

## Technical Memorandum

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**DATE:** February 3, 2014  
**TO:** Lonny Miller  
A/ Manager of Public Works and Capital Projects  
Village of Pemberton  
**FROM:** Colwyn Sunderland, ASCT  
**RE: VILLAGE OF PEMBERTON**  
**Implementation of Water Rates 2014-2019**  
**Our File 0743.009**

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The Village of Pemberton (VoP) retained Kerr Wood Leidal Associates (KWL) in January 2013 to conduct a review of its water rate structure, with particular focus on the allocation of costs of service to the Pemberton North Water Service area (PNWS) and other customers outside the municipal boundary. Our April 2013 *Water Rate Review - Final Report* included recommendations to:

- Adjust the distribution of rate revenue among customer classes based on our cost of service review;
- Establish a budget for asset renewal;
- Engage SLRD to negotiate terms of service for customers located outside the municipal boundary, including PNWS; and
- Prepare an implementation plan for water rate changes, including analysis of customer impacts.

VoP has retained KWL to develop an implementation plan for water rate changes, including recommended amendments to Water Regulations and Rates Bylaw No. 232, 1989. For metered customers, KWL was asked to develop a conservation-oriented rate structure option. This technical memorandum presents our methodology and recommendations for implementing changes to water rates. The principles, terminology and cost of service allocation methodology used in this memorandum are described in the April 2013 *Water Rate Review* report.

### 1. Assumptions for Rate Design

The cost of service analysis and rate design presented in this memorandum are based on limited available water usage and financial information. Several assumptions and estimates are made throughout the process, and are identified in the following sections. In general, it is assumed that:

- The required annual budget for sustainable asset renewal is \$324,000<sup>1</sup>;
- All costs associated with growth and development will be recovered through other means;
- Operating and administration costs will remain constant; and
- Inflation will not significantly change the revenue requirement over the implementation period (2014-2019).

These assumptions are unlikely to be entirely accurate, and rate adjustments may be required within the implementation period to address variances from the assumed parameters. A discussion of financial and user-pay equity risks is provided in Section 5.

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<sup>1</sup> *Village of Pemberton Water Rate Review – Final Report*, Kerr Wood Leidal Associates Ltd., April 2013. The estimated asset replacement value is based on Earth Tech (2008), adjusted for additions since 2008 and for inflation. The replacement value is annualized using life expectancies provided by the BC Ministry of Community Services (2008).



## 2. Revenue Requirement

### 2.1 Debt Servicing (Frontage Tax)

VoP currently recovers all debt costs from its ratepayers using frontage taxes; therefore no costs of acquiring assets are assigned to customers outside the boundary where debt financing is used. Applying the cost allocation methodology described in the Water Rate Review, the revenue requirements for debt servicing are distributed to each customer class as shown in Table 1. Debt costs and associated revenue requirements will be constant through 2019, assuming no current debts are retired and no new debts will be incurred after 2014.

VoP proposes to borrow \$1.088 million in 2014 for a new reservoir, and to recover the full cost of the new debt and existing debt using frontage taxes and equivalent fixed charges for customers outside the municipal boundary. The annual costs of the new debt were estimated using the Municipal Finance Authority amortization schedule tool based on the indicative market rate of 4.15% for a 25-year term.<sup>2</sup>

**Table 1: Debt Servicing Revenue Requirements**

<b>Annual Debt Cost<sup>a</sup></b>	<b>Commodity</b>	<b>Demand</b>	<b>Total</b>
2002/09 Debt	\$13,109	\$39,326	\$52,435
2014 Debt		\$78,614	\$78,614
Total Annual Debt Cost	\$13,109	\$117,941	\$131,049
<b>Units of Service</b>	<b>Commodity</b>	<b>Demand</b>	
Inside Boundary (Frontage Tax)	532,400	2,792	
OB (Debt Cost Charge)	14,000	220	
PNWS (Debt Cost Charge)	133,000	660	
Total Units of Service	679,400	3,672	
<b>Annual Debt Cost Distribution</b>	<b>Commodity</b>	<b>Demand</b>	<b>Total</b>
Inside Boundary (Frontage Tax)	\$10,272	\$89,676	\$99,948
OB Share (recovered through utility rate) <sup>b</sup>	\$270	\$7,066	\$7,336
PNWS Share (recovered through utility rate) <sup>b</sup>	\$2,566	\$21,198	\$23,765
Total Annual Debt Cost	\$13,109	\$117,941	\$131,049

<sup>a</sup> Assume 2002/09 debt expense is 50% groundwater well, 50% reservoir. New (2014) debt is 100% reservoir. Distribution reservoirs are treated entirely as demand; wells are treated as 1/2 commodity, 1/2 demand.

<sup>b</sup> Funding for capital expenses for customers outside the municipal boundary is calculated based on fair share of depreciation, interest on capital debt and a return on capital equity.

For all customer classes located inside the municipal boundary, the \$99,948 share of debt servicing costs will be recovered through frontage taxes (consistent with current practice). For customers outside the boundary, debt servicing costs are recovered through utility rates that include amounts for depreciation and returns on capital debt and equity.

<sup>2</sup> <http://mfa.bc.ca/resources/tools> and <http://mfa.bc.ca/long-term-lending-rates> (accessed February 3, 2014)



## 2.2 Rate Revenue Requirement

Excluding debt-related costs, the revenue requirements per customer class were calculated for each year between 2014 and 2019 to implement a \$324,000 asset renewal budget over a six-year period in annual increments of \$54,000. Two alternatives are considered for implementing changes the cost distribution among customer classes:

- Under **Alternative 1** (Table 2), changes to the cost distribution among customer classes are fully implemented in 2014; and
- Under **Alternative 2** (Table 3), all changes are phased in incrementally between 2014 and 2019.

**Table 2: Non-Debt Revenue Requirements by Customer Class and Year – Alternative 1**

Year	Unmetered Residential	Unmetered ICI	Metered Residential	Metered ICI	Outside Boundary	PNWS	TOTAL
2013	\$294,628	\$164,793	\$456	\$26,263	\$19,995	\$138,373	\$644,508
2014	\$363,981	\$172,191	\$600	\$28,018	\$27,909	\$107,983	\$700,682
2015	\$388,901	\$187,082	\$640	\$30,497	\$30,575	\$116,989	\$754,682
2016	\$413,820	\$201,973	\$679	\$32,975	\$33,240	\$125,995	\$808,682
2017	\$438,740	\$216,863	\$718	\$35,454	\$35,906	\$135,001	\$862,682
2018	\$463,660	\$231,754	\$757	\$37,932	\$38,572	\$144,007	\$916,682
2019	\$488,579	\$246,645	\$797	\$40,411	\$41,237	\$153,013	\$970,682

**Table 3: Non-Debt Revenue Requirements by Customer Class and Year – Alternative 2**

Year	Unmetered Residential	Unmetered ICI	Metered Residential	Metered ICI	Outside Boundary	PNWS	TOTAL
2013	\$294,628	\$164,793	\$456	\$26,263	\$19,995	\$138,373	\$644,508
2014	\$326,954	\$178,435	\$513	\$28,621	\$23,535	\$140,813	\$698,871
2015	\$359,279	\$192,077	\$570	\$30,979	\$27,076	\$143,253	\$753,233
2016	\$391,604	\$205,719	\$626	\$33,337	\$30,616	\$145,693	\$807,595
2017	\$423,929	\$219,361	\$683	\$35,695	\$34,156	\$148,133	\$861,957
2018	\$456,254	\$233,003	\$740	\$38,053	\$37,697	\$150,573	\$916,320
2019	\$488,579	\$246,645	\$797	\$40,411	\$41,237	\$153,013	\$970,682

## 2.3 Total Cost of Service Per Retail Customer

The forecast average annual revenue per customer in each class, including both taxation and rate revenue components, is shown in Figure 1 (Alternative 1) and Figure 2 (Alternative 2). For PNWS, the cost shown is for bulk water supply, which is included as a component of the cost SLRD charges its retail customers. The large 2014 adjustment is primarily the new debt cost for reservoir construction. For PNWS, the new debt cost is offset by a downward adjustment in operating cost allocation.

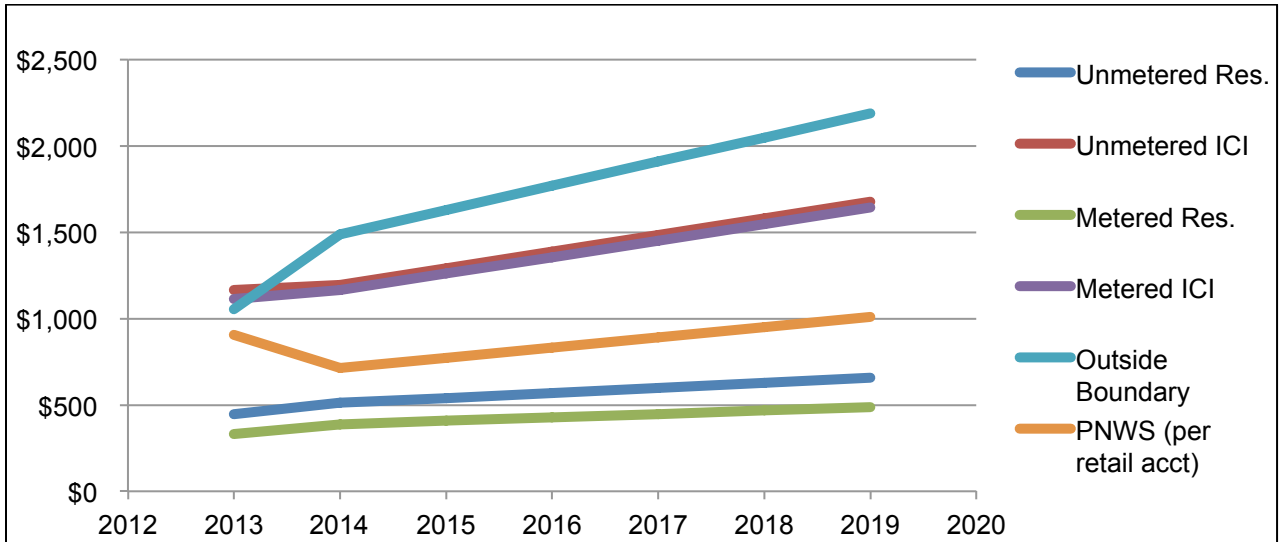


Figure 1: Forecast Average Annual Water Service Cost per Retail Account – Alternative 1

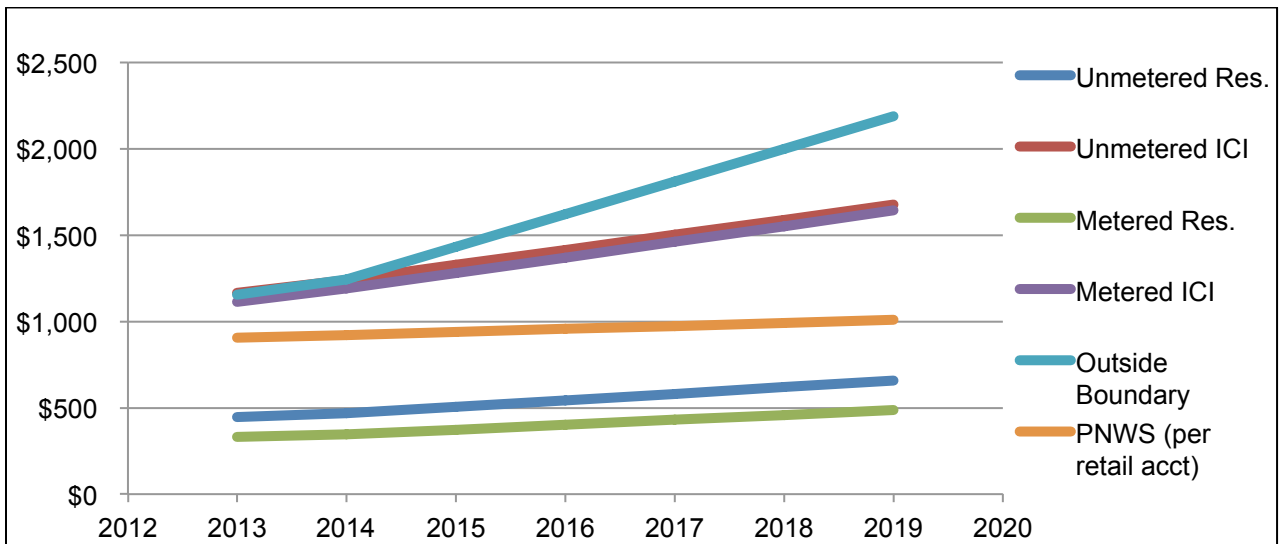


Figure 2: Forecast Average Annual Water Service Cost per Retail Account – Alternative 2

Alternative 1 has the advantages of achieving equitable cost distribution among customer classes in the first year of implementation, and providing a smooth transition in the total annual cost to PNWS. However, the unmetered residential and outside boundary retail classes each experience a single-year rate increase of more than 30% in 2014.

Alternative 2 reduces the maximum single-year rate increases in all classes below 20%. However, this approach sustains significant inequities between customer classes over several years. In particular, the addition of new debt cost causes a sharp, short-term peak in the cost of water service to PNWS until the cost distribution adjustment gradually reduces the cost over the next five years.



### 3. Rate Adjustments for Unmetered Customer Classes

For unmetered classes, the rate adjustments required to meet the non-debt revenue targets were calculated based on the percentage change in total revenue requirement in each year. The annual adjustments to unmetered rates are shown in Table 4. Rates are calculated for each year by multiplying the prior year's rates by these factors.

**Table 4: Annual Rate Adjustments for Unmetered Classes**

Year	2013	2014	2015	2016	2017	2018	2019
<b>Alternative 1 - Cost of Service Reallocation Implemented in 2014</b>							
Unmetered Residential	0.00%	23.54%	6.85%	6.41%	6.02%	5.68%	5.37%
Unmetered ICI	0.00%	4.49%	8.65%	7.96%	7.37%	6.87%	6.43%
<b>Alternative 2 - Cost of Service Reallocation Phased over Six Years</b>							
Unmetered Residential	0.00%	10.97%	9.89%	9.00%	8.25%	7.63%	7.08%
Unmetered ICI	0.00%	8.28%	7.65%	7.10%	6.63%	6.22%	5.85%

### 4. Rate Alternatives for Metered Classes

For metered connections, 2012 actual water demands and revenues were used as a basis for calculating the rates required to achieve the target revenue requirements.

#### 4.1 Adjustments to Cost Allocations

The 2012 actual billing data revealed two significant anomalies that had not been taken into account in the *Water Rate Review*:

1. Of the six accounts identified as Metered Residential in the *Water Rate Review*, only two were active and billed in 2012, resulting in over-allocation of costs to this class; and
2. Adjustments to billing for very high usage (leak adjustments) accounted for a significant proportion of total usage revenue in the Outside Boundary class, resulting in over-allocation of costs to this class.

It was necessary to recalculate the cost allocations from those in the *Water Rate Review* to account for these changes. The resulting allocations of total revenue requirement are significantly different for the Metered Residential and Outside Boundary classes, but are unchanged for the unmetered classes (Table 5). These changes are reflected in the total revenues shown in Tables 2 and 3.

**Table 5: Percentage of Rate Revenue Requirement by Customer Class and Year – Alternative 1**

Year	Unmetered Residential	Unmetered ICI	Metered Residential	Metered ICI	Outside Boundary	PNWS	TOTAL
2013	45.7%	25.6%	0.1%	4.1%	3.1%	21.5%	100.0%
2014	51.9%	24.6%	0.1%	4.0%	4.0%	15.4%	100.0%
2015	51.5%	24.8%	0.1%	4.0%	4.1%	15.5%	100.0%
2016	51.2%	25.0%	0.1%	4.1%	4.1%	15.6%	100.0%
2017	50.9%	25.1%	0.1%	4.1%	4.2%	15.6%	100.0%
2018	50.6%	25.3%	0.1%	4.1%	4.2%	15.7%	100.0%
2019	50.3%	25.4%	0.1%	4.2%	4.2%	15.8%	100.0%

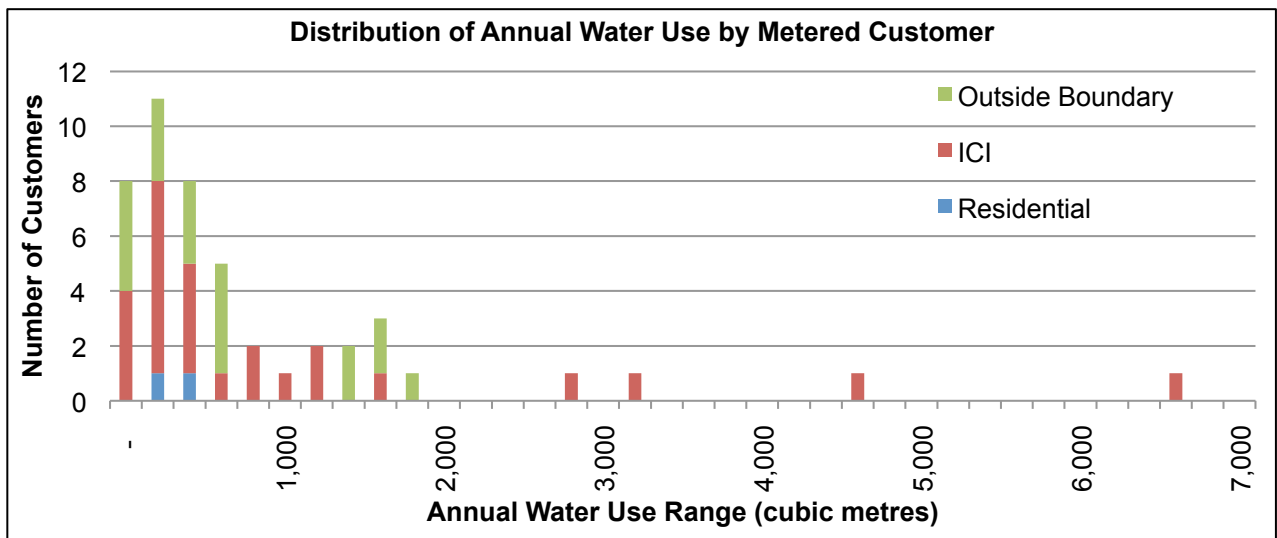


**Table 6: Percentage of Non-Debt Revenue Requirement by Customer Class and Year – Alternative 2**

Year	Unmetered Residential	Unmetered ICI	Metered Residential	Metered ICI	Outside Boundary	PNWS	TOTAL
2013	45.7%	25.6%	0.1%	4.1%	3.1%	21.5%	100.0%
2014	46.8%	25.5%	0.1%	4.1%	3.4%	20.1%	100.0%
2015	47.7%	25.5%	0.1%	4.1%	3.6%	19.0%	100.0%
2016	48.5%	25.5%	0.1%	4.1%	3.8%	18.0%	100.0%
2017	49.2%	25.4%	0.1%	4.1%	4.0%	17.2%	100.0%
2018	49.8%	25.4%	0.1%	4.2%	4.1%	16.4%	100.0%
2019	50.3%	25.4%	0.1%	4.2%	4.2%	15.8%	100.0%

## 4.2 Water Usage Characteristics

Water demands were analyzed to determine the impacts that water rate changes would have on water bills for a range of customers in each class. A distribution of annual water use per customer for metered retail accounts is shown in Figure 3.



**Figure 3. 2012 Retail Water Use Distribution**

Seasonal water use profiles for each customer class are shown in Figure 4.

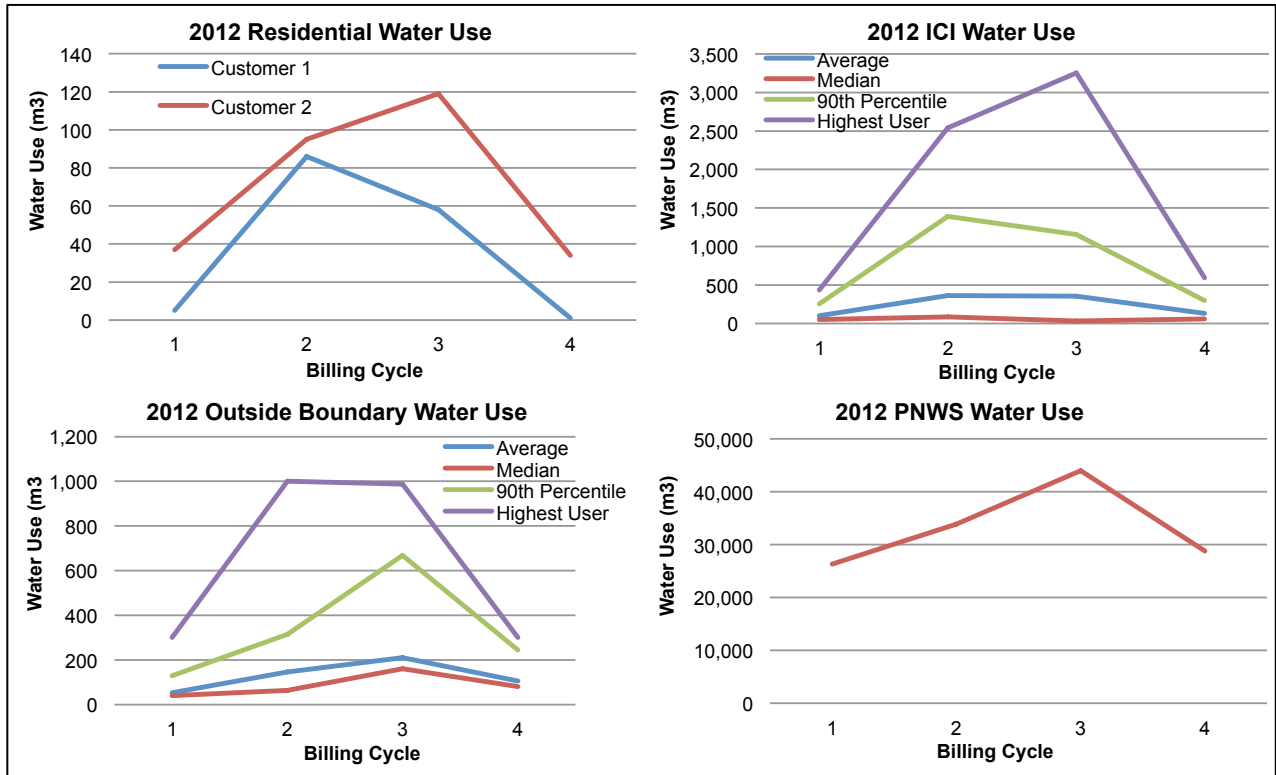


Figure 4: Seasonal Water Use per Customer Statistics

### 4.3 Revenue Adjustment for Water Demand Changes

Water demands per capita are generally declining in North America, driven by increasing awareness of water efficient practices, rising unit costs of water and sewer services, and the gradual replacement of inefficient fixtures such as toilets and washing machines with new, much more efficient units. Changes in VoP water rates are likely to result in substantial decreases in usage, particularly by high users facing increased costs. The risks of a revenue shortfall are discussed in detail in Section 4. To mitigate these risks and adjust for the expected decrease in water demands, a 10-12% adjustment is added to the revenue target in each of the following rate design scenarios.

### 4.4 Metered Residential Rates

Only two residential customers within the VoP boundary were billed based on water usage in 2012, providing an inadequate sample for reliably estimating future revenues. Both are relatively low water users (150 and 285 m<sup>3</sup>/year), with a high ratio of seasonal to annual average water use (one customer appears to be a part-time occupant, having essentially no winter water use).

In order to establish rates for a broader range of demand patterns, two hypothetical customer profiles were created. The water use profiles used in the rate calculations are shown in Table 7.



**Table 7: Modeled Residential Water Demands**

Customer Description	Q1 (m <sup>3</sup> )	Q2 (m <sup>3</sup> )	Q3 (m <sup>3</sup> )	Q4 (m <sup>3</sup> )	TOTAL (m <sup>3</sup> )
Customer 1	37	95	119	34	285
Customer 2	5	86	58	1	150
Hypothetical average user	64	134	94	64	356
Hypothetical high seasonal user	50	200	200	50	500

A status quo rate scenario and a tiered (inclining block) rate scenario were developed to calculate the revenues based on the two existing customers, and the annual costs per user for the actual and hypothetical customers. The scenario inputs are shown in Tables 8 and 9, and the Alternative 1 results are shown in Figure 5 with the flat (unmetered) residential rate for comparison.

**Table 8: Metered Residential Rate Scenarios – Alternative 1**

Scenario:	Status Quo Structure		Scenario:	2-Tier Inclining Block	
	2014	2019		2014	2019
Frontage tax (average)	\$95.92	\$95.92	Frontage tax (average)	\$95.92	\$95.92
Quarterly meter charge	\$20.32	\$26.97	Quarterly meter charge	\$20.00	\$26.54
Tier 1 rate	\$1.15	\$1.53	Tier 1 rate	\$1.00	\$1.33
threshold m <sup>3</sup>	-	-	threshold m <sup>3</sup>	65	65
Tier 2 rate	-	-	Tier 2 rate	\$2.25	\$2.99
Calculated rate revenue	\$663	\$880	Calculated total revenue	\$666	\$884
Target rate revenue	\$600	\$797	Target revenue	\$600	\$797
Calculated / target	110%	110%	Calculated / target	111%	111%

**Table 9: Metered Residential Rate Scenarios – Alternative 2**

Scenario:	Status Quo Structure		Scenario:	2-Tier Inclining Block	
	2014	2019		2014	2019
Frontage tax (average)	\$95.92	\$95.92	Frontage tax (average)	\$95.92	\$95.92
Quarterly meter charge	\$20.32	\$31.57	Quarterly meter charge	\$20.00	\$31.08
Tier 1 rate	\$0.93	\$1.45	Tier 1 rate	\$0.93	\$1.45
threshold m <sup>3</sup>	-	-	threshold m <sup>3</sup>	65	65
Tier 2 rate	-	-	Tier 2 rate	\$1.55	\$2.41
Calculated rate revenue	\$567	\$881	Calculated total revenue	\$570	\$885
Target rate revenue	\$513	\$797	Target revenue	\$513	\$797
Calculated / target	111%	111%	Calculated / target	111%	111%

As illustrated in Figure 5, under Alternative 1 a metered customer using less than 270 m<sup>3</sup> of water in 2014 will pay less than an unmetered customer. Under Alternative 2 (not shown), the threshold is 350 m<sup>3</sup>/year.

The impact of the inclining block rate structure (where the threshold for the Tier 2 rate is equal to the estimated average base water demand) is evident in the hypothetical 'high seasonal user' case, where the top tier rate results in a \$200 annual premium over the status quo (uniform) rate.



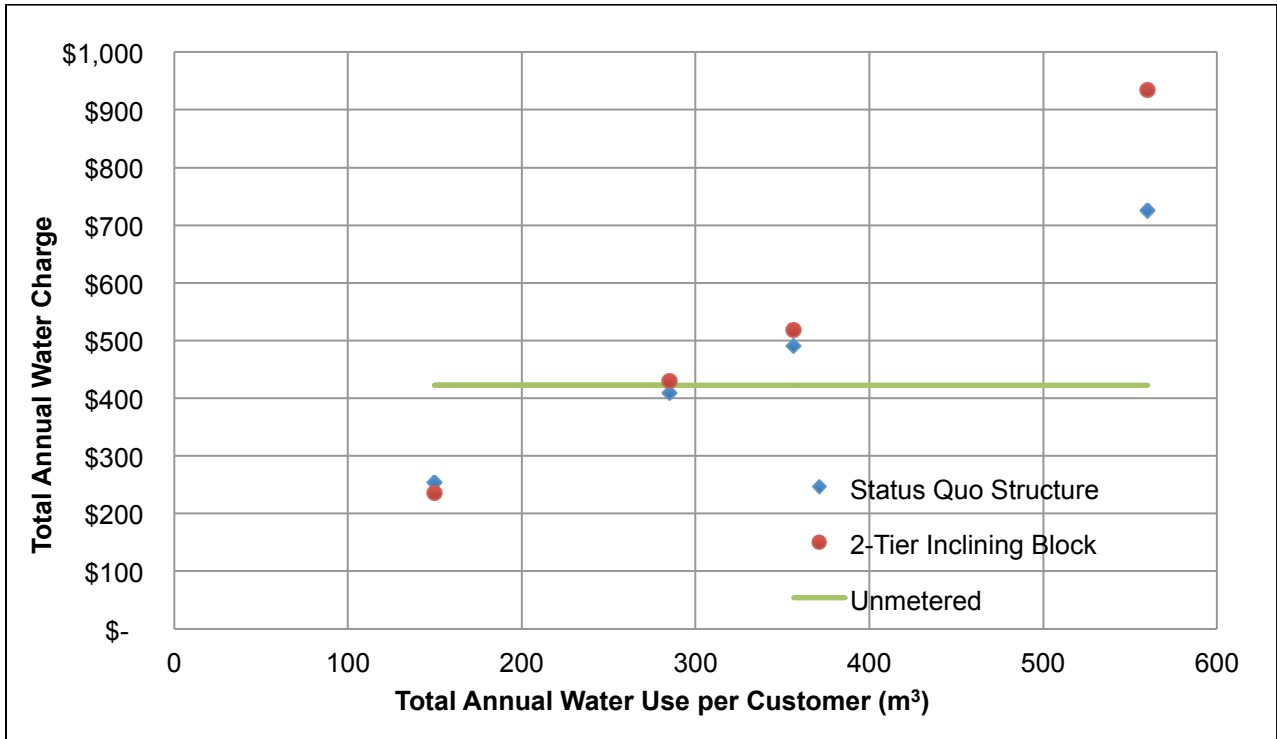


Figure 5: Residential Water Usage vs. Charges, 2014 – Alternative 1

## 4.5 Metered Industrial, Commercial, Institutional (ICI) Rates

Rate calculations for metered ICI accounts are based on 2012 water use by 26 customers with annual use ranging from zero to 6,600 m<sup>3</sup>.

The status quo ICI rate scenario includes a flat quarterly charge that includes up to 300 m<sup>3</sup> of consumption. Only consumption above 300 m<sup>3</sup> per quarter is billed at a variable consumption charge. Only 8 of the 26 customers paid more than the minimum charge in 2012; these customers have no economic incentive to reduce water demands below the quarterly threshold.

The status quo structure and a flat meter charge plus uniform rate scenario with no lower threshold were developed to calculate total revenue and annual costs per user based on the 26 existing customers' 2012 demands. The scenario inputs are shown in Tables 10 and 11, and the Alternative 1 results are shown in Figure 6 with flat (unmetered) 'Retail < 1,000 sq.ft.' and 'Industrial/Commercial' rates for comparison. The Alternative 2 results (not shown) are essentially identical.



**Table 10: Metered ICI Rate Scenarios – Alternative 1**

Scenario:	Status Quo Structure		Scenario:	Meter Charge and Uniform Rate	
	2014	2019		2014	2019
Frontage tax (average)	\$95.92	\$95.92	Frontage tax (average)	\$95.92	\$95.92
Quarterly meter charge	\$169.65	\$244.69	Quarterly meter charge	\$100.00	\$144.23
Tier 1 rate	-	-	Tier 1 rate	\$0.82	\$1.18
threshold m <sup>3</sup>	300	300	threshold m <sup>3</sup>	-	-
Tier 2 rate	\$0.98	\$1.41	Tier 2 rate	-	-
Calculated total revenue	\$31,082	\$44,831	Calculated total revenue	\$30,925	\$44,604
Target revenue	\$28,018	\$40,411	Target revenue	\$28,018	\$40,411
Calculated / target	111%	111%	Calculated / target	110%	110%

**Table 11: Metered ICI Rate Scenarios – Alternative 2**

Scenario:	Status Quo Structure		Scenario:	Meter Charge and Uniform Rate	
	2014	2019		2014	2019
Frontage tax (average)	\$95.92	\$95.92	Frontage tax (average)	\$95.92	\$95.92
Quarterly meter charge	\$169.65	\$239.53	Quarterly meter charge	\$115.00	\$162.37
Tier 1 rate	-	-	Tier 1 rate	\$0.79	\$1.12
threshold m <sup>3</sup>	300	300	threshold m <sup>3</sup>	-	-
Tier 2 rate	\$1.03	\$1.45	Tier 2 rate	-	-
Calculated total revenue	\$31,768	\$44,854	Calculated total revenue	\$31,734	\$44,807
Target revenue	\$28,614	\$40,411	Target revenue	\$28,621	\$40,411
Calculated / target	111%	111%	Calculated / target	111%	111%

The 'meter charge and uniform rate' scenario is more equitable than the 'status quo' scenario, ensuring that basic customer and direct fire protection costs are recovered through frontage tax and meter charges, while commodity and demand costs are recovered through the uniform consumption charge. Under this scenario, 16 of the 26 customers would enjoy cost savings compared to the status quo, which tends to overcharge customers with usage less than 300 m<sup>3</sup>/year while undercharging customers with usage close between 400 and 1,200 m<sup>3</sup>/year.

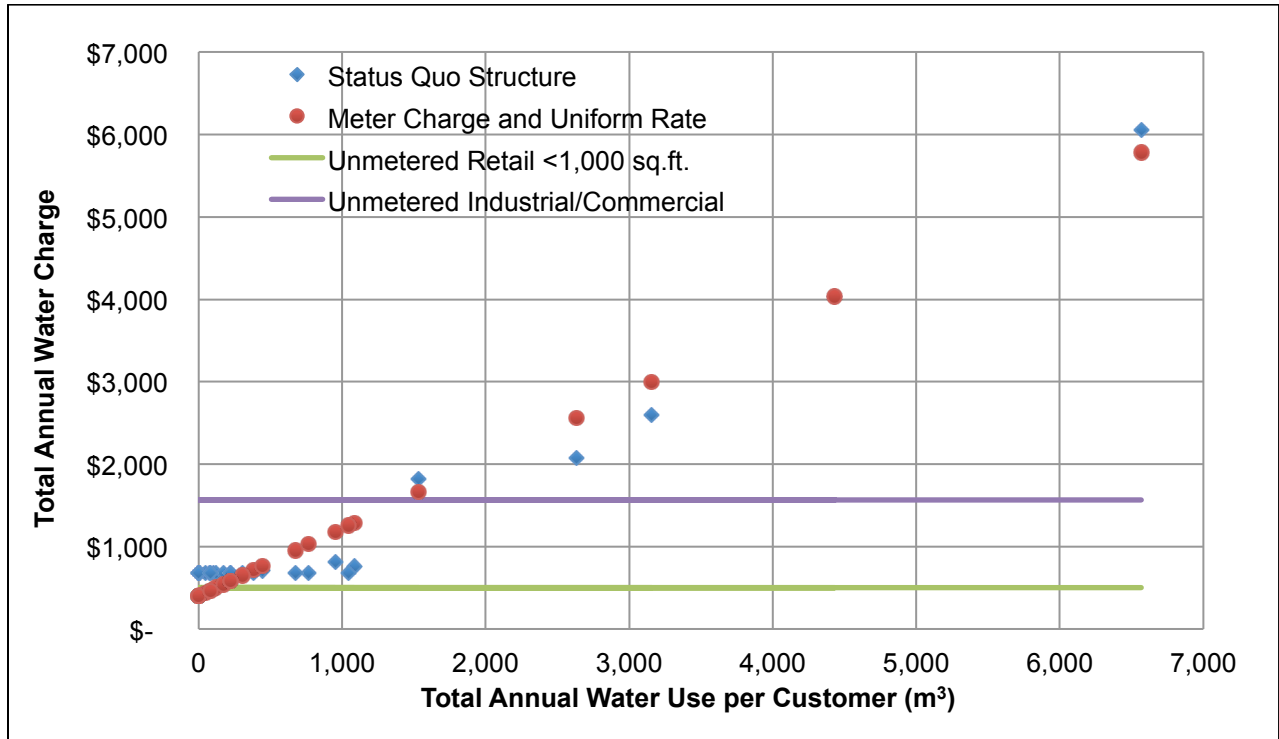


Figure 6: ICI Water Usage vs. Charges, 2014 – Alternative 1

## 4.6 Outside Boundary Retail (OB) Rates

Rate calculations for OB accounts are based on 2012 water use by 19 customers with annual use ranging from zero to more than 1,600 m<sup>3</sup>. The upper limit of billable consumption per customer in the OB class is unclear, as usage has varied widely from year to year, and leak adjustments appear have been applied in several cases where meter records indicate consumption well in excess of 2,000 m<sup>3</sup>.

As with the metered ICI class, the status quo OB rate scenario includes a flat quarterly charge that includes up to 300 m<sup>3</sup> of consumption. Only consumption above 300 m<sup>3</sup> per quarter is billed at a variable consumption charge. Only 5 of the 19 OB customers paid more than the minimum charge in 2012; these customers have no economic incentive to reduce water demands below the quarterly threshold.

The status quo structure and a two-tier inclining block rate scenario with no lower threshold (identical to the residential inside boundary scenario) were developed to calculate total revenue and annual costs per user based on the 26 existing customers' 2012 demands. The scenario inputs are shown in Tables 12 and 13, and the Alternative 1 results are shown in Figure 7. The Alternative 2 results (not shown) are essentially identical.



**Table 12: Metered OB Rate Scenarios – Alternative 1**

Scenario:	Status Quo Structure		Scenario:	2-Tier Inclining Block	
	2014	2019		2014	2019
Quarterly meter charge	\$297.90	\$440.17	Quarterly meter charge	\$25.00	\$36.94
Tier 1 rate	-	-	Tier 1 rate	\$1.00	\$1.48
threshold m <sup>3</sup>	300	300	threshold m <sup>3</sup>	65	65
Tier 2 rate	\$2.65	\$3.92	Tier 2 rate	\$2.60	\$3.84
Calculated total revenue	\$30,794	\$45,501	Calculated total revenue	\$31,012	\$45,823
Target revenue	\$27,909	\$41,237	Target revenue	\$27,909	\$41,237
Calculated / target	110%	110%	Calculated / target	111%	111%

**Table 13: Metered OB Rate Scenarios – Alternative 2**

Scenario:	Status Quo Structure		Scenario:	2-Tier Inclining Block	
	2014	2019		2014	2019
Quarterly meter charge	\$287.00	\$505.86	Quarterly meter charge	\$20.00	\$35.04
Tier 1 rate	-	-	Tier 1 rate	\$1.00	\$1.75
threshold m <sup>3</sup>	300	300	threshold m <sup>3</sup>	65	65
Tier 2 rate	\$1.35	\$2.37	Tier 2 rate	\$2.15	\$3.77
Calculated total revenue	\$25,966	\$45,496	Calculated total revenue	\$26,125	\$45,774
Target revenue	\$23,535	\$41,237	Target revenue	\$23,535	\$41,237
Calculated / target	110%	110%	Calculated / target	111%	111%

Assuming that OB customers are primarily residential water users, the ‘2-tier inclining block’ scenario is more equitable than the ‘status quo’ scenario and recovers most costs at the same rates as residential customers inside the municipal boundary. Under the inclining block structure, 13 of the 19 customers would enjoy cost savings compared to the status quo structure, which tends to overcharge users with low to moderate usage while undercharging customers with very high usage.

If an OB customer uses water primarily for non-residential purposes, the uniform ICI rate structure could be used as an alternative to the inclining block residential structure.

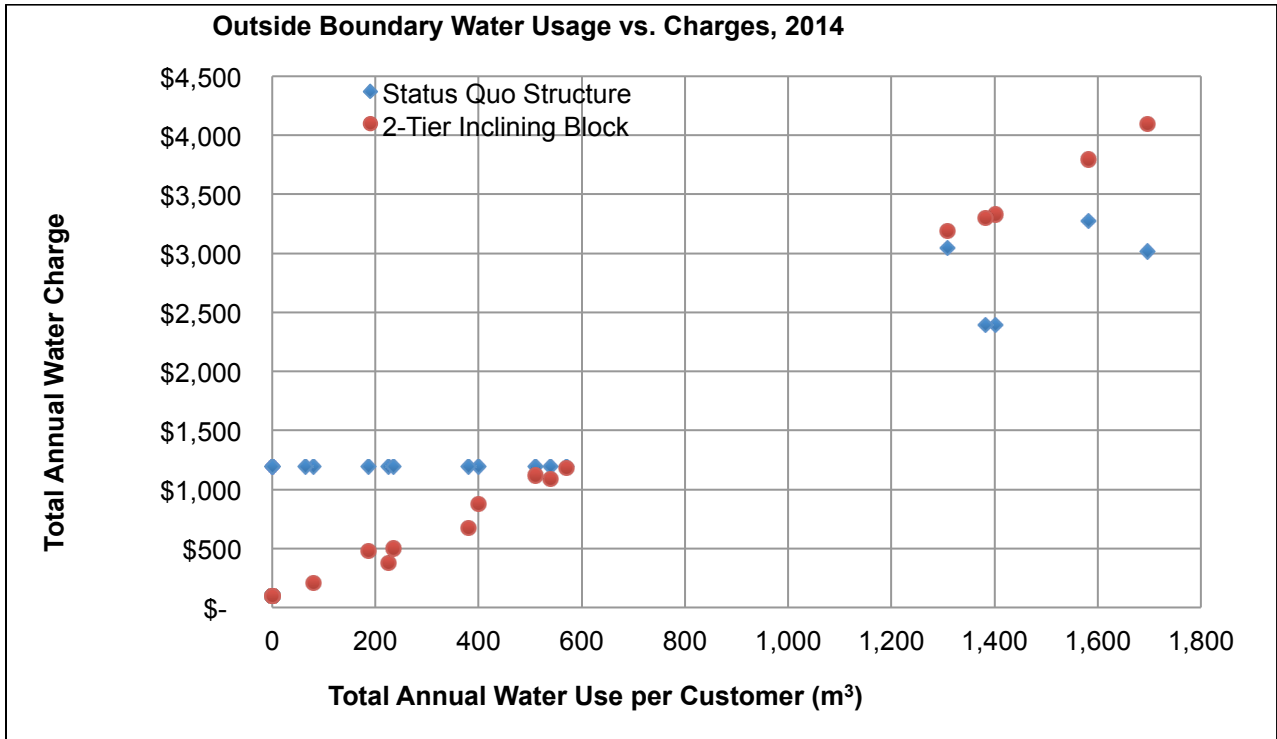


Figure 7: Outside Boundary Retail Water Usage vs. Charges, 2014 – Alternative 1

### 4.7 Pemberton North Water Service (PNWS) Rates

PNWS is a metered bulk water account that provides water supply to the Pemberton North Water Service Area operated by the Squamish-Lillooet Regional District (SLRD). The service area is situated outside VoP’s municipal boundary, although two of the 153 customer connections to the PNWS system are dwellings in VoP. Retail connections to the PNWS system are unmetered, and are primarily residential.

Distribution losses in the PNWS system are believed to account for a substantial proportion of the bulk water demand<sup>3</sup>. VoP wishes to provide an economic incentive for reducing losses in the PNWS system to make water supply capacity available for future needs. However, the PNWS already carries a high debt load associated with previous watermain replacement aimed at reducing losses, and high bulk water costs may impair the users’ capacity for further investment in water loss reduction. The potential for a substantial reduction in base demand also poses significant revenue risk to VoP.

A modified status quo structure is modelled, simplified by removing the bottom tier, where the first 300 m<sup>3</sup> per quarter are provided at no consumption charge (which will never be used since consumption will always exceed this amount). A two-tier inclining block rate scenario with no lower threshold is also modelled. The scenarios are shown in Tables 14 and 15.

<sup>3</sup> Water Rate Review, Section 2.3



**Table 14: PNWS Rate Scenarios – Alternative 1**

Scenario:	Modified Status Quo Structure		Scenario:	2-Tier Inclining Block	
	2014	2019		2014	2019
Quarterly meter charge	\$150.26	\$212.92	Quarterly meter charge	\$200.00	\$283.40
Tier 1 rate	\$0.89	\$1.26	Tier 1 rate	\$0.62	\$0.88
threshold m <sup>3</sup>	-	-	threshold m <sup>3</sup>	9,945	9,945
Tier 2 rate	-	-	Tier 2 rate	\$1.00	\$1.42
Calculated total revenue	\$119,016	\$168,648	Calculated total revenue	\$118,735	\$168,248
Target revenue	\$107,983	\$153,013	Target revenue	\$107,983	\$153,013
Calculated / target	110%	110%	Calculated / target	110%	110%

**Table 15: PNWS Rate Scenarios – Alternative 2**

Scenario:	Modified Status Quo Structure		Scenario:	2-Tier Inclining Block	
	2014	2019		2014	2019
Quarterly meter charge	\$150.26	\$163.28	Quarterly meter charge	\$200.00	\$217.33
Tier 1 rate	\$1.16	\$1.26	Tier 1 rate	\$0.65	\$0.71
threshold m <sup>3</sup>	-	-	threshold m <sup>3</sup>	9,945	9,945
Tier 2 rate	-	-	Tier 2 rate	\$1.38	\$1.50
Calculated total revenue	\$154,940	\$168,364	Calculated total revenue	\$155,371	\$168,832
Target revenue	\$140,813	\$153,013	Target revenue	\$140,813	\$153,013
Calculated / target	110%	110%	Calculated / target	110%	110%

Under either alternative, the modified status quo rate structure achieves the revenue target while providing a substantial economic incentive to reduce leakage losses and end user demands. The inclining block structure provides a stronger price incentive to reduce demands below 9,945 m<sup>3</sup> per quarter (65 m<sup>3</sup> per retail connection), and a more favourable rate for basic needs. However, this scenario increases revenue risk, as discussed in Section 5.

## 4.8 Summary of Cost of Service Implementation Alternatives

Alternative 1 has the advantages of achieving equitable cost distribution among customer classes in the first year of implementation, and providing a smooth transition in the total annual cost to PNWS. However, the metered residential and outside boundary retail classes each experience a single-year rate increase of more than 30% in 2014.

Alternative 2 reduces the maximum single-year rate increases in all classes below 20%. However, this approach sustains significant inequities between customer classes over several years. The inequity is particularly significant for the outside boundary classes: In the first few years of implementation PNWS would pay significantly more than its fair share, while retail customers outside the boundary would pay significantly less than their fair share.

Alternative 1 is recommended, and is the only alternative considered in the following sections.



## 5. Financial Risks

As municipalities retrofit water meters and adopt consumption-based pricing for water and sewer services, utility revenues become dependant on consumption patterns. Unit water demands are generally declining in North America as customers replace old, inefficient fixtures and appliances with much more water-efficient ones. Summer water demands vary with weather, and a cool, wet summer can substantially reduce seasonal water use. Long-term trends and seasonal variations must be considered in rate setting.

### 5.1 Overall Revenue

The revenue risk in VoP's current rate structure is extremely low. Currently, 75% of VoP's water revenue is received from unmetered customers that pose no risk of revenue shortfall related to water demand. In addition, fixed or minimum charges and frontage taxes account for 64% of revenue from metered customers. In total, 91% of 2013 budget revenue is derived from fixed charges and only 9% is dependent on consumption. Even a dramatic drop in overall water usage of 30% of current total demand would likely result in a revenue shortfall of less than 5% of budget. The 10-12% contingencies included in metered rate structures mitigate the risk of a revenue shortfall.

Increasing financial incentives to conserve water will introduce corresponding increases in revenue risk. Under the most aggressive scenarios (inclining block residential, OB and PNWS rates), fixed revenue decreases to 80% of total, and 20% is dependent on consumption<sup>4</sup>. The overall revenue risk would roughly double under these scenarios; however, the year-to-year variability is likely still well under 5% of total revenue. A general decreasing trend in consumption over several years may necessitate adjustments to rates to ensure budget targets are achieved in an average year.

### 5.2 Revenues in Metered Classes

Revenue risks are much greater in the metered customer classes than overall. This poses two potential problems:

- A large decrease in usage within a single class will result in a large shortfall in associated revenue, introducing user-pay inequity; and
- If a significant proportion of unmetered accounts are metered, the overall revenue risk will increase.

For example, if SLRD is able to reduce PNWS leakage losses by 1.5 L/s (47,000 m<sup>3</sup>/year, or 35% of 2012 total demand), revenue would decrease by 35% under the uniform rate scenario, or by 44% under the inclining block scenario. While its share in the total cost of service would also decrease, the actual revenue decrease would be greater than the decrease in its share of the cost of service. Customer costs are fixed, and demand costs are based on peak demands. Reducing water losses will proportionally decrease commodity costs, but has relatively little impact on peak demand.

There is a large degree of variability and uncertainty in the total demands (and associated revenues) in the residential metered and OB classes based on the records for the years 2010-2012. It is likely that actual revenues in these classes will vary widely from the budget targets outlined in the previous sections, particularly as price signals from increasing rates and more conservation-oriented structures motivate customers to eliminate unnecessary water uses such as fixture leaks and over-irrigation.

<sup>4</sup> Although a conservation-oriented rate structure would typically recover a higher proportion of total revenue using consumption charges, VoP is constrained by the relatively small proportion of customer connections having meters.



The cost of service analysis may need to be revisited before 2019 as demands change, particularly if a significant number of connections are retrofitted with meters. Given the sensitivity associated with these risks, VoP may wish to specifically establish a one- to two-year review of actual vs. forecast results.

## 6. Review of Water Rates Bylaw

A consolidated version of *VoP Water Regulation Connection and Rates By-law No. 232, 1989* (with amendments to June 2013) is included in Attachment 1, including review comments in the right margin. Implementing changes to water rates as discussed in this Technical Memorandum will require the replacement of Schedule 'A' only; however, some other parts of the Bylaw currently conflict with Schedule A (e.g., user rates for Industrial Park customers set out in Schedule 'E') and will require amendment.

## 7. Recommendations

The following actions are recommended for implementing changes to Village of Pemberton water rates:

1. Revise budget revenue requirements to:
  - Achieve the cost of service distribution calculated using the methodology set out in the April 2013 Water Rates Review;
  - Accommodate new borrowing through the Municipal Finance Authority in 2014 for a new distribution reservoir; and
  - Phase in a total annual asset renewal budget of \$324,000 over the years 2014-2019.
2. Fully implement cost of service reallocations among customer classes in 2014 (Alternative 1).
3. Adopt water rate structures as follows for metered customer classes:
  - Residential: Two-tier inclining block and fixed quarterly meter charge;
  - ICI: Uniform rate and fixed quarterly meter charge;
  - Outside Boundary: Two-tier inclining block and fixed quarterly meter charge; and
  - PNWS: Uniform rate and fixed quarterly meter charge (Modified Status Quo).
4. Set water frontage taxes for the sole purpose of recovering the inside-boundary share of long-term capital debt servicing costs, using the cost of service distribution methodology set out in the April 2013 Water Rates Review (see Table 1). For outside boundary classes, the utility basis water rate recovers debt costs through amortization and return on capital.
5. Amend, or repeal and replace, Bylaw No. 232, 1989 based on the comments included in Attachment 1.
6. Replace Schedule 'A' of Bylaw No. 232, 1989 with the Schedule provided in Attachment 2.
7. Provide opportunities for public and stakeholder presentation and dialogue on the recommended rate changes before January 1, 2014.
8. Review actual vs. target rate revenues annually, and amend rates as required to meet targets and maintain equitable cost distribution among customer classes. Review estimates and assumptions used for rate design in 2017, including review and adjustment of asset renewal charges based on an asset management plan and long-term financial plan.





**KERR WOOD LEIDAL ASSOCIATES LTD.**

Prepared by:

Colwyn Sunderland, ASCT  
Specialist, Asset and Demand Management

Reviewed by:

Mike Nolan, M.Eng., P.Eng.  
Sector Leader – Water Supply and Treatment

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### Revision History

Revision #	Date	Status	Revision	Author
0.1	August 15, 2013	Draft	Issued for VoP review	CPS
0.2	September 17, 2013	Draft	Revised for VoP comments on Draft 0.1	CPS
1.0	November 14, 2013	Final	Revised for VoP comments on Draft 0.2	CPS
1.1	November 28, 2013	Final	Corrected typo in debt charge calculation	CPS
1.2	February 3, 2014	Revised	Revisions per SLRD review	CPS