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**REPORT TO WILDERNESS MOUNTAIN WATER SERVICE COMMISSION
MEETING OF TUESDAY, MARCH 31, 2015**

**SUBJECT EXPLORE OPTIONS FOR ENHANCED ALARM SYSTEM FOR THE
STORAGE TANK AT THE WATER DISINFECTION FACILITY**

ISSUE

The Wilderness Mountain Water Service Commission wishes to explore options for enhanced alarming points for the reservoir tank associated with the water disinfection facility.

BACKGROUND

At the Wilderness Mountain Water Service Commission (Commission) meeting of October 7, 2014, the commission requested that the Capital Regional District (CRD) staff prepare a report for a phased approach for an enhanced alarm system as identified in the 2016 capital plan and determine funding options.

A new water disinfection facility was commissioned in October of 2012, consisting of new raw water pump, flow meter, coarse cartridge filters, turbidity meter, Ultraviolet Light (UV), aqueous ammonia and sodium hypochlorite injection equipment. The water disinfection facility also has telemetry/communications in the form of a land line/cell phone and internet.

An incident occurred on July 16, 2013, in which the reservoir tank was empty and the supply pumps were running dry. A resident called the CRD's Japan Gulch Water Disinfection Plant (JGWDP) to advise that they were without water. CRD staff were already on route to perform regular maintenance at the Wilderness Mountain water disinfection facility. Once they arrived on-site the raw water pump were immediately started. It was also noted that BC Hydro had a planned power outage for that day replacing power poles on Mount Matheson Road. The CRD staff then called for a water delivery truck and dispatched a generator to the site to assist with refilling the storage tanks. The cause of the incident was believed to be a faulty pressure switch, which was subsequently replaced. However, this highlighted a potential risk with the water system delivery and a need to address the situation.

In review of best management practises, most water disinfection facilities have some form of telemetry capabilities enabling continuous real time remote monitoring of operational status including reservoir levels, system pressures, disinfectant residual monitoring, etc. Currently, this is not in place at the Wilderness Mountain water disinfection facility. The water facility is visited twice a week by the CRD water treatment operators and otherwise, it is not possible to determine the operational status of the water storage tanks and/or other water system parameters. The Wilderness Mountain water disinfection facility has limited telemetry/communications in the form of a land line/cell phone and internet. The concept of remotely controlling the treatment plant operation and acquiring plant performance data is called supervisory control and data acquisition (SCADA).

There are a range of SCADA options for consideration. The preferred option is subject to the level-of-service the commission may desire to achieve. The cost estimates include the supply of instruments and equipment, installation and programming, engineering and contingency, but not applicable taxes.

Option 1: Basic Alarm – This option includes adding additional float switches in the storage tank and connecting the system to the existing telephone call-out system. This may require new buried cable between the tank and disinfection building. Should a problem be identified, the JGWDP operators can contact key individuals at Wilderness Mountain and ask that this information be disseminated to the customers and that water usage be curtailed until sufficient storage is available (as long as land phone lines remain active).

This option is not scalable/expandable should the commission wish to advance to a continuously monitored SCADA system in the future.

The cost of this option is estimated at \$5,000 if the existing telemetry cable has capacity, otherwise an additional amount of approximately \$50,000 may be required to supply and bury a new cable between the storage tanks and the disinfection plant. If this option is selected, the first step would be to review the existing cable capacity. If the cable is not suitable, then the buried cable alignment should be conceptualized and construction costs be refined.

Option 2: Partial SCADA – This option includes the installation of basic electronics (radio, remote terminal unit (RTU) and transducers/level transmitters to continuously monitor water storage levels. JGWDP operators can contact key individuals at Wilderness Mountain prior to running the tanks empty and ask that this information be disseminated to residents and water use be curtailed until sufficient storage is available. This could also allow operators to proactively and remotely troubleshoot a situation by determining if low storage is caused by a pump failure or leak in system by examination of water level pattern. Additional equipment and connections to send data to be monitored continuously through the SCADA system can be added incrementally until all points in the water system are monitored.

This option is scalable and can be expanded incrementally to a full SCADA system if and when desired by the Commission. This option would not realize any additional operational savings.

The cost of this option is estimated at \$26,250.

Option 3: Full SCADA – This option includes the installation of various electronics, as identified in Option 2, which would accommodate all data points associated with the water disinfection and operation. This also includes the installation of transducers to continuously monitor water storage levels, free and total chlorine analyser, intrusion alarms, including connection of all other instruments (water meter, turbidity meter, UV output to the RTU). Operating costs could be reduced by JGWDP operators by making fewer trips to the site. This would enable the JGWDP operators to remotely troubleshoot anomalies detected through SCADA system and stop operation if disinfection is interrupted as well as be proactive by determining if low storage level is caused by pump failure or a leak in system by examination of water level pattern. This would enable the CRD to contact key individuals at Wilderness Mountain and ask that this information be disseminated to residents and water use be curtailed until sufficient storage is available.

This option may also result in lower operational costs associated with performing routine maintenance monitoring and/or call-out for items that could be addressed by accessing information from the water disinfection facility remotely at the JGWDP.

The cost of this option is estimated at \$62,500.

ALTERNATIVES

Alternative 1

That the Wilderness Mountain Water Service Commission direct Capital Regional District staff to purchase and install the Full SCADA system (Option 3) at a cost of up to \$62,500 plus applicable taxes with funding to be provided from the service's capital reserve fund subject to available funding.

Alternative 2

That the Wilderness Mountain Water Service Commission direct Capital Regional District staff to purchase and install the Partial SCADA system (Option 2) at a cost of up to \$26,250 plus applicable taxes initially with additional funding in the future to achieve Full SCADA status, with funding to be provided from the service's capital reserve fund subject to available funding.

Alternative 3

That the Wilderness Mountain Water Service Commission direct Capital Regional District staff to purchase and install a Basic Alarm system (Option 1) at a cost between \$5,000 and \$50,000 plus applicable taxes depending on the status of the existing cable, with funding to be provided from the service's capital reserve fund subject to available funding.

Alternative 4

That the Wilderness Mountain Water Service Commission direct Capital Regional District staff not to take any further action and receive this report for information.

IMPLICATIONS

Alternative 1 – The Full SCADA option is consistent with the industry best practise and allows full supervisory control and data acquisition to the water disinfection facility to be monitored remotely by CRD staff, thereby reducing the risk of system failures. This may result in lower annual operating costs of up to \$3,000 per year by reducing regular routine maintenance monitoring and/or call-outs to the site. The actual reduction in annual operating costs would be reviewed on a yearly basis, but there would be an increase for SCADA equipment servicing estimated to be \$1,000.

Alternative 2 – The Partial SCADA option is consistent with the industry best practise, although it only allows select supervisory control and data acquisition to the water disinfection facility to be monitored remotely by CRD staff. The benefit of this option is that the installation to achieve full SCADA capabilities can be phased over time. Initially the priority equipment would be installed and commissioned. There is no anticipated reduction in the annual operating costs, however, there would be an increase for SCADA equipment servicing of approximately \$400.

Alternative 3 – The Basic Alarm system (Option 1) has very limited capabilities and is not expandable for the future. A significant risk is related to the existing cable status and may need replacing and therefore the work could range between \$5,000 for float switch installation to approximately \$50,000 should a new buried cable be required. A reduction in the operating cost would not be expected with this limited equipment as the operators would have to continue to

complete most duties manually on-site. Like the other enhancement options, there would be no increase for equipment servicing costs.

Alternative 4 – If it is decided that no alarm enhancements would occur then the water service will continue to be operated manually with limited remote reporting system and the operators not be fully aware of system performance issues as they would not be able to monitor all points (water quality, supply and storage) continuously. With this alternative it is expected that the operating effort would remain the same and there would not be an increase due to equipment servicing.

CONCLUSION

In assessing the various options, the CRD staff concluded that implementing Full SCADA (Option 3) would be the best solution in order to address the immediate concern raised by the commission with monitoring the water level in the reservoir tank, but also other data points associated with the water disinfection equipment and system operation.

Some of the initial capital cost can be potentially offset somewhat by a reduction in labour costs from reduced site visits by the JGWDP operators by reducing the number of site visits from twice a week to once a week, although by virtue of adding new equipment an increase in operating cost to service the equipment itself is expected.

RECOMMENDATION

That the Wilderness Mountain Water Service Commission direct Capital Regional District staff to purchase and install the Full SCADA system (Option 3) at a cost of up to \$62,500 plus applicable taxes with funding to be provided from the service's capital reserve fund subject to available funding.

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Attachments: 1

Attachment 1 – Summary of Conceptual Cost Estimate

Option 1: Basic Alarm	
Supply of Materials - additional float switches and cable	\$1,000
Installation and programming labour	\$3,000
	Subtotal \$4,000
Engineering and Contingency (25%)	\$1,000
	Total \$5,000
Plus Applicable Tax	
Provisional - New Buried Cable (tank site to water treatment plant)	
Civil - mobilization, excavation, backfill, etc.	\$30,000
Electrical - cable, termination points, etc.	\$5,000
Provisional - environmental, rock excavation, legal, etc.	\$5,000
	Subtotal \$40,000
Engineering and Contingency (25%)	\$10,000
	Total \$50,000
Plus Applicable Tax	

Option 2: Partial SCADA	
Supply of Instruments and Equipment - transmitters, RTU, radios/antenna, enclosures, etc.	\$11,000
Installation and programming labour	\$10,000
	Subtotal \$21,000
Engineering and Contingency (25%)	\$5,250
	Total \$26,250
Plus Applicable Tax	

Option 3: Full SCADA	
Supply of Instruments and Equipment - Option 2 I&E <u>plus</u> CI analyser, intrusion alarm, HMI, etc.	\$35,000
Installation and programming labour	\$15,000
	Subtotal \$50,000
Engineering and Contingency (25%)	\$12,500
	Total \$62,500
Plus Applicable Tax	