Final Report

TOWN OF GOLDEN

Water Metering Assessment

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1.0 BACKGROUND

The Town of Golden has undertaken a variety of water demand management initiatives over the last several years. As part of this process, there was a desire to more thoroughly examine universal water metering as a potential addition to the Town's prior initiatives. In this context, universal water metering means the installation of these devices on all connections served by the Town's water utility. This would involve installing meters on 1,378 residences where they currently do not exist and allowing for pit meter installations in a few instances. The purpose of this document is to report the results of the assessment of costs and benefits of universal metering from financial, utility operation, environmental and social perspectives.

This report contains the following sections:

- Section 2 – outlines the scope of the assessment;
- Section 3 – estimates the water savings and sewage reductions which would result from a metering program;
- Section 4 – presents the financial cost-benefit component of the assessment;
- Section 5 – summarizes the other assessment components – utility operations, environmental and social benefits and costs; and
- Section 6 – provides the conclusions of the assessment.

2.0 SCOPE OF THE ASSESSMENT

The scope of this assessment was derived through discussions between Town staff and John Dumbrell with Urban Systems. Key elements of the scope are described below:

- Estimate Potential Water and Sewer 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 is contemplated in this assessment. Based upon this breadth of application, the Town'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 ESTIMATED REDUCTIONS IN WATER CONSUMPTION AND SEWAGE GENERATION

In order to estimate reduced water consumption and sewage generation should the Town move to universal water metering, the following approach was used. First, residential water use by non-metered residential accounts was reviewed for 2011 (to allow comparison to pilot metered accounts, discussed below). The results of this review are shown below in Table 1.

Table 1 – Residential Water Use by Non-Metered Accounts (2011) [1]

Parameter of Demand	Total Water Pumped (ML)	% Attributed to Non-Metered Residences [3]	Net water to Non-Metered Residences (ML)	# of Non-Metered Residential Units	Average Demand/Unit /Month (m^3)
Maximum [2]	210	50	105	1,378	38.1
Winter (Indoor) [2]	266	50	133	1,378	24.1
Overall	948	50	474	1,378	28.7

Notes;

[1] *2011 chosen for comparison as residential use by metered accounts available that year.*

[2] *Maximum demand July and August; winter (indoor) January, February, November and December.*

[3] *% of attributed to non-metered from "other" columns in Town records for 2011 and excludes water for parks, 10% estimate of system losses, industrial/commercial/institutional (ICI) customers and metered residences.*

These results were then compared to water use by those residences who participated in the Town's voluntary pilot metering program. Findings are summarized in Table 2.

Table 2 – Comparison of Residential Water Use by Non-Metered and Metered Accounts (2011) [1]

Parameter of Demand	Average Demand/Unit/Month		Reduced Use by Metered Account	
	Non-Metered (m^3/month)	Metered (m^3/month)	Volume (m^3/month)	Percentage (%)
Maximum [2]	38.1	33.23	- 4.87	- 13
Winter (Indoor) [2]	24.1	14.56	- 9.54	- 40
Overall	28.7	19.00	- 9.70	- 34

Notes;

[1] *2011 chosen for comparison as residential use by metered accounts available that year.*

[2] *Maximum demand July and August; winter (indoor) January, February, November and December.*

The Town's experience was then compared to that of other communities who have moved to universal metering programs. Comparisons included:

- Survey data in Environment Canada's 2011 Municipal Water Use Report, which shows that municipalities similar in size to Golden which are not metered have average residential consumption rates 50% higher than municipalities which are fully metered;
- Water Conservation Plan Guidelines published by the US Environmental Protection Agency (1998) which indicate a 20% reduction in water use when communities move to universal metering;
- Experience of 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 adopted universal metering programs. It should be noted that both of these communities had other water demand management initiatives such as alternate day watering schedules and public education in place prior to moving fully to metering of all water service connections.

Additional comparisons of Golden's water use reveal the results set out below in Table 3.

Assumptions made regarding potential savings in Golden are shown in Table 4 on the following page.

Table 3 – Comparisons of Residential Water Use in Golden, BC and Canada

Community	Average Residential Water Use (litres per capita per day (lpcd))
Golden – Metered	256 lpcd [1]
Golden – Not Metered	383 lpcd [1]
British Columbia	353 lpcd [2]
Canada	274 lpcd [2]

Notes;

[1] *Average Demand/Unit/Month from Table 3 divided by 30 days in month and 2.5 people per unit.*

[2] *Source – Environment Canada 2011 Municipal Water Use Report, P. 6, Table 2 (does not distinguish metered and not metered communities)*

Table 4 – Assumed Water Demand Savings for Town of Golden from Universal Residential Metering Program

Parameter of Demand	Golden's Experience (2011)	Other Communities' Experience	Assumed Savings in Golden from Universal Metering
Maximum	13%	20 – 30%	20%
Winter (Indoor)	40%	15 – 20%	15%
Overall	34%	15 – 20%	15%

As noted in the right-hand column in Table 4, it is assumed that a universal water metering program would result in the following demand reductions:

- Maximum Demand – 20%;
- Winter (Indoor) and Overall Demand (including sewage generation) – 15%.

4.0 FINANCIAL ASSESSMENT

4.1 Meter Program Costs

There are two elements of meter program costs. The first is the costs to supply and install the meters, as well as remote reading equipment and related software. An estimate of these costs is provided below in Table 5.

Table 5 – Costs of Meter Supply and Installation

Meter Size	No. [1]	Supply and Install Cost per Meter [2]	Total
New Meters	1378	$600	$ 826,800
Pit Meters [3]	10	$2,500	$ 25,000
Sub-Total			$ 851,800
Reading System & Software	1	$25,000	$ 25,000
Sub-Total			$ 876,800
Contingency (10%)			$ 86,680
TOTAL			**$ 964,480**

Notes:

[1] *Number of meters of various sizes obtained from Town of Golden 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 install pit meters when residential irrigation systems divert from water connection between property line and inside of home.*

An allowance has also been provided for replacement of the meter registers in 20 years. The current cost of these registers is approximately $300.

The second element of metering program costs relates to ongoing operation of the meters. A start-up allowance for the first two years of the metering program has been provided to establish and reconcile the meter roll, organize utility billing, trouble-shoot individual subscriber issues and related activities. This allowance is $20,000 per year (approximately a quarter-time staff position). Discussions with Town staff indicate that other ongoing efforts (i.e. quarterly meter reading, billing, etc.) would require the continuation of this staff position and associated budget allowance beyond project start-up.

4.2 Meter Program - Capital and Operating Cost Reductions

There is the potential for the demand reductions summarized in Section 3 to result in capital and operating cost savings. With respect to capital, a number of documents were reviewed, including the Town's Five Year Financial Plan (2012 – 2016), Development Cost Charge Review Final Report, and recently-completed Water Distribution System Study (the latter two documents were reviewed to ensure projects beyond the imminent 5 year period were considered). As a result of this review, it was determined that the Northeast Booster Upgrade project could be delayed from 2015 to 2021 if demands were further reduced by the percentages identified within Table 4. The value of this project is estimated at $140,000 (2012 dollars), comprising $80,000 for standby power, and a $60,000 allowance for electrical services Other water and sewer projects were required for reasons other than demand, and therefore not considered for deferral.

With respect to operating costs, the Town's water and sewer utility budgets were reviewed to determine variable costs which could be reduced if less water was used or sewer generated. The majority of costs are fixed (such as wages, benefits, equipment), with only hydro / utilities costs considered to be variable. For the purpose of the financial analysis, it has been assumed that a 1:1 ratio exists between water and sewer volume reductions, and hydro cost reductions. This assumption is based upon prior work in communities including Fort St. John and Pemberton where this close relationship was demonstrated.

4.3 Comparison of Costs and Benefits

Appendices A through E provide detailed comparisons of the costs and benefits of universal metering. In instances where the Town's funding is less than 100%, it is assumed that other sources of revenue (such as senior government grant programs) would supplement contributions from the water utility. These grant programs may include, for example, the Gas Tax program, or the Infrastructure Stimulus / Building Canada or BC Towns for Tomorrow programs (if renewed). In every instance, Option 1 (top portion of the spreadsheet) sets out relevant utility costs without meters (i.e. Northeast Booster Upgrades project required in 2015, no change to hydro / utility costs). Furthermore, Option 2 in each of the Appendices envisions costs for the metering program beginning in year 1, along with deferral of the Northeast Booster Upgrade to year 10 (at inflated cost), and reduced hydro / utility costs in year 1. The annual net (cost) benefit is shown at the bottom of each spreadsheet as individual year and cumulative totals.

A summary of the cumulative costs or benefits over 20 years is summarized in the following table.

Table 6 – Summary of Financing Options (See Appendices A – E for details)

Finance Option	Cumulative Cost Benefit (20 Years)
100% of Meter Capital Cost Paid for by Town of Golden	- $ 1,622,688
50% of Meter Capital Cost Paid for by Town of Golden	- $ 1,105,488
33% of Meter Capital Cost Paid for by Town of Golden	- $ 929,688
20% of Meter Capital Cost Paid for by Town of Golden	- $ 795,288
0% of Meter Capital Cost Paid for by Town of Golden	- $ 588,688

5.0 ASSESSMENT OF UTILITY OPERATIONS, ENVIRONMENTAL AND SOCIAL COMPONENTS

A summary of the utility operations, environmental and social benefits and costs of a universal water metering program in Golden in provided in Table 7.

Table 7 – Summary of Utility Operations, Environmental and Social Benefits and Costs of Universal Water Metering Program

Assessment Component	Benefits	Costs
Utility Operations	• Ability to identify unaccounted for water • Ability to detect leaks • Potential for additional financial savings from reduced water losses • Potential additional revenue through ensuring that all customers are identified and billed • Extension of capacity and life of utility system components (in addition to those accounted for in financial terms in Section 4)	• Additional quarter –time staff position (accounted for in financial analysis in Section 4)
Environmental	• Reduced greenhouse gas emissions from reduced energy use (estimated reduction 4 to 5 tonnes of CO_2 equivalencies)	•
Social	• Potential equity and fairness in levying utility charges to customers • Ability of individuals to influence water bill	• Disruption of people's privacy and living space during installation.

6.0 CONCLUSIONS

The analyses presented in the preceding sections of this report point to the following conclusions:

- The completion of the Town's universal water metering program through installation of approximately 1,400 meters on single family residences is not financially viable over a 20 year time horizon. This conclusion is valid regardless of the extent of funding of the initial capital cost of metering being drawn from sources other than the Town's water utility (such as senior government grant programs). Details are provided in Section 4.3 on pages 7 – 8.

- Aside from financial viability, there remain benefits that would be realized with a universal metering program. These are shown in Section 5 on page 9 and include:

  - Utility Operations – ability to detect leaks, account for water within the system, identify and bill all customers, and extend the capacity and life of the water and sewer utilities;

  - Environmental – reduction of greenhouse gas emissions as a result of reduced energy use;

  - Social – enhanced equity and fairness in levying utility charges to customers. Installation of meters can also cause challenges through disruption of people's privacy; these challenges can be minimized through engaging the services of a highly-competent installer with excellent customer service skills.

- Universal water metering can be considered in the context of the Town's Asset Management Program, including factors such as enhanced longevity of water and sewer utility components resulting from water/sewer savings, improved leak detection, and approaches to funding the meter register replacement allowance.

Appendix A

100% of Meter Capital Cost Paid for by Town of Golden

100% of Meter Capital Cost Paid for by Town of Golden

Total Capital Cost of Installing Meters =	$964,480
Funding Scenario -100% Golden =	$964,480

Option 1 - Water Metering Assessment Financial Cost: Benefit Analysis - With No Meters

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	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
- Operating	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
- Total [1]	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Utility Operating Costs																				
- Capital Upgrades [2]	$0	$0	$0	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000
- Hydro-Water [3]	$65,208	$68,142	$70,187	$72,292	$74,461	$76,695	$78,996	$81,366	$83,807	$86,321	$88,910	$91,578	$94,325	$97,155	$100,069	$103,071	$106,164	$109,348	$112,629	$116,008
- Hydro-Sewer [4]	$15,571	$16,271	$16,759	$17,262	$17,780	$18,313	$18,863	$19,429	$20,011	$20,612	$21,230	$21,867	$22,523	$23,199	$23,895	$24,612	$25,350	$26,110	$26,894	$27,701
- Total	$80,779	$84,414	$86,946	$97,554	$100,241	$103,008	$105,858	$108,794	$111,818	$114,933	$118,141	$121,445	$124,848	$128,354	$131,964	$135,683	$139,514	$143,459	$147,523	$151,708
Annual Utility Operating Costs (Option 1)	$80,779	$84,414	$86,946	$97,554	$100,241	$103,008	$105,858	$108,794	$111,818	$114,933	$118,141	$121,445	$124,848	$128,354	$131,964	$135,683	$139,514	$143,459	$147,523	$151,708
Cumulative Utility Operating Costs (Option 1)	$80,779	$165,192	$252,138	$349,692	$449,933	$552,941	$658,800	$767,594	$879,412	$994,345	$1,112,485	$1,233,930	$1,358,778	$1,487,131	$1,619,095	$1,754,779	$1,894,292	$2,037,751	$2,185,274	$2,336,982

Notes:
[1] No capital or operating expenditures to install meters
[2] Total cost of upgrades NE Booster ($150,000 in 2015) funded through MFA over 20 years and 4% interest rate through sinking fund.
[3] Annual hydro cost to operate water system - annual inflation rate of 4.5% used in 2013 & 2014, and 3% after 2014 to project BC Hydro rate increases.
[4] Annual hydro cost to operate sewer system - annual inflation rate of 4.5% used in 2013 & 2014, and 3% after 2014 to project BC Hydro rate increases.

Option 2 - Water Metering Assessment Financial Cost: Benefit Analysis -With Meters

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 [5]	$51,700	$51,700	$51,700	$51,700	$51,700	$51,700	$51,700	$51,700	$51,700	$51,700	$51,700	$51,700	$51,700	$51,700	$51,700	$51,700	$51,700	$51,700	$51,700	$51,700
- Operating [6]	$20,000	$20,400	$20,808	$21,224	$21,649	$22,082	$22,523	$22,974	$23,433	$23,902	$24,380	$24,867	$25,365	$25,872	$26,390	$26,917	$27,456	$28,005	$28,565	$29,136
- Replacement Allowance [7]	$22,950	$23,409	$23,877	$24,355	$24,842	$25,339	$25,845	$26,362	$26,890	$27,427	$27,976	$28,535	$29,106	$29,688	$30,282	$30,888	$31,505	$32,136	$32,778	$33,434
- Total	$94,650	$95,509	$96,385	$97,279	$98,190	$99,120	$100,069	$101,036	$102,023	$103,029	$104,056	$105,103	$106,171	$107,260	$108,372	$109,505	$110,661	$111,840	$113,043	$114,270
Utility Operating Costs																				
- Capital Upgrades [8]	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100
- Hydro-Water [9]	$52,166	$54,514	$56,149	$57,834	$59,569	$61,356	$63,197	$65,092	$67,045	$69,057	$71,128	$73,262	$75,460	$77,724	$80,055	$82,457	$84,931	$87,479	$90,103	$92,806
- Hydro-Sewer [10]	$13,235	$13,830	$14,245	$14,673	$15,113	$15,566	$16,033	$16,514	$17,010	$17,520	$18,046	$18,587	$19,145	$19,719	$20,311	$20,920	$21,547	$22,194	$22,860	$23,545
- Total	$65,401	$68,344	$70,395	$72,507	$74,682	$76,922	$79,230	$81,607	$84,055	$95,677	$98,274	$100,949	$103,705	$106,543	$109,466	$112,477	$115,578	$118,773	$122,063	$125,452
Annual Utility Operating Costs (Option 2)	$160,051	$163,853	$166,780	$169,785	$172,872	$176,042	$179,299	$182,643	$186,078	$198,706	$202,330	$206,052	$209,876	$213,803	$217,838	$221,982	$226,239	$230,613	$235,106	$239,722
Cumulative Utility Operating Costs (Option 2)	$160,051	$323,905	$490,685	$660,470	$833,342	$1,009,385	$1,188,683	$1,371,326	$1,557,404	$1,756,110	$1,958,439	$2,164,491	$2,374,367	$2,588,170	$2,806,008	$3,027,990	$3,254,229	$3,484,842	$3,719,948	$3,959,670

Notes:
[5] Town of Golden share of capital cost of meters (@100% = $964,500) funded through MFA over 20 years and 4% interest rate through sinking fund.
[6] Additional staff required for meter program costs
[7] Replacement allowance to build up reserve to replace meter registers in 20 years (current value $300; interest rate 2%)
[8] Defer NE booster capital upgrade to 10 years - annual inflation rate of 2% consistent with Government of Canada projections.
Total cost in 10 years ($170,000) funded through MFA over 20 years and 5% interest rate through sinking fund.
[9] Annual hydro cost to operate water system with anticipated 20% saving due to reduced hydro consumption - annual inflation rate of 4.5% used in 2013 & 2014, and 3% after 2014 to project BC Hydro rate increases.
[10] Annual hydro cost to operate sewer system with anticipated 15% saving due to reduced hydro consumption - annual inflation rate of 4.5% used in 2013 & 2014, and 3% after 2014 to project BC Hydro rate increases.

Annual Net (Cost) Benefit Analysis

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Annual Benefit [11]	-$79,273	-$79,440	-$79,834	-$72,231	-$72,631	-$73,034	-$73,440	-$73,849	-$74,260	-$83,773	-$84,189	-$84,607	-$85,028	-$85,450	-$85,874	-$86,299	-$86,726	-$87,154	-$87,583	-$88,013
Cumulative Benefit [12]	-$79,273	-$158,713	-$238,547	-$310,778	-$383,409	-$456,443	-$529,883	-$603,732	-$677,992	-$761,765	-$845,954	-$930,562	-$1,015,589	-$1,101,039	-$1,186,912	-$1,273,211	-$1,359,937	-$1,447,091	-$1,534,675	-$1,622,688

Notes:
[11] Annual utility operating cost with no meters (option 1) minus annual utility operating cost with meters (option 2)
[12] Cumulative utility operating cost with no meters (option 1) minus cumulative net utility operating cost with meters (option 2)

Appendix B

50% of Meter Capital Cost Paid for by Town of Golden

50% of Meter Capital Cost Paid for by Town of Golden

Total Capital Cost of Installing Meters =	$964,480
Funding Scenario -50% Golden =	$482,240

Option 1 - Water Metering Assessment Financial Cost: Benefit Analysis - With No Meters

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	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
- Operating	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
- Total [1]	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Utility Operating Costs																				
- Capital Upgrades [2]	$0	$0	$0	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000
- Hydro-Water [3]	$65,208	$68,142	$70,187	$72,292	$74,461	$76,695	$78,996	$81,366	$83,807	$86,321	$88,910	$91,578	$94,325	$97,155	$100,069	$103,071	$106,164	$109,348	$112,629	$116,008
- Hydro-Sewer [4]	$15,571	$16,271	$16,759	$17,262	$17,780	$18,313	$18,863	$19,429	$20,011	$20,612	$21,230	$21,867	$22,523	$23,199	$23,895	$24,612	$25,350	$26,110	$26,894	$27,701
- Total	$80,779	$84,414	$86,946	$97,554	$100,241	$103,008	$105,858	$108,794	$111,818	$114,933	$118,141	$121,445	$124,848	$128,354	$131,964	$135,683	$139,514	$143,459	$147,523	$151,708
Annual Utility Operating Costs (Option 1)	$80,779	$84,414	$86,946	$97,554	$100,241	$103,008	$105,858	$108,794	$111,818	$114,933	$118,141	$121,445	$124,848	$128,354	$131,964	$135,683	$139,514	$143,459	$147,523	$151,708
Cumulative Utility Operating Costs (Option 1)	$80,779	$165,192	$252,138	$349,692	$449,933	$552,941	$658,800	$767,594	$879,412	$994,345	$1,112,485	$1,233,930	$1,358,778	$1,487,131	$1,619,095	$1,754,779	$1,894,292	$2,037,751	$2,185,274	$2,336,982

Notes:
[1] No capital or operating expenditures to install meters
[2] Total cost of upgrades NE Booster ($150,000 in 2015) funded through MFA over 20 years and 4% interest rate through sinking fund.
[3] Annual hydro cost to operate water system - annual inflation rate of 4.5% used in 2013 & 2014, and 3% after 2014 to project BC Hydro rate increases.
[4] Annual hydro cost to operate sewer system - annual inflation rate of 4.5% used in 2013 & 2014, and 3% after 2014 to project BC Hydro rate increases.

Option 2 - Water Metering Assessment Financial Cost: Benefit Analysis -With Meters

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 [5]	$25,840	$25,840	$25,840	$25,840	$25,840	$25,840	$25,840	$25,840	$25,840	$25,840	$25,840	$25,840	$25,840	$25,840	$25,840	$25,840	$25,840	$25,840	$25,840	$25,840
- Operating [6]	$20,000	$20,400	$20,808	$21,224	$21,649	$22,082	$22,523	$22,974	$23,433	$23,902	$24,380	$24,867	$25,365	$25,872	$26,390	$26,917	$27,456	$28,005	$28,565	$29,136
- Replacement Allowance [7]	$22,950	$23,409	$23,877	$24,355	$24,842	$25,339	$25,845	$26,362	$26,890	$27,427	$27,976	$28,535	$29,106	$29,688	$30,282	$30,888	$31,505	$32,136	$32,778	$33,434
- Total	$68,790	$69,649	$70,525	$71,419	$72,330	$73,260	$74,209	$75,176	$76,163	$77,169	$78,196	$79,243	$80,311	$81,400	$82,512	$83,645	$84,801	$85,980	$87,183	$88,410
Utility Operating Costs																				
- Capital Upgrades [8]	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100
- Hydro-Water [9]	$52,166	$54,514	$56,149	$57,834	$59,569	$61,356	$63,197	$65,092	$67,045	$69,057	$71,128	$73,262	$75,460	$77,724	$80,055	$82,457	$84,931	$87,479	$90,103	$92,806
- Hydro-Sewer [10]	$13,235	$13,830	$14,245	$14,673	$15,113	$15,566	$16,033	$16,514	$17,010	$17,520	$18,046	$18,587	$19,145	$19,719	$20,311	$20,920	$21,547	$22,194	$22,860	$23,545
- Total	$65,401	$68,344	$70,395	$72,507	$74,682	$76,922	$79,230	$81,607	$84,055	$95,677	$98,274	$100,949	$103,705	$106,543	$109,466	$112,477	$115,578	$118,773	$122,063	$125,452
Annual Utility Operating Costs (Option 2)	$134,191	$137,993	$140,920	$143,925	$147,012	$150,182	$153,439	$156,783	$160,218	$172,846	$176,470	$180,192	$184,016	$187,943	$191,978	$196,122	$200,379	$204,753	$209,246	$213,862
Cumulative Utility Operating Costs (Option 2)	$134,191	$272,185	$413,105	$557,030	$704,042	$854,225	$1,007,663	$1,164,446	$1,324,664	$1,497,510	$1,673,979	$1,854,171	$2,038,187	$2,226,130	$2,418,108	$2,614,230	$2,814,609	$3,019,362	$3,228,608	$3,442,470

Notes:
[5] Town of Golden share of capital cost of meters (@50% = $482,240) funded through MFA over 20 years and 4% interest rate through sinking fund.
[6] Additional staff required for meter program costs
[7] Replacement allowance to build up reserve to replace meter registers in 20 years (current value $300; interest rate 2%)
[8] Defer NE booster capital upgrade to 10 years - annual inflation rate of 2% consistent with Government of Canada projections.
Total cost in 10 years ($170,000) funded through MFA over 20 years and 5% interest rate through sinking fund.
[9] Annual hydro cost to operate water system with anticipated 20% saving due to reduced hydro consumption - annual inflation rate of 4.5% used in 2013 & 2014, and 3% after 2014 to project BC Hydro rate increases.
[10] Annual hydro cost to operate sewer system with anticipated 15% saving due to reduced hydro consumption - annual inflation rate of 4.5% used in 2013 & 2014, and 3% after 2014 to project BC Hydro rate increases.

Annual Net (Cost) Benefit Analysis

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Annual Benefit [11]	-$53,413	-$53,580	-$53,974	-$46,371	-$46,771	-$47,174	-$47,580	-$47,989	-$48,400	-$57,913	-$58,329	-$58,747	-$59,168	-$59,590	-$60,014	-$60,439	-$60,866	-$61,294	-$61,723	-$62,153
Cumulative Benefit [12]	-$53,413	-$106,993	-$160,967	-$207,338	-$254,109	-$301,283	-$348,863	-$396,852	-$445,252	-$503,165	-$561,494	-$620,242	-$679,409	-$738,999	-$799,012	-$859,451	-$920,317	-$981,611	-$1,043,335	-$1,105,488

Notes:
[11] Annual utility operating cost with no meters (option 1) minus annual utility operating cost with meters (option 2)
[12] Cumulative utility operating cost with no meters (option 1) minus cumulative net utility operating cost with meters (option 2)

Appendix C

33% of Meter Capital Cost Paid for by Town of Golden

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

Total Capital Cost of Installing Meters =	$964,480
Funding Scenario -33% Golden =	$318,278

Option 1 - Water Metering Assessment Financial Cost: Benefit Analysis - With No Meters

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	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
- Operating	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
- Total [1]	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Utility Operating Costs																				
- Capital Upgrades [2]	$0	$0	$0	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000
- Hydro-Water [3]	$65,208	$68,142	$70,187	$72,292	$74,461	$76,695	$78,996	$81,366	$83,807	$86,321	$88,910	$91,578	$94,325	$97,155	$100,069	$103,071	$106,164	$109,348	$112,629	$116,008
- Hydro-Sewer [4]	$15,571	$16,271	$16,759	$17,262	$17,780	$18,313	$18,863	$19,429	$20,011	$20,612	$21,230	$21,867	$22,523	$23,199	$23,895	$24,612	$25,350	$26,110	$26,894	$27,701
- Total	$80,779	$84,414	$86,946	$97,554	$100,241	$103,008	$105,858	$108,794	$111,818	$114,933	$118,141	$121,445	$124,848	$128,354	$131,964	$135,683	$139,514	$143,459	$147,523	$151,708
Annual Utility Operating Costs (Option 1)	$80,779	$84,414	$86,946	$97,554	$100,241	$103,008	$105,858	$108,794	$111,818	$114,933	$118,141	$121,445	$124,848	$128,354	$131,964	$135,683	$139,514	$143,459	$147,523	$151,708
Cumulative Utility Operating Costs (Option 1)	$80,779	$165,192	$252,138	$349,692	$449,933	$552,941	$658,800	$767,594	$879,412	$994,345	$1,112,485	$1,233,930	$1,358,778	$1,487,131	$1,619,095	$1,754,779	$1,894,292	$2,037,751	$2,185,274	$2,336,982

Notes:
[1] No capital or operating expenditures to install meters
[2] Total cost of upgrades NE Booster ($150,000 in 2015) funded through MFA over 20 years and 4% interest rate through sinking fund.
[3] Annual hydro cost to operate water system - annual inflation rate of 4.5% used in 2013 & 2014, and 3% after 2014 to project BC Hydro rate increases.
[4] Annual hydro cost to operate sewer system - annual inflation rate of 4.5% used in 2013 & 2014, and 3% after 2014 to project BC Hydro rate increases.

Option 2 - Water Metering Assessment Financial Cost: Benefit Analysis -With Meters

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 [5]	$17,050	$17,050	$17,050	$17,050	$17,050	$17,050	$17,050	$17,050	$17,050	$17,050	$17,050	$17,050	$17,050	$17,050	$17,050	$17,050	$17,050	$17,050	$17,050	$17,050
- Operating [6]	$20,000	$20,400	$20,808	$21,224	$21,649	$22,082	$22,523	$22,974	$23,433	$23,902	$24,380	$24,867	$25,365	$25,872	$26,390	$26,917	$27,456	$28,005	$28,565	$29,136
- Replacement Allowance [7]	$22,950	$23,409	$23,877	$24,355	$24,842	$25,339	$25,845	$26,362	$26,890	$27,427	$27,976	$28,535	$29,106	$29,688	$30,282	$30,888	$31,505	$32,136	$32,778	$33,434
- Total	$60,000	$60,859	$61,735	$62,629	$63,540	$64,470	$65,419	$66,386	$67,373	$68,379	$69,406	$70,453	$71,521	$72,610	$73,722	$74,855	$76,011	$77,190	$78,393	$79,620
Utility Operating Costs																				
- Capital Upgrades [8]	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100
- Hydro-Water [9]	$52,166	$54,514	$56,149	$57,834	$59,569	$61,356	$63,197	$65,092	$67,045	$69,057	$71,128	$73,262	$75,460	$77,724	$80,055	$82,457	$84,931	$87,479	$90,103	$92,806
- Hydro-Sewer [10]	$13,235	$13,830	$14,245	$14,673	$15,113	$15,566	$16,033	$16,514	$17,010	$17,520	$18,046	$18,587	$19,145	$19,719	$20,311	$20,920	$21,547	$22,194	$22,860	$23,545
- Total	$65,401	$68,344	$70,395	$72,507	$74,682	$76,922	$79,230	$81,607	$84,055	$95,677	$98,274	$100,949	$103,705	$106,543	$109,466	$112,477	$115,578	$118,773	$122,063	$125,452
Annual Utility Operating Costs (Option 2)	$125,401	$129,203	$132,130	$135,135	$138,222	$141,392	$144,649	$147,993	$151,428	$164,056	$167,680	$171,402	$175,226	$179,153	$183,188	$187,332	$191,589	$195,963	$200,456	$205,072
Cumulative Utility Operating Costs (Option 2)	$125,401	$254,605	$386,735	$521,870	$660,092	$801,485	$946,133	$1,094,126	$1,245,554	$1,409,610	$1,577,289	$1,748,691	$1,923,917	$2,103,070	$2,286,258	$2,473,590	$2,665,179	$2,861,142	$3,061,598	$3,266,670

Notes:
[5] Town of Golden share of capital cost of meters (@33% = $318,300) funded through MFA over 20 years and 4% interest rate through sinking fund.
[6] Additional staff required for meter program costs
[7] Replacement allowance to build up reserve to replace meter registers in 20 years (current value $300; interest rate 2%)
[8] Defer NE booster capital upgrade to 10 years - annual inflation rate of 2% consistent with Government of Canada projections.
Total cost in 10 years ($170,000) funded through MFA over 20 years and 5% interest rate through sinking fund.
[9] Annual hydro cost to operate water system with anticipated 20% saving due to reduced hydro consumption - annual inflation rate of 4.5% used in 2013 & 2014, and 3% after 2014 to project BC Hydro rate increases.
[10] Annual hydro cost to operate sewer system with anticipated 15% saving due to reduced hydro consumption - annual inflation rate of 4.5% used in 2013 & 2014, and 3% after 2014 to project BC Hydro rate increases.

Annual Net (Cost) Benefit Analysis

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Annual Benefit [11]	-$44,623	-$44,790	-$45,184	-$37,581	-$37,981	-$38,384	-$38,790	-$39,199	-$39,610	-$49,123	-$49,539	-$49,957	-$50,378	-$50,800	-$51,224	-$51,649	-$52,076	-$52,504	-$52,933	-$53,363
Cumulative Benefit [12]	-$44,623	-$89,413	-$134,597	-$172,178	-$210,159	-$248,543	-$287,333	-$326,532	-$366,142	-$415,265	-$464,804	-$514,762	-$565,139	-$615,939	-$667,162	-$718,811	-$770,887	-$823,391	-$876,325	-$929,688

Notes:
[11] Annual utility operating cost with no meters (option 1) minus annual utility operating cost with meters (option 2)
[12] Cumulative utility operating cost with no meters (option 1) minus cumulative net utility operating cost with meters (option 2)

Appendix D

20% of Meter Capital Cost Paid for by Town of Golden

Water Metering Assessment Financial Cost: Benefit – 20% Funding Option

Total Capital Cost of Installing Meters =	$964,480
Funding Scenario -20% Golden =	$192,896

Option 1 - Water Metering Assessment Financial Cost: Benefit Analysis - With No Meters

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	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
- Operating	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
- Total [1]	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Utility Operating Costs																				
- Capital Upgrades [2]	$0	$0	$0	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000
- Hydro-Water [3]	$65,208	$68,142	$70,187	$72,292	$74,461	$76,695	$78,996	$81,366	$83,807	$86,321	$88,910	$91,578	$94,325	$97,155	$100,069	$103,071	$106,164	$109,348	$112,629	$116,008
- Hydro-Sewer [4]	$15,571	$16,271	$16,759	$17,262	$17,780	$18,313	$18,863	$19,429	$20,011	$20,612	$21,230	$21,867	$22,523	$23,199	$23,895	$24,612	$25,350	$26,110	$26,894	$27,701
- Total	$80,779	$84,414	$86,946	$97,554	$100,241	$103,008	$105,858	$108,794	$111,818	$114,933	$118,141	$121,445	$124,848	$128,354	$131,964	$135,683	$139,514	$143,459	$147,523	$151,708
Annual Utility Operating Costs (Option 1)	$80,779	$84,414	$86,946	$97,554	$100,241	$103,008	$105,858	$108,794	$111,818	$114,933	$118,141	$121,445	$124,848	$128,354	$131,964	$135,683	$139,514	$143,459	$147,523	$151,708
Cumulative Utility Operating Costs (Option 1)	$80,779	$165,192	$252,138	$349,692	$449,933	$552,941	$658,800	$767,594	$879,412	$994,345	$1,112,485	$1,233,930	$1,358,778	$1,487,131	$1,619,095	$1,754,779	$1,894,292	$2,037,751	$2,185,274	$2,336,982

Notes:
[1] No capital or operating expenditures to install meters
[2] Total cost of upgrades NE Booster ($150,000 in 2015) funded through MFA over 20 years and 4% interest rate through sinking fund.
[3] Annual hydro cost to operate water system - annual inflation rate of 4.5% used in 2013 & 2014, and 3% after 2014 to project BC Hydro rate increases.
[4] Annual hydro cost to operate sewer system - annual inflation rate of 4.5% used in 2013 & 2014, and 3% after 2014 to project BC Hydro rate increases.

Option 2 - Water Metering Assessment Financial Cost: Benefit Analysis -With Meters

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 [5]	$10,330	$10,330	$10,330	$10,330	$10,330	$10,330	$10,330	$10,330	$10,330	$10,330	$10,330	$10,330	$10,330	$10,330	$10,330	$10,330	$10,330	$10,330	$10,330	$10,330
- Operating [6]	$20,000	$20,400	$20,808	$21,224	$21,649	$22,082	$22,523	$22,974	$23,433	$23,902	$24,380	$24,867	$25,365	$25,872	$26,390	$26,917	$27,456	$28,005	$28,565	$29,136
- Replacement Allowance [7]	$22,950	$23,409	$23,877	$24,355	$24,842	$25,339	$25,845	$26,362	$26,890	$27,427	$27,976	$28,535	$29,106	$29,688	$30,282	$30,888	$31,505	$32,136	$32,778	$33,434
- Total	$53,280	$54,139	$55,015	$55,909	$56,820	$57,750	$58,699	$59,666	$60,653	$61,659	$62,686	$63,733	$64,801	$65,890	$67,002	$68,135	$69,291	$70,470	$71,673	$72,900
Utility Operating Costs																				
- Capital Upgrades [8]	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100
- Hydro-Water [9]	$52,166	$54,514	$56,149	$57,834	$59,569	$61,356	$63,197	$65,092	$67,045	$69,057	$71,128	$73,262	$75,460	$77,724	$80,055	$82,457	$84,931	$87,479	$90,103	$92,806
- Hydro-Sewer [10]	$13,235	$13,830	$14,245	$14,673	$15,113	$15,566	$16,033	$16,514	$17,010	$17,520	$18,046	$18,587	$19,145	$19,719	$20,311	$20,920	$21,547	$22,194	$22,860	$23,545
- Total	$65,401	$68,344	$70,395	$72,507	$74,682	$76,922	$79,230	$81,607	$84,055	$95,677	$98,274	$100,949	$103,705	$106,543	$109,466	$112,477	$115,578	$118,773	$122,063	$125,452
Annual Utility Operating Costs (Option 2)	$118,681	$122,483	$125,410	$128,415	$131,502	$134,672	$137,929	$141,273	$144,708	$157,336	$160,960	$164,682	$168,506	$172,433	$176,468	$180,612	$184,869	$189,243	$193,736	$198,352
Cumulative Utility Operating Costs (Option 2)	$118,681	$241,165	$366,575	$494,990	$626,492	$761,165	$899,093	$1,040,366	$1,185,074	$1,342,410	$1,503,369	$1,668,051	$1,836,557	$2,008,990	$2,185,458	$2,366,070	$2,550,939	$2,740,182	$2,933,918	$3,132,270

Notes:
[5] Town of Golden share of capital cost of meters (@20% = $192,900) funded through MFA over 20 years and 4% interest rate through sinking fund.
[6] Additional staff required for meter program costs
[7] Replacement allowance to build up reserve to replace meter registers in 20 years (current value $300; interest rate 2%)
[8] Defer NE booster capital upgrade to 10 years - annual inflation rate of 2% consistent with Government of Canada projections.
Total cost in 10 years ($170,000) funded through MFA over 20 years and 5% interest rate through sinking fund.
[9] Annual hydro cost to operate water system with anticipated 20% saving due to reduced hydro consumption - annual inflation rate of 4.5% used in 2013 & 2014, and 3% after 2014 to project BC Hydro rate increases.
[10] Annual hydro cost to operate sewer system with anticipated 15% saving due to reduced hydro consumption - annual inflation rate of 4.5% used in 2013 & 2014, and 3% after 2014 to project BC Hydro rate increases.

Annual Net (Cost) Benefit Analysis

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Annual Benefit [11]	-$37,903	-$38,070	-$38,464	-$30,861	-$31,261	-$31,664	-$32,070	-$32,479	-$32,890	-$42,403	-$42,819	-$43,237	-$43,658	-$44,080	-$44,504	-$44,929	-$45,356	-$45,784	-$46,213	-$46,643
Cumulative Benefit [12]	-$37,903	-$75,973	-$114,437	-$145,298	-$176,559	-$208,223	-$240,293	-$272,772	-$305,662	-$348,065	-$390,884	-$434,122	-$477,779	-$521,859	-$566,362	-$611,291	-$656,647	-$702,431	-$748,645	-$795,288

Notes:
[11] Annual utility operating cost with no meters (option 1) minus annual utility operating cost with meters (option 2)
[12] Cumulative utility operating cost with no meters (option 1) minus cumulative net utility operating cost with meters (option 2)

Appendix E

0% of Meter Capital Cost Paid for by Town of Golden

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

Total Capital Cost of Installing Meters =	$964,480
Funding Scenario -0% Golden =	$0

Option 1 - Water Metering Assessment Financial Cost: Benefit Analysis - With No Meters

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	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
- Operating	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
- Total [1]	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Utility Operating Costs																				
- Capital Upgrades [2]	$0	$0	$0	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000
- Hydro-Water [3]	$65,208	$68,142	$70,187	$72,292	$74,461	$76,695	$78,996	$81,366	$83,807	$86,321	$88,910	$91,578	$94,325	$97,155	$100,069	$103,071	$106,164	$109,348	$112,629	$116,008
- Hydro-Sewer [4]	$15,571	$16,271	$16,759	$17,262	$17,780	$18,313	$18,863	$19,429	$20,011	$20,612	$21,230	$21,867	$22,523	$23,199	$23,895	$24,612	$25,350	$26,110	$26,894	$27,701
- Total	$80,779	$84,414	$86,946	$97,554	$100,241	$103,008	$105,858	$108,794	$111,818	$114,933	$118,141	$121,445	$124,848	$128,354	$131,964	$135,683	$139,514	$143,459	$147,523	$151,708
Annual Utility Operating Costs (Option 1)	$80,779	$84,414	$86,946	$97,554	$100,241	$103,008	$105,858	$108,794	$111,818	$114,933	$118,141	$121,445	$124,848	$128,354	$131,964	$135,683	$139,514	$143,459	$147,523	$151,708
Cumulative Utility Operating Costs (Option 1)	$80,779	$165,192	$252,138	$349,692	$449,933	$552,941	$658,800	$767,594	$879,412	$994,345	$1,112,485	$1,233,930	$1,358,778	$1,487,131	$1,619,095	$1,754,779	$1,894,292	$2,037,751	$2,185,274	$2,336,982

Notes:
[1] No capital or operating expenditures to install meters
[2] Total cost of upgrades NE Booster ($150,000 in 2015) funded through MFA over 20 years and 4% interest rate through sinking fund.
[3] Annual hydro cost to operate water system - annual inflation rate of 4.5% used in 2013 & 2014, and 3% after 2014 to project BC Hydro rate increases.
[4] Annual hydro cost to operate sewer system - annual inflation rate of 4.5% used in 2013 & 2014, and 3% after 2014 to project BC Hydro rate increases.

Option 2 - Water Metering Assessment Financial Cost: Benefit Analysis -With Meters

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 [5]	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
- Operating [6]	$20,000	$20,400	$20,808	$21,224	$21,649	$22,082	$22,523	$22,974	$23,433	$23,902	$24,380	$24,867	$25,365	$25,872	$26,390	$26,917	$27,456	$28,005	$28,565	$29,136
- Replacement Allowance [7]	$22,950	$23,409	$23,877	$24,355	$24,842	$25,339	$25,845	$26,362	$26,890	$27,427	$27,976	$28,535	$29,106	$29,688	$30,282	$30,888	$31,505	$32,136	$32,778	$33,434
- Total	$42,950	$43,809	$44,685	$45,579	$46,490	$47,420	$48,369	$49,336	$50,323	$51,329	$52,356	$53,403	$54,471	$55,560	$56,672	$57,805	$58,961	$60,140	$61,343	$62,570
Utility Operating Costs																				
- Capital Upgrades [8]	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100	$9,100
- Hydro-Water [9]	$52,166	$54,514	$56,149	$57,834	$59,569	$61,356	$63,197	$65,092	$67,045	$69,057	$71,128	$73,262	$75,460	$77,724	$80,055	$82,457	$84,931	$87,479	$90,103	$92,806
- Hydro-Sewer [10]	$13,235	$13,830	$14,245	$14,673	$15,113	$15,566	$16,033	$16,514	$17,010	$17,520	$18,046	$18,587	$19,145	$19,719	$20,311	$20,920	$21,547	$22,194	$22,860	$23,545
- Total	$65,401	$68,344	$70,395	$72,507	$74,682	$76,922	$79,230	$81,607	$84,055	$95,677	$98,274	$100,949	$103,705	$106,543	$109,466	$112,477	$115,578	$118,773	$122,063	$125,452
Annual Utility Operating Costs (Option 2)	$108,351	$112,153	$115,080	$118,085	$121,172	$124,342	$127,599	$130,943	$134,378	$147,006	$150,630	$154,352	$158,176	$162,103	$166,138	$170,282	$174,539	$178,913	$183,406	$188,022
Cumulative Utility Operating Costs (Option 2)	$108,351	$220,505	$335,585	$453,670	$574,842	$699,185	$826,783	$957,726	$1,092,104	$1,239,110	$1,389,739	$1,544,091	$1,702,267	$1,864,370	$2,030,508	$2,200,790	$2,375,329	$2,554,242	$2,737,648	$2,925,670

Notes:
[5] Town of Golden share of capital cost of meters (@0% = $0) funded through MFA over 20 years and 4% interest rate through sinking fund.
[6] Additional staff required for meter program costs
[7] Replacement allowance to build up reserve to replace meter registers in 20 years (current value $300; interest rate 2%)
[8] Defer NE booster capital upgrade to 10 years - annual inflation rate of 2% consistent with Government of Canada projections.
Total cost in 10 years ($170,000) funded through MFA over 20 years and 5% interest rate through sinking fund.
[9] Annual hydro cost to operate water system with anticipated 20% saving due to reduced hydro consumption - annual inflation rate of 4.5% used in 2013 & 2014, and 3% after 2014 to project BC Hydro rate increases.
[10] Annual hydro cost to operate sewer system with anticipated 15% saving due to reduced hydro consumption - annual inflation rate of 4.5% used in 2013 & 2014, and 3% after 2014 to project BC Hydro rate increases.

Annual Net (Cost) Benefit Analysis

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Annual Benefit [11]	-$27,573	-$27,740	-$28,134	-$20,531	-$20,931	-$21,334	-$21,740	-$22,149	-$22,560	-$32,073	-$32,489	-$32,907	-$33,328	-$33,750	-$34,174	-$34,599	-$35,026	-$35,454	-$35,883	-$36,313
Cumulative Benefit [12]	-$27,573	-$55,313	-$83,447	-$103,978	-$124,909	-$146,243	-$167,983	-$190,132	-$212,692	-$244,765	-$277,254	-$310,162	-$343,489	-$377,239	-$411,412	-$446,011	-$481,037	-$516,491	-$552,375	-$588,688

Notes:
[11] Annual utility operating cost with no meters (option 1) minus annual utility operating cost with meters (option 2)
[12] Cumulative utility operating cost with no meters (option 1) minus cumulative net utility operating cost with meters (option 2)