
- Hydro-Water [3]	$ 5,000	$ 5,150	$ 5,305	$ 5,464	$ 5,628	$ 5,796	$ 5,970	$ 6,149	$ 6,334	$ 6,524	$ 6,720	$ 6,921	$ 7,129	$ 7,343	$ 7,563	$ 7,790	$ 8,024	$ 8,264	$ 8,512	$ 8,768
- Sewer Treatment [2]	$ 700	$ 714	$ 728	$ 743	$ 758	$ 773	$ 788	$ 804	$ 820	$ 837	$ 853	$ 870	$ 888	$ 906	$ 924	$ 942	$ 961	$ 980	$ 1,000	$ 1,020
- Hydro-Sewer [3]	$ 3,000	$ 3,090	$ 3,183	$ 3,278	$ 3,377	$ 3,478	$ 3,582	$ 3,690	$ 3,800	$ 3,914	$ 4,032	$ 4,153	$ 4,277	$ 4,406	$ 4,538	$ 4,674	$ 4,814	$ 4,959	$ 5,107	$ 5,261
- Total	$ 13,500	$ 13,850	$ 14,209	$ 14,578	$ 14,957	$ 15,347	$ 15,746	$ 16,157	$ 16,578	$ 17,011	$ 17,456	$ 17,912	$ 18,381	$ 18,863	$ 19,358	$ 19,866	$ 20,388	$ 20,924	$ 21,475	$ 22,041
Annual Net (Cost) Benefit	-$ 19,600	-$ 14,250	-$ 8,891	-$ 8,522	-$ 8,143	-$ 7,753	-$ 7,354	-$ 6,943	-$ 6,522	-$ 6,089	-$ 5,644	-$ 5,188	-$ 4,719	-$ 4,237	-$ 3,742	-$ 3,234	-$ 2,712	-$ 2,176	-$ 1,625	-$ 1,059
Cumulative (Cost) Benefit	-$ 19,600	-$ 33,850	-$ 42,741	-$ 51,262	-$ 59,405	-$ 67,158	-$ 74,512	-$ 81,455	-$ 87,977	-$ 94,066	-$ 99,710	-$ 104,897	-$ 109,616	-$ 113,853	-$ 117,595	-$ 120,829	-$ 123,541	-$ 125,717	-$ 127,342	-$ 128,401

Notes:
[1] Total cost of meters ($432,000) funded through MFA over 20 years and 4% interest rate through sinking fund.
[2] Annual inflation rate of 2% consistent with Government of Canada projections.
[3] Annual inflation rate of 3% used to project BC Hydro rate increases.

Water Metering Assessment Financial Cost:Benefit – 50% Funding Option

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Cost of Metering Program																				
- Capital [1]	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500
- Operating	$ 10,000	$ 5,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Total	$ 21,500	$ 16,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500	$ 11,500
Benefits (Savings) of Metering Program																				
- Purification and Treatment of Water [2]	$ 4,800	$ 4,896	$ 4,994	$ 5,094	$ 5,196	$ 5,300	$ 5,406	$ 5,514	$ 5,624	$ 5,736	$ 5,851	$ 5,968	$ 6,088	$ 6,209	$ 6,333	$ 6,460	$ 6,589	$ 6,721	$ 6,856	$ 6,993
- Hydro-Water [3]	$ 5,000	$ 5,150	$ 5,305	$ 5,464	$ 5,628	$ 5,796	$ 5,970	$ 6,149	$ 6,334	$ 6,524	$ 6,720	$ 6,921	$ 7,129	$ 7,343	$ 7,563	$ 7,790	$ 8,024	$ 8,264	$ 8,512	$ 8,768
- Sewer Treatment [2]	$ 700	$ 714	$ 728	$ 743	$ 758	$ 773	$ 788	$ 804	$ 820	$ 837	$ 853	$ 870	$ 888	$ 906	$ 924	$ 942	$ 961	$ 980	$ 1,000	$ 1,020
- Hydro-Sewer [3]	$ 3,000	$ 3,090	$ 3,183	$ 3,278	$ 3,377	$ 3,478	$ 3,582	$ 3,690	$ 3,800	$ 3,914	$ 4,032	$ 4,153	$ 4,277	$ 4,406	$ 4,538	$ 4,674	$ 4,814	$ 4,959	$ 5,107	$ 5,261
- Total	$ 13,500	$ 13,850	$ 14,209	$ 14,578	$ 14,957	$ 15,347	$ 15,746	$ 16,157	$ 16,578	$ 17,011	$ 17,456	$ 17,912	$ 18,381	$ 18,863	$ 19,358	$ 19,866	$ 20,388	$ 20,924	$ 21,475	$ 22,041
Annual Net (Cost) Benefit	-$ 8,000	-$ 2,650	$ 2,709	$ 3,078	$ 3,457	$ 3,847	$ 4,246	$ 4,657	$ 5,078	$ 5,511	$ 5,956	$ 6,412	$ 6,881	$ 7,363	$ 7,858	$ 8,366	$ 8,888	$ 9,424	$ 9,975	$ 10,541
Cumulative (Cost) Benefit	-$ 8,000	-$ 10,650	-$ 7,941	-$ 4,862	-$ 1,405	$ 2,442	$ 6,688	$ 11,345	$ 16,423	$ 21,934	$ 27,890	$ 34,303	$ 41,184	$ 48,547	$ 56,405	$ 64,771	$ 73,659	$ 83,083	$ 93,058	$ 103,599

Notes:
[1] Total cost of meters ($216,000) funded through MFA over 20 years and 4% interest rate through sinking fund.
[2] Annual inflation rate of 2% consistent with Government of Canada projections.
[3] Annual inflation rate of 3% used to project BC Hydro rate increases.

Water Metering Assessment Financial Cost:Benefit – 33% Funding Option

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Cost of Metering Program																				
- Capital [1]	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700
- Operating	$ 10,000	$ 5,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Total	$ 17,700	$ 12,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700	$ 7,700
Benefits (Savings) of Metering Program																				
- Purification and Treatment of Water [2]	$ 4,800	$ 4,896	$ 4,994	$ 5,094	$ 5,196	$ 5,300	$ 5,406	$ 5,514	$ 5,624	$ 5,736	$ 5,851	$ 5,968	$ 6,088	$ 6,209	$ 6,333	$ 6,460	$ 6,589	$ 6,721	$ 6,856	$ 6,993
- Hydro-Water [3]	$ 5,000	$ 5,150	$ 5,305	$ 5,464	$ 5,628	$ 5,796	$ 5,970	$ 6,149	$ 6,334	$ 6,524	$ 6,720	$ 6,921	$ 7,129	$ 7,343	$ 7,563	$ 7,790	$ 8,024	$ 8,264	$ 8,512	$ 8,768
- Sewer Treatment [2]	$ 700	$ 714	$ 728	$ 743	$ 758	$ 773	$ 788	$ 804	$ 820	$ 837	$ 853	$ 870	$ 888	$ 906	$ 924	$ 942	$ 961	$ 980	$ 1,000	$ 1,020
- Hydro-Sewer [3]	$ 3,000	$ 3,090	$ 3,183	$ 3,278	$ 3,377	$ 3,478	$ 3,582	$ 3,690	$ 3,800	$ 3,914	$ 4,032	$ 4,153	$ 4,277	$ 4,406	$ 4,538	$ 4,674	$ 4,814	$ 4,959	$ 5,107	$ 5,261
- Total	$ 13,500	$ 13,850	$ 14,209	$ 14,578	$ 14,957	$ 15,347	$ 15,746	$ 16,157	$ 16,578	$ 17,011	$ 17,456	$ 17,912	$ 18,381	$ 18,863	$ 19,358	$ 19,866	$ 20,388	$ 20,924	$ 21,475	$ 22,041
Annual Net (Cost) Benefit	-$ 4,200	$ 1,150	$ 6,509	$ 6,878	$ 7,257	$ 7,647	$ 8,046	$ 8,457	$ 8,878	$ 9,311	$ 9,756	$ 10,212	$ 10,681	$ 11,163	$ 11,658	$ 12,166	$ 12,688	$ 13,224	$ 13,775	$ 14,341
Cumulative (Cost) Benefit	-$ 4,200	-$ 3,050	$ 3,459	$ 10,338	$ 17,595	$ 25,242	$ 33,288	$ 41,745	$ 50,623	$ 59,934	$ 69,690	$ 79,903	$ 90,584	$ 101,747	$ 113,405	$ 125,571	$ 138,259	$ 151,483	$ 165,258	$ 179,599

Notes:
[1] Total cost of meters ($143,000) funded through MFA over 20 years and 4% interest rate through sinking fund.
[2] Annual inflation rate of 2% consistent with Government of Canada projections.
[3] Annual inflation rate of 3% used to project BC Hydro rate increases.

Water Metering Assessment Financial Cost:Benefit – 0% Funding Option

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Cost of Metering Program																				
- Capital [1]	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Operating	$ 10,000	$ 5,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Total	$ 10,000	$ 5,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Benefits (Savings) of Metering Program																				
- Purification and Treatment of Water [2]	$ 4,800	$ 4,896	$ 4,994	$ 5,094	$ 5,196	$ 5,300	$ 5,406	$ 5,514	$ 5,624	$ 5,736	$ 5,851	$ 5,968	$ 6,088	$ 6,209	$ 6,333	$ 6,460	$ 6,589	$ 6,721	$ 6,856	$ 6,993
- Hydro-Water [3]	$ 5,000	$ 5,150	$ 5,305	$ 5,464	$ 5,628	$ 5,796	$ 5,970	$ 6,149	$ 6,334	$ 6,524	$ 6,720	$ 6,921	$ 7,129	$ 7,343	$ 7,563	$ 7,790	$ 8,024	$ 8,264	$ 8,512	$ 8,768
- Sewer Treatment [2]	$ 700	$ 714	$ 728	$ 743	$ 758	$ 773	$ 788	$ 804	$ 820	$ 837	$ 853	$ 870	$ 888	$ 906	$ 924	$ 942	$ 961	$ 980	$ 1,000	$ 1,020
- Hydro-Sewer [3]	$ 3,000	$ 3,090	$ 3,183	$ 3,278	$ 3,377	$ 3,478	$ 3,582	$ 3,690	$ 3,800	$ 3,914	$ 4,032	$ 4,153	$ 4,277	$ 4,406	$ 4,538	$ 4,674	$ 4,814	$ 4,959	$ 5,107	$ 5,261
- Total	$ 13,500	$ 13,850	$ 14,209	$ 14,578	$ 14,957	$ 15,347	$ 15,746	$ 16,157	$ 16,578	$ 17,011	$ 17,456	$ 17,912	$ 18,381	$ 18,863	$ 19,358	$ 19,866	$ 20,388	$ 20,924	$ 21,475	$ 22,041
Annual Net (Cost) Benefit	$ 3,500	$ 8,850	$ 14,209	$ 14,578	$ 14,957	$ 15,347	$ 15,746	$ 16,157	$ 16,578	$ 17,011	$ 17,456	$ 17,912	$ 18,381	$ 18,863	$ 19,358	$ 19,866	$ 20,388	$ 20,924	$ 21,475	$ 22,041
Cumulative (Cost) Benefit	$ 3,500	$ 12,350	$ 26,559	$ 41,138	$ 56,095	$ 71,442	$ 87,188	$ 103,345	$ 119,923	$ 136,934	$ 154,390	$ 172,303	$ 190,684	$ 209,547	$ 228,905	$ 248,771	$ 269,159	$ 290,083	$ 311,558	$ 333,599

Notes:
[1] Total cost of meters ($0) funded through MFA over 20 years and 4% interest rate through sinking fund.
[2] Annual inflation rate of 2% consistent with Government of Canada projections.
[3] Annual inflation rate of 3% used to project BC Hydro rate increases.