THE UNIVERSAL WATER METER IMPLEMENTATION PLAN

Framework for the implementation strategy for metered water service across the small water systems owned by the RDOS

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REGIONAL DISTRICT OF OKANAGAN-SIMILKAMEEN
101 Martin Street, Penticton, BC V2A 5J9 | 250-492-0237 | www.rdos.bc.ca | info@rdos.bc.ca
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It is hard to deny that weather patterns have changed and the frequency of extreme weather events appear to occur more often. In a report completed by the Okanagan Basin Water Board (OBWB), *Climate Projections for the Okanagan Region*, published in February of 2020, there are a number of changes across the valley that will impact the supply of safe water available for residents in the region.

Adopting a proactive approach to infrastructure means developing a strategy to ensure infrastructure in the Regional District is functioning efficiently and in a cost effective manner. The Universal Metering Implementation Plan will outline the justification, schedule, components and timeline for both installing meters and the tiered billing structure that will apply once activation is complete.

1 Contents

2 Introduction

The purpose of this report is to outline the rationale behind the implementation of water meters on all connections to RDOS owned and managed small water systems. Analysis of the implementation process in similar Municipalities and Regional Districts in Southern BC will aide in setting parameters for the tiered billing structure, with recommendations on how to approach scheduling developed by department staff input. Statistics extracted from the *Climate Projections for the Okanagan Region (2020)* aide in demonstrating the importance of planning for future conditions.

A number of factors were reviewed in the report, ranging from regional indicators, summer and winter indicators as well as precipitation indicators that will all have impacts on industry, agriculture and residential activities. It becomes clear that the small water systems owned by the Regional District will need to make adjustments to how water is managed in the region.

A phased program is proposed to install and activate the pit meters and tiered billing structure. A prioritized list of current small water systems will be included to lay out the timeline and order in which systems will be addressed in the plan. Careful consideration has been given to budget the process in an efficient and fiscally responsible way.

2.1 Rationale for Water Metering

There are a number of reasons to consider water meters on the small water systems within the RDOS. The most important benefit of the metering program is to establish efficient and effective assessments of infrastructure. Generally, infrastructure associated with the RDOS managed water systems is aging and showing signs of needing upgrades and improvements to maintain level of service and allow for additional connections to service increasing populations across the region.

With the effects of climate change and the impacts to the water supply seen in recent years, water conservation programming will aide in reducing excessive use and allow residents to monitor and manage their water use responsibly and make informed decisions regarding their consumption. Some of the factors looked at in the Climate Projections report are the days above 30°C. Comparing historical data and projecting forward to 2050 and 2080, the RDOS is expected to see a significant increase in the coming years.

TABLE 1: CHANGE IN SUMMER DAYS ABOVE 30°C

		Past Days	2050s Change (Days)		2080s Change (Days)	
			Average	(Range)	Average	(Range)
RDNO	Whole Regional District	6	16	(9 to 25)	31	(15 to 52)
	Valley Bottom Only	27	32	(17 to 47)	52	(31 to 75)
RDCO	Whole Regional District	7	18	(10 to 29)	35	(19 to 57)
	Valley Bottom Only	24	32	(19 to 48)	54	(32 to 78)
RDOS	Whole Regional District	5	14	(7 to 23)	29	(16 to 47)
	Valley Bottom Only	28	33	(19 to 47)	54	(33 to 76)

TABLE NOTES
Past refers to the time period from 1971 to 2000.
2050 Change refers to the projected increase in days by the 2050s from the past baseline.
2080 Change refers to the projected increase in days by the 2080s from the past baseline.

(Climate Projections for the Okanagan Region, 2020)

Along with the hotter summer overall, it is expected that the growing season will also expand beyond historical limits. Projections into 2080 show the growing season for the RDOS to increase by nearly 70 days. It quickly becomes obvious reading through the report that the demand for water in the region will require careful attention and the involvement of all users to ensure a stable supply.

TABLE 4: CHANGE IN GROWING SEASON LENGTH

		Past (Days)	2050s Change (Days)		2080s Change (Days)	
			Average	(Range)	Average	(Range)
RDNO	Whole Regional District	167	36	(23 to 49)	62	(47 to 76)
	Valley Bottom Only	227	39	(28 to 54)	72	(54 to 85)
RDCO	Whole Regional District	180	39	(26 to 54)	67	(50 to 80)
	Valley Bottom Only	237	44	(31 to 61)	78	(60 to 93)
RDOS	Whole Regional District	163	41	(28 to 54)	69	(50 to 86)
	Valley Bottom Only	243	44	(29 to 55)	73	(56 to 91)

TABLE NOTES
Past refers to the time period from 1971 to 2000.
2050 Change refers to the projected increase in the days of growing season by the 2050s from the past baseline.
2080 Change refers to the projected increase in the days of growing season by the 2080s from the past baseline.

(Climate Projections for the Okanagan Region, 2020)

There are changes to the winter seasonal conditions that will also affect water availability in the region. Warmer average overnight temperatures and fewer days that drop below 0°C will have an impact on agricultural practices and how residential landscaping is managed.

- Valley bottoms have historically experienced fewer frost days. In the past, the South Okanagan's valley bottom has experienced 96 frost days, annually. This is less than the other Regional Districts. By the 2050s, frost days in the South Okanagan are expected to decline by 49%, and by 71% by the 2080s.

(Climate Projections for the Okanagan Region, 2020)

The preferred strategy is a steady and organized approach to work through the systems using a priority scale based on size, age, consumption and history. As we are focussing on residential water use, the reduction of excess outdoor use is crucial for managing water shortages. The intention of the universal metering plan is to address water use concerns before critical shortages become an issue that would affect indoor use. Consideration for agricultural users and multi-unit properties will ensure that as small water system purveyors we are able to monitor all components of our infrastructure. Alternate billing structures will be applied to agriculture and commercial connections to account for the differing usage patterns and economic impact in the region.

Drought patterns are cyclical and developing a robust program of sound infrastructure, responsible consumption, practical efforts for landscaping, knowledgeable residents and using reliable technology will allow the region to withstand pressures related to climate change and the variable weather patterns we have experienced in the recent past.

Referring again back to the Climate Projections report, precipitation trends for the region will increase the reliance on purveyed supply versus rainfall or snowpack recharge. In the table below, less summer rain and increase in spring and fall precipitation are shown for each season. From a supply perspective, this indicates a greater reliance of surface application or irrigation over the summer months for agriculture and residential users due to the decreased average rainfall over the summer season.

Additional outreach will be organized for agriculture and commercial connections for each water system to request input and guidance related to each sector from a water use perspective.

TABLE 11: SEASONAL PRECIPITATION

			Past (mm)	2050s Percent Change		2080s Percent Change	
				Average	(Range)	Average	(Range)
RDNO	Spring	Whole Regional District	215	12%	(3 to 21)	18%	(13 to 30)
		Valley Bottom Only	98	13%	(2 to 19)	20%	(14 to 30)
	Summer	Whole Regional District	220	-12%	(-32 to 1)	-20%	(-45 to -1)
		Valley Bottom Only	120	-11%	(-29 to 4)	-19%	(-43 to 1)
	Autumn	Whole Regional District	265	10%	(2 to 17)	18%	(8 to 26)
		Valley Bottom Only	116	11%	(3 to 18)	20%	(9 to 28)
	Winter	Whole Regional District	251	7%	(0 to 14)	14%	(1 to 27)
		Valley Bottom Only	109	8%	(-2 to 17)	15%	(3 to 29)
RDCO	Spring	Whole Regional District	148	11%	(1 to 18)	17%	(12 to 25)
		Valley Bottom Only	74	13%	(2 to 21)	19%	(13 to 24)
	Summer	Whole Regional District	156	-14%	(-36 to 2)	-22%	(-48 to -1)
		Valley Bottom Only	95	-12%	(-31 to 4)	-20%	(-46 to 0)
	Autumn	Whole Regional District	181	10%	(2 to 20)	19%	(9 to 29)
		Valley Bottom Only	87	10%	(2 to 20)	19%	(9 to 30)
	Winter	Whole Regional District	188	7%	(-1 to 14)	14%	(3 to 27)
		Valley Bottom Only	89	8%	(-2 to 18)	15%	(3 to 25)
RDOS	Spring	Whole Regional District	156	10%	(0 to 18)	15%	(9 to 21)
		Valley Bottom Only	82	12%	(2 to 21)	17%	(12 to 24)
	Summer	Whole Regional District	142	-17%	(-41 to 2)	-26%	(-56 to -2)
		Valley Bottom Only	96	-14%	(-37 to 3)	-22%	(-50 to 0)
	Autumn	Whole Regional District	192	9%	(0 to 23)	17%	(7 to 27)
		Valley Bottom Only	74	9%	(1 to 18)	16%	(6 to 28)
	Winter	Whole Regional District	220	5%	(-2 to 12)	12%	(3 to 26)
		Valley Bottom Only	76	7%	(-1 to 17)	14%	(4 to 25)

TABLE NOTES
Past refers to the time period from 1971 to 2000.
2050 Percent Change refers to the projected percent change by the 2050s from the past baseline.
2080 Percent Change refers to the projected percent change by the 2080s from the past baseline.

(Climate Projections for the Okanagan Region, 2020)

As small water system purveyors, there is a responsibility to encourage sensible use, but also to ensure that losses in mainlines are managed and minimized. The efficient function of the system as a whole will extend the life of the infrastructure which results in cost savings for users if upgrades can be planned and budgeted versus emergency repairs.

3 Prioritizing Systems

3.1 Criteria

Several factors are being considered for the prioritizing of the systems for the installation of meters. Discussions have occurred that ensures a clear understanding of what water systems are higher priority than others.

Some of criteria considered in the process of prioritizing are:

- the age of the system,
- what is the potential for undetected leaks in infrastructure,
- the number of connections,
- proportions that are residential, agricultural irrigation or commercial connections,
- consumption patterns,
- performance of infrastructure in peak use periods,
- available capacity to manage current and projected future use,
- funding availability,
- supply chain limitations.

Each of the criteria looks at components of the water supply infrastructure, but the potential reduction in use and how that reduction can extend the service life of the system will also be considered. The intention is to reduce some strain on the infrastructure as it currently exists which can give the Regional District the opportunity to plan and budget for upgrades versus performing emergency repairs after failures occur.

3.2 System Summary

The current status for each of the owned water systems varies widely, as does the customer base. With the implementation of meters, there will be a mechanism for both provider and customer to gain a better understanding of water use. For the RDOS as a provider, having the ability to assess the effectiveness of water restrictions implemented, identifying unbilled water losses i.e. leaks in mainline portions of infrastructure and having usage data to analyse the status of the infrastructure is invaluable. Future expansion must be taken into account for infrastructure management and planning. Building resilience in infrastructure given the recent extreme weather events, water scarcity and projections into the future will be critical to ensuring availability for all residents in the region.

The current status of the ten water systems owned or managed by the RDOS are summarized in the table below.

System name - EA	**Year acquired**	**# connections**	**Source**	**Treatment**	**Notes**	**KMs mains**
West Bench - F	2012	384	City of Pen	chlorination	Fully metered	12
Naramata - E	1995	1113	Lake	UV and chlorination	Some meters and some pits ready to go	55
Willowbrook - C	2016	82	well	chlorinated	Low storage	4.5
Sage Mesa - F	2010	286	lake	chlorinated	Managed, BWN in lz Low storage	
Faulder - F	1993	81	well	Uranium	At capacity- supply limitation	3.6
Olalla - G	1999	226	well	none	Low storage	16
Missezula Lake - H	2020	200	lake	chlorinated	Unstable supply	4.4
Okanagan Falls - D	2023	1050	wells		Storage limitations	18
Gallagher Lake - C	2014	103	well	chlorinated		.85
Sun Valley - D	2017	28	well	none	Infrastructure limitations	2.3
Totals:		3553				116.65

3.3 Scheduling

Planning for installation will include a community by community approach. Working with the priority criteria, acquisition requirements and funding availability, each of our water systems will be completed individually and sequentially. This will allow us to troubleshoot any complications or issues that arise in the process as well as determine more accurate timelines and coordination efforts. Considerations for scheduling include funding availability and limitations, access to the properties, contractor availability, communications with the public, purchase and supply of materials, traffic control, site remediation after installation, and the time for installation of one meter pit and meter which will vary depending on subsurface structure and topography.

The following table outlines the current proposed or recommended budgets for meter implementation for each of the water systems. West Bench water system was excluded as it is already metered; Sage Mesa and Gallagher Lake are managed but not owned by RDOS.

System Name	2025 budget (proposed)	2026 budget (recommended)	2027 Budget (recommended)	2028 Budget (recommended)	2029 Budget (recommended)
Naramata	50,000	100,000	100,000	100,000	100,000
Willowbrook	50,000	50,000	50,000	50,000	30,000
Faulder		300,000	120,000		
Olalla			25,000	100,000	150,000
Missezula Lake				100,000	100,000
Okanagan Falls					
Sun Valley	20,000	20,000	20,000	20,000	20,000

4 Installation Process

4.1 Meters

Currently the only water system owned by the RDOS that has meters installed is the West Bench Water System. The brand currently installed – Neptune Technologies and the T- 10 meters (Neptune Technologies Canada, 2024) are performing well and have the capacity to implement additional technology that would be beneficial for both consumers and the RDOS. It is recommended to stay consistent with the meters and hardware already in place with Neptune Technologies. This eliminates any delay in activation as staff in multiple departments are already familiar with the functions and software.

Neptune T-10 Residential meter

Availability of a range of meter sizes, options for reading methods, secure access to consumption data and the interactive customer portal are all benefits of continuing with a proven supplier and brand.

A propagation study has been performed which assesses the ideal method of meter reading technology and placement of receivers for data collection that is the most reliable and economical for the community. Site visits are planned with Neptune representatives and RDOS Utilities staff for several locations across the region to verify and refine study results.

The three systems recommended for installation based on the prioritization criteria would be Willowbrook, Faulder and Olalla. The installation process will be a phased process with the aim of minimizing costs to residents. Initially, there is the possibility budgeted funds where available to start the installation. There are no grant funding streams currently open, however, that will be a priority throughout the process. Successful grant applications may change the sequence identified in the prioritized list.

Our current approach is to have new connections to our water systems add a pit and meter as a mandatory component of development as well as introducing metering as a condition of acquisition for systems new to the RDOS.

4.2 Staff

As the workload of RDOS staff is fully accounted for, the installation process will be contracted out using the RFP process. Project management and oversight will be assigned to staff, but the installation of the pits and meters will be the responsibility of the contractor. Locating meters within the residence has been eliminated as an option as it poses additional issues with access for operators if inspection, readings or repairs are needed. It also increases the risk of unauthorized diversion for irrigation or additional uses. All meters will be installed in pits at or near the property line frontage.

The meters are currently being used as AMR or automated meter reading which requires an operator to access monthly meter readings by activating the handheld unit in close proximity of the meter; such as driving along the roadway. It also allows an operator to access the meter readings in alternate read modes to assist residents with leak detection on their property. This is a vital tool for West Bench as the high risk geotechnical concerns could be exacerbated by undetected leaks. The current metering system is also compatible with AMI or advanced metering infrastructure which relies on receivers and antennae mounted throughout the community that will receive real-time data from each meter. This would eliminate the need for an operator to perform the meter reading each month. There is an increased subscription cost for the software associated with the AMI systems, but it eliminates time needed for monthly meter readings and the leak detection deep read process.

Additionally, the AMI software comes with an interactive customer portal, My360, which would allow residents to login in and see their usage in fifteen minute increments. Users can also set threshold alarms to warn them if their usage has gone above a certain amount which could indicate a leak on their side of the property line. In recent Water System Events in each community, the RDOS has introduced the idea of universal metering and has been met by positive responses from residents.

Once meters are installed, a period of mock billing will occur to allow the residents to become familiar with the billing process as well as giving them the ability to adjust their use before the updated billing structure is applied.

4.3 Benefits

Universal metering is proven to have numerous benefits to a water system. For newly metered systems, an average of a 30% reduction in use is expected in the first year. This reduction results in benefits across the water system; residents have a better awareness of consumption and recognize ways to reduce in dry seasons, the wear on the infrastructure is also reduced and the life span of the system increases. This translates into the possibility of delaying infrastructure upgrades and replacement. Metering allows staff to identify and repair leaks in mains that also contribute to a shorter lifespan for

infrastructure. Eliminating leaks and excess use means reducing costs associated with extracting, treating and distribution of water in each of the water systems across the region. Finally, as weather patterns change, the recharge and supply within both surface and groundwater sources are fluctuating. It is no longer appropriate to assume that our water supply is limitless. With water restrictions implemented throughout the summer in 2023, on unmetered systems it is not possible to assess impacts of the restrictions. There are a number of reasons that restrictions are put in place, it can be related to low precipitation and drought conditions, increasing fire risk or concerns with infrastructure and maintaining supply to residents. Having metered systems allows for data to support public outreach and education programs and determine how effectively the water system manages such pressures. Rapid snowmelt, atmospheric rivers and wildfires are all affecting the regions supply. Implementing technology and infrastructure is critical to ensure waste is minimized and that users are responsible in their consumption.

A region-wide water conservation education campaign, Regional Connections project page and a series of public outreach events will be integrated into the universal metering plan to engage and inform residents as the process unfolds.

5 Billing structure

One of the lessons learned from assessing the usage in the only metered system in the RDOS is that following the initial reduction in consumption; changes in ownership, new residents in the region and impacts of Covid-19, users have either grown accustomed to the costs associated with use or are not aware of the need for conservation measures and limitations of the infrastructure. As a tool to combat excessive use or wasteful consumption, a tiered billing structure for residential users is proposed to ensure residents remain vigilant in water conservation activities. The concept has been adopted successfully by many of the larger water purveyors in the Thompson-Okanagan region. The rate structure proposed will be similar to neighboring regional districts and municipalities. An assessment of operating costs and a review of system master plans will determine necessary upgrades for each system, this data will impact user fees and the billing structure as minimum costs must be covered as well as including a nominal contribution to a contingency fund for future works

Purveyor	**Flat rate (yearly)**	**Base rate/q**	**Tier 1 vol (m^3)**	**Tier 1 rate/ m^3**	**Tier 2 vol (m^3)**	**Tier 2 rate/ m^3**	**Tier 3 vol (m^3)**	**Tier 3 rate/ m^3**
West Kelowna			0-100	0.46	101-300	0.92	301+	1.47
Vernon		108.00	0-40	0.98	40-80	1.96	80+	2.94
Summerland		147.27	0-25	0.53	25+	2.09		
City of Kelowna		49.41	0-60	0.563	61-160	0.757	160-250	1.148
Oliver	191.94	141.80						
Osoyoos	535.64	283.35		0.97				
RDOS(Olalla)		**125.00**	**0-30**	**0.75**	**30-90**	**0.95**	**90+**	**1.25**

Currently, each water system has a billing structure that existed prior to acquisition by the RDOS. Through a tiered billing system, the RDOS can have a more standardized billing structure across all water systems. However, because the water systems vary so much from one another, there will still need to be some variation. The needs of each water system and number of connections will determine a system specific base price to cover operation and maintenance costs. Tiered consumption rates would apply in addition to the base rate for all systems.

In the table above, water use rates from several Municipalities and Regional Districts were compared to determine a reasonable starting point for our pricing guide. A preliminary example of RDOS rates are in the bottom row, this structure was calculated and based on the current fee structure for Olalla water system. There may need to be adjustments made as we start to collect user data to define operating costs and maintenance needs for each system. Further analysis will identify if the proposed fee structure is effective for operations and economical for users.

6 Conclusion

A Universal Water Meter Plan is recommended to commence across all water systems owned by the RDOS. A priority list will be confirmed so that installation occurs in a manner that minimizes costs, disruption to communities and allows full activation of the each system. Grant funding applications are submitted as they become available, an RPF process occurs to hire a contractor to perform the installation of the pits and meters, a tiered rate structure be implemented based on consumption and that a multi-faceted education and outreach program be created to support the metering plan from installation, through the mock billing period and into the full activation process.

Data collection and analysis during the activation period will give staff information about the consumption patterns of users, mainline losses and any adjustments that are needed from a management perspective.

The implementation of universal meters across the RDOS will contribute significantly to creating resilience and the security of source water, benefitting all residents as well as ensuring efficient and cost effective management of utilities across the region.

7 References

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(2020). *Climate Projections for the Okanagan Region.* Retrieved from https://www.rdos.bc.ca/assets/PLANNING/AreaX/2020/ClimateProjections/FinalReport.pdf