VILLAGE POINT IMPROVEMENT DISTRICT (VPID)

Metering Committee Report

January 2021

In November 2020 a VPID metering committee was re-established with the goal of bringing "to conclusion the work of the Metering Committee, struck in 2017". The committee comprised four VPID Board Trustees: Al Maxwell (Committee Chair), Mike Sywulych, Philippe Kruchten, John Glover; and four at-large members: Avon Mersey, Dave Boal, Olivia Kajander, Mike Jones. The committee has met on six occasions: Nov 23, Nov 30, Jan 6, Jan 13, Jan 20, Jan 27. This report briefly summarizes the findings of the committee.

At our initial meeting we discussed and agreed upon a set of objectives for the committee, and assigned committee members to each objective. These were:

1. To review other jurisdictions in their use of metering for water use and assess evidence that water conservation is enhanced (Sywulych, Kajander, Jones).

2. To come up with a reference "standard daily usage" number that reflects a conservation goal for water usage specific to VPID (Sywulych, Kajander, Jones).

3. To gather information via questionnaire from VPID subscribers, regarding interest in having household meters, and what benefits are perceived to result from metering (Kruchten).

4. To assess the expected cost of installing household meters (Maxwell, Boal).

5. To explore options for external funding or meter installation (Glover).

Findings:

Objective 1 (evidence for conservation from metering): We identified water districts on Mayne (4), Pender (3), and Saltspring (4) that have household meters installed and asked a representative from each district to responds to a 10-question survey. Table 1 summarizes information from each district, with the exception of one district on Saltspring which included several commercial and multi-unit residential connections and was thus considered not relevant to our situation. Names of individual districts are not included, to respect potential privacy issues.

Nearly all of the respondents indicated that they believed the installation of meters resulted in water conservation, but data were available in only one case: a relatively large water district on Pender. In this case total water consumption declined by 13.4% from 140,000 m^3 (~ 36 million

US gallons)in 2011 (the single year of pre-metering data available) to an average of 122,000 m^3 (~ 32 million US gallons) for 2012-2019 (after meters installed).

District	# Connections	Fraction permanent residents	Average annual use per connection	Fees affected by consumption?	Comments
1 (Mayne)	67	27%	n/a	No	Consider 36-38.5 g/day **per person** as goal
2 (Mayne)	131	35%	available but not reported	No	Use above 132 g/day per connection for one month, or 88 g/day/connection for 3 months triggers a response
3 (Mayne)	139	?	not willing to share	No	Notify users if they exceed 4200 gals/month
4 (Mayne)	100	50%	have data, didn't summarize	No	
5 (Pender)	92	42%	40 g/day	No	estimate from total consumption, notify households in excess of 48 gal/day
6 (Pender)	29	?	n/a	No	
7 (Pender)	1043	70%	84 g/day	Yes	fraction permanent is guess, may be higher
8 (Saltspring)	321	70%	115 g/day	Yes	
9 (Saltspring)	128	70%	106 g/day	Yes	
10 (Saltspring)	60	50%	60 g/day	Yes	

Table 1. Summary of water district questionnaire results (volumes are reported here in US gallons).

Three water districts also noted that they used monthly household consumption data to determine when individual households exceeded a consumption standard that they defined. The information is used to inform property owners of high consumption levels, in some cases publicly, in others

privately. The contention in each case was that this significantly affected use, although again no data were shared.

Only four of the ten water districts use consumption data to influence user fees. All four districts that do this are managed by the CRD. The other districts, which charge a flat fee per connection, are managed locally. Fees for the four CRD-managed districts include a flat rate to which a supplementary fee is added if consumption exceeds a threshold – the threshold varies from 100-150 US gals/day among districts.

All water districts reported that metering was beneficial for leak detection. However, it was not clear that any of the districts had a system comparable to the current VPID system for leak detection prior to installing meters.

Objective 2 (reference use level): We interpreted this objective as being to define a reasonable expectation for average water consumption for VPID that reflects use patterns elsewhere for metered water districts and is consistent with meeting VPID water conservation goals. We considered three lines of evidence in developing a reference use level: household residency; expectations for reductions in use due to metering; and recent use levels in VPID.

Annual water consumption by households will depend considerably on the portion of the year for which the household is occupied. Accordingly, the average consumption across all households will be influenced by the proportion of year-round versus seasonal residents. Our estimate for the fraction of year-round residents in VPID is 40%.

Research about the effects of metering on water consumption reveals observed reductions in water use varying from about 10% to 25%. The aforementioned water district on Pender observed a 13% decline in water consumption after metering (based on a single year of pre-metering data).

A 2019 study from England (the "Oxford Study[1]) has the benefit from data from over 150,000 customers and appears to be the largest study available for review. Data from that study indicated that with meters, overall water use was reduced by 22% based on 2 full years of records. The average reduction was 23.5 US gallons a day. What was also very interesting was that this study considered reductions based on households with high income, medium and low income. The statistics between the households differed by only 1%. There was a 23% reduction for low income homes to 22% for medium and high income homes.

West Vancouver, with perhaps one of the wealthiest per household incomes in BC, on its website has indicated that consumption after meter installation has reduced water consumption by 25%.

This suggests that even high income households reduce consumption with metering, which counters the notion that wealthier homeowners would just pay the extra cost of a surcharge rather than conserve, after meters are installed.

[1] Oxford Economic Papers, 2019, 1-24 (Ornaghi and Tonin). doi: 10.1093/oep/gpz068.

In 2020, total estimated household water consumption in VPID was 5,585,961 US gallons, or 64.6 gallons per connection per day (total 2020 water usage, including maintenance is higher at 5,740,739 US gals).

We compared VPID water use in 2019 (60 gals/day) and 2020 (65 gals/day) to estimates from other metered water districts for which we obtained data, after accounting for differences in the proportion of year-round residents among districts (Figure 1). VPID water use was higher than expected, given the pattern observed in Figure 1 among other Gulf Islands water districts with meters. According to this pattern we might expect an average water use for VPID of roughly 45-55 gallons/day with meters.

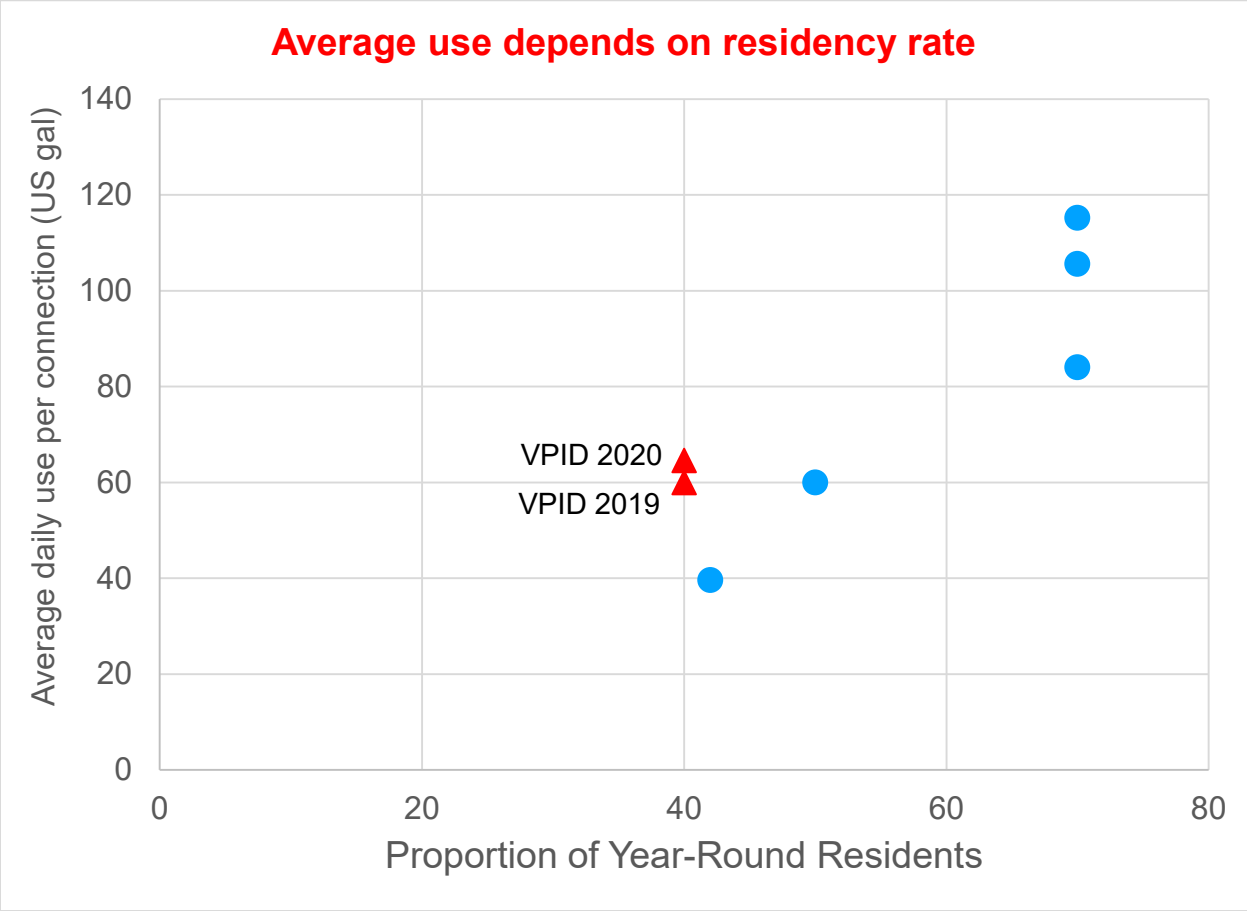

Figure 1. Average daily water use versus the proportion of connections occupied by year-round residents. Blue circles represent data from metered water districts in the Gulf Islands; red triangles represent VPID data for two years.

If we were to assume a 15% decline in average VPID water use due to the addition of household meters, the 2020 value of 65 gallons per day would drop to 55 gallons/day. In addition, we believe VPID water use in 2020 was a bit higher than typical because of increased residency on Mayne Island during the Covid-19 pandemic. Water use in 2019 was roughly 8% lower than 2020.

With these considerations in mind, the committee proposes a reference level for average daily water use per connection of 55 gallons/day. We stress that this does not mean year-round residents on Mayne need to reduce their average use to this level, because this reference average includes many residents who are not present and thus not consuming water for much of the year. If this reference level can be attained the committee believes VPID will be able to avoid future water conservation issues.

Objective 3 (survey of VPID households): The metering committee organized a survey of the homeowners to collect opinions and ideas about individual metering in the VPID. The survey using Qualtrics was open from January 9 to 20 and elicited 136 complete responses (19 more were left incomplete).

One third of the respondents are permanent residents, and the majority (43%) are non-resident, staying on Mayne between 40 and 100 days a year. The majority of respondents are over 60, and most properties (73%) have only 2 occupants or less in general. There is no obvious strong correlation between answers. Some 15% seem very opposed to having meters.

In general, respondents were hoping that meters would

- Allow VPID to charge water based on actual consumption
- Encourage water conservation
- Help detect leaks

However, the majority of homeowners showed a preference for paying no more than $500 per property for an installed meter, and would prefer to spread this cost over 2 years.
A large majority is opposed to the publication of consumption--and many decry the "shaming" policy of our neighbouring district. Sixty per cent already collect rainwater, and another 24% plan to do so.

We were agreeably surprised that half of the respondents made extensive use of the open-ended question at the end to convey their opinions; their comments fill 9 pages! Many respondents used this to qualify or justify their answers to the earlier questions. In the comments, we see the same split of, on one hand, *supporters* of metering ("Let us pay for what we consume") and, on the other hand, *opponents* to such a move (based on cost, inequity, ineffectiveness at water conservation). The comments also highlight a few areas that would require better information about our system (actual consumption patterns, leaks, bounded supply, operating costs), and about meters; the reasoning behind some of the comments seems to make some assumptions that are not valid.

Although the survey was anonymous, 52 homeowners opted to "sign" their responses, and 34 left an email address for follow up. A handful of homeowners responded twice, which does not significantly affect our results.

A more complete report with all the comments and opinions is available for consultation on the VPID web site: https://vpid.ca/2021-metering-survey/

Objective 4 (expected costs): The cost of adding water meters to the VPID system has three principal components: installation, hardware and maintenance.

Installation: This is the largest and, unfortunately, the least predictable cost of the program. For security and ease of reading, the meter must be installed near the street, an environment that may range from loose soil (easy) to sandstone or conglomerate (difficult). Unless a configuration can be found to accommodate the meter and associated valves within the existing boxes, they will have to be replaced. Several years back, a flat charge of $1,000 per household was quoted by one supplier, an amount deemed excessive at the time. In this report, we assume an installation cost for the meter box of $750 per household on average, or $172,500 for the system. In addition, EMCO quotes $33,100 (incl. tax) for meter boxes, check valves and curb stops, or $144 per household.

Hardware: We obtained quotes for metering hardware from three suppliers; we have disregarded DIY-type meters which are subject to tampering through removal of their power source, ease of disconnection or ability to be reset.

Bartle and Gibson. The least expensive model is the accuSTREAM water meter, which in its basic configuration is battery driven but must be read through an LCD display. $132.70 incl. tax.

EMCO. The accuSTREAM meter is also available through EMCO; with the addition of a transmitter to make it readable by wand, $183.70 incl. tax. EMCO also carries a smart meter, iPERL, at $243.50 incl. tax. A wand reader adds $4170 (incl. tax) to the cost of the system.

Iconix. The most sophisticated meter appears to be the Badger, carried by Iconix. It communicates to a remote server via cell technology, eliminating the need for drive-by or walk-by readings. Iconix didn't provide a breakdown of the meter price, just a complete system quote of $357,000 (incl. tax and software training), or $1550 per household.

To summarize, the total cost of installation and all hardware for 230 hookups ranges from $237,000 for the simplest system to $357,000 for the most sophisticated, or between $1000 and $1500 per household. A large component of the installation cost is replacement of the meter/valve boxes.

Maintenance: The cost of reading and maintaining the system, and translating the readings into billable amounts, varies with the sophistication of the meters. The simplest direct-read meters have to be read in person, on-site, with the possibility of errors in transcription to the accounting system. Even if such readings were made monthly, they would provide only limited feedback to the householder about factors influencing their water usage. Meters that can be read by wand reduce the likelihood of transcription errors, and would be less time-consuming to read. The most sophisticated meters communicate via cell tower, don't need to be read on-site, and provide continuous data. They have the advantage of not requiring more VPID personnel hours, but add a monthly charge of $1.50 per unit, or about $5000 annually, after tax.

Other options: We see from the above that the acquisition of an effective metering system will likely cost more than $200,000 in total, plus ongoing charges. Are there other options? Viewed

strictly as a supply/demand mismatch, perhaps instead of moderating the demand side of the problem by introducing meters, might there be a less expensive, but sustainable, way of increasing the supply side through the addition of more wells?

Currently, VPID pumps about 6 million gals/yr: how does this compare with the capacity of the treatment plant, and with the capacity of the aquifers to support more wells? For example, to add a highly productive well yielding 2 million gals/yr would increase the average throughput of the plant from about 16,000 gals/day (2020) to 21,000 gals/day. Given that the plant has a peak output of 36,000 gals/day (which is not sustainable for long periods of time), it's likely that an extra well could be accommodated without the need to refit the plant.

However, the constraints on output may lie elsewhere: in the capacity of the aquifers. The hydrological report prepared by Foweraker in 1974 estimated that the VPID region could generate roughly 8 million gals/yr; this is a fairly robust estimate that can easily be confirmed from the known precipitation on Mayne and the water absorption capability of its thin layers of soil. The cost of bringing well #19 into production is about $33,000, which certainly looks attractive compared to the cost of meters. At 5,000 gals/day, well #19 alone would increase supply by 1.8 million gals/yr if it could be pumped and treated without interference with the output from other wells. In other words, well #19 at full output would bring the total production of the system uncomfortably close to the limit estimated by Foweraker. Now, Foweraker cautioned that his production estimate was conservative, but clearly it would be unwise to add yet another well without thoroughly understanding its potential for exceeding the capacity of the VPID aquifers.

Recommendations

Recommendation 1.

That the Board adopt the suggested goal of 55 USG per connection per day over the upcoming year as a benchmark for our expected efforts at conservation this year.

Recommendation 2.

That the Board mandate the existing Metering Committee for another year, with revised scope in the terms of reference to focus on educating householders on issues related to water conservation efforts and metering for VPID. These efforts should be informed by the VPID Water Conservation Strategy, specifically regarding categories A and B discussed therein.

Recommendation 3.

That the Board set as an agenda item for the AGM of 2022 a referendum on whether VPID should carry out a project which adds meters to every water connection.