Comox Valley REGIONAL DISTRICT

Staff report

DATE: April 10, 2019

FILE: 5600-01/BCOB

TO: Chair and Director
Black Creek/ Oyster Bay Services Committee

FROM: Russell Dyson
Chief Administrative Officer

Supported by Russell Dyson
Chief Administrative Officer

R. Dyson

RE: Watutco Water System Assessment and Governance Options

Purpose

To provide the findings of the recently completed feasibility study and the governance options report assessing the Watutco Water System.

Recommendations from the Chief Administrative Officer

1. THAT the Comox Valley Regional District develop the cost per connection details for three possible scenarios:
    a. Watutco remaining a private utility;
    b. Watutco becoming a Comox Valley Regional District service, wherein Watutco would supply source water to the Black Creek/ Oyster Bay Water Local Service Area and receive treated water as a participant of the Black Creek/Oyster Bay Water Local Service Area; or
    c. Watutco becoming a Comox Valley Regional District service, wherein Watutco remains an independent water system.

2. THAT the Comox Valley Regional District proceed with discussions with Watutco Enterprises Ltd. regarding the potential conversion of the Watutco Water System to a Comox Valley Regional District service.

Executive Summary

The owner of the Watutco Water System has submitted a letter formally requesting to enter into negotiations with the Comox Valley Regional District (CVRD) to take over their private system, including the three water licenses held by Pacific Playgrounds. Before negotiations could proceed, more information on the system and potential governance options were required. This report serves to provide the water system assessment completed by McElhanney and governance options review completed by Stewart McDannold Stuart.

It is important to note that although the studies look at multiple options, due to the water availability concerns of the Black Creek/ Oyster Bay (BCOB) Water Local Service Area (WLSA), the CVRD would only consider connecting Watutco to the BCOB WLSA if Watutco's river infiltration gallery was connected to the BCOB Water System, and Watutco supplied additional source water capacity.

CVRD staff assume that all costs of conversion would be borne by Watutco residents, and that any impacts to existing BCOB property owners in Option 2 would be positive, arising from more properties sharing in the costs of operating the BCOB system going forward.

McElhanney has completed an assessment of the water system (attached as Appendix A) and concludes the following:

- It is estimated that the Watutco infiltration gallery could supply an additional 50m^3/hr if the two infiltration galleries were interconnected, in comparison the effective capacity of the current BCOB river infiltration gallery is 120m^3/hr. Watutco holds three water licenses for a total licensed volume of 144,361m^3/year;
- Interconnection of the two river infiltration galleries mitigates the seasonal limitations that the BCOB system is currently experiencing and enables water transfer from Watutco to BCOB when water is most needed in the summer season without compromising filtration deferral for BCOB;
- The capital cost to complete the required Watutco upgrades to meet CVRD standards is approximately $1,393,540 (Class D cost estimate (+/-50 per cent)), and includes the costs associated with metering all Watutco connections and capital improvement cost charges (CICCs) – all to be borne by the Watutco residents.

Prior to engaging with residents of Watutco, the CVRD recommends developing a better understanding of the cost per connection and the impact on water rates that would occur for existing BCOB property owners and Watutco property owners. The three options and the cost per connection details that would be further developed are:

1. Watutco remaining an independent private utility;
2. Watutco becoming a CVRD owned and operated service, wherein source water from Watutco's river infiltration gallery is supplied to the existing BCOB system; or
3. Watutco remaining an independent service area but becoming owned and operated by the CVRD.

Prepared by:	Concurrence:	Concurrence:
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Zoe Berkey, EIT Engineering Analyst	Kris La Rose, P.Eng. Senior Manager of Water/Wastewater Services	Marc Rutten, P.Eng. General Manager of Engineering Services

Stakeholder Distribution (Upon Agenda Publication)

Watutco Enterprises Ltd.	
Strathcona Regional District	

Background/Current Situation

The Watutco Water System is a privately owned and operated water supply and distribution system supplying water to 128 residential and two commercial operations. Water for the system is supplied by an infiltration gallery and a shallow well located within the Pacific Playgrounds recreation site adjacent to the Oyster River.

The current challenge for the water system is:

- The Watutco system treats water with ultraviolet and chlorine and is not in compliance with Island Health's *Drinking Water Treatment Objectives (Microbiological) for Surface Water Supplies* and will require upgrades to be in compliance.

In December 2015, the owner of the Watutco Water System submitted a letter formally requesting to enter into negotiations with the CVRD to take over the private system, including the three water licences held by Pacific Playgrounds. Before proceeding with these negotiations more information was required. A water system assessment and governance options analysis has been completed assessing potential options for the conversion of the Watutco system to a CVRD WLSA. Three options reviewed by McElhanney and associated governance structures are summarized below, the water system assessment and governance report are attached as Appendix A and B respectively.

Additionally, there remains the option of the status quo, where Watutco remains a private utility and continues to operate as such. Should the two systems remain independent the Watutco system will require upgrades to be in compliance with Island Health, the upgrades developed within Option 1 of the McElhanney report would still be required for this option.

Option 1: Watutco System Remain Separate from the BCOB System but Operated by CVRD
In this option the Watutco Water System would become a separate CVRD WLSA that would be owned and operated by the CVRD. Upgrades to the Watutco system would include the addition of direct filtration complemented with chemical addition to comply with regulations and addition of a clearwell.

Option 2: Raw Water Transfer from Watutco to BCOB
In this option, raw water from the Watutco system would be transferred to the BCOB via a new water main under the Oyster River to the existing source water infrastructure of the BCOB system. A new reservoir for the Watutco system would be required to help equalize flow and to provide storage for firefighting purposes. Currently the Watutco and BCOB distribution networks are interconnected but valved off, minor modifications to the Watutco distribution system may be required when the valve is opened.

Option 3: Water for Both Watutco and BCOB Supplied from the Existing BCOB System
The Watutco system would be supplied water directly from the existing BCOB system, no source water transfer would occur. A new reservoir for the Watutco system would still be required and minor modifications to the Watutco distribution system may be required when the valve connecting the two distribution systems is opened. Establishment of a new service area for Watutco would be necessary. Due to water availability concerns, this option is not recommended and will not be considered moving forward.

For all options it is recommended that the CVRD consider administration and operation of the service by CVRD staff under the guidance of the Board and the respective committee. Prior to conversion to a CVRD service, elector assent would be required.

Policy Analysis
At the August 15, 2016 meeting the Black Creek/ Oyster Bay Services Committee approved the following recommendation:

> *THAT up to $20,000 of Electoral Area 'C' feasibility study funds be allocated for a study to assess the condition of the existing system, the quality and quantity of water associated with the three licences that supply the Watutco Water System and the feasibility of incorporating the Watutco system into the Black Creek-Oyster Bay water system;*
>
> *AND FURTHER THAT the 2016-2020 financial plan for Puntledge-Black Creek (Area 'C') feasibility studies service, function 153 be amended to reallocate $17,000 from liquid waste management studies to fund the Watutco Water System feasibility study.*

Policy No. 5600-00 requires specific steps to be met such that due diligence is performed and the CVRD understands the condition of infrastructure that may be transferred as the result of a water system transfer to the CVRD.

Options

The Black Creek/ Oyster Bay Services Committee has the following options:

1. To proceed with further discussions with the owners of the Watutco Water System and complete the development of cost per connection impacts and public consultation with residents in regards to the conversion of the Watutco Water System.
2. To not proceed with further discussions regarding the conversion of the Watutco Water System at this time.

Further work is required to develop a better understanding of the costs to residents and the interest from residents in regards to becoming a CVRD owned and operated service. As such only Option No.1 above is recommended.

Financial Factors

The water system assessment looked at three potential options for the Watutco system should the system be transferred to the CVRD. Costs are a very important in determining the options for conversion of a service, the cost of each option for Watutco is described within Table No. 1 below. The costs for Option 3, connection to BCOB with no source water supply is not shown as it is not considered a feasible option. In addition to infrastructure system changes and construction, for options two capital improvement cost charges would be required to be paid.

Table No. 1: Class 'D' (+/- 50 per cent) Capital Cost Estimates for Watutco Connection Options

Component	Option 1 *Separate CVRD Service*	Option 2 *Source Water Supply to BCOB*
WTP Upgrade	$500,000	
Reconfigure Booster Lift Station	$20,000	$20,000
Gravity/Forcemain		$50,000
Backwash Lift Station	$30,000	
Backwash Main	$30,000	
Reservoir/Clearwell	$700,000	$350,000
Water Distribution System		$30,000
Capital Improvement Cost Charges (130 at $6,058 each)		$787,540
Water Meters (130 at $1,200 each)	$156,000	$156,000
Total Cost	**$1,436,000**	**$1,393,540**

Further work is required to determine the effect on water rates and the cost per connection for these options. Additionally, discussions with Watutco will be required to better understand the cost impacts of the status quo option.

Legal Factors

A satisfactory agreement between Watutco and the CVRD for the acquisition of the water system would be required, and the CVRD will be required to establish a service area to fund the cost of acquisition of the Watutco Water System.

Establishment of a service area for the purpose of acquiring, operating, constructing or extending of the water system will require some form of elector approval under section 342 of the *Local Government Act* (RSBC 2015 c.1).

Regional Growth Strategy Implications
The Regional Growth Strategy has identified the Saratoga Miracle Beach area as a settlement node. A prime issue limiting growth within the Saratoga Beach settlement node is the lack of servicing, including water. The Watutco system currently owns and operates three water licenses, transfer of the water licenses and source water to the BCOB system may help relieve some of the current water capacity concerns within the system.

In addition, the current Watutco system is unmetered, potentially resulting in higher consumption patterns. Should the CVRD begin managing the system improved water management and conservation efforts in accordance with the Regional Growth Strategy will be implemented, including the installation of water meters.

Intergovernmental Factors
Discussions with Watutco Enterprises and the Ministry of Community, Sport and Cultural Development will be required should it be decided to proceed with the conversion process.

Interdepartmental Involvement
Engineering Services is leading this work and has initiated the water system assessment and governance review studies.

Should consultation with the public indicate that there is an appetite for Watutco to become a CVRD service, significant work with Legislative Services will be required to coordinate discussions, acquisitions and elector assent.

Citizen/Public Relations
One of the key steps in the potential transfer of water systems is engaging with Watutco residents and property owners to share information on the conversion, identify expected costs and describe proposed governance structures. Once a better understanding on the cost impacts for residents has been developed, an open house will be an essential next step in the process to inform about options.

Attachments: Appendix A – "Watutco Water System Assessment Report, McElhanney"
Appendix B – "Watutco Water Service Acquisition Governance and Acquisition Options for New Water Service Review, Stewart McDannold Stuart"

Technical Memo

McElhanney

Appendix A

TO	FROM
Kris La Rose, P.Eng. Sr. Manager of Water/Wastewater	Dragan Rokić, P.Eng. Bob Hudson, P.Eng.
COMPANY	**MCSL BRANCH**
Comox Valley Regional District	2211 – Courtenay
RE	**DATE**
Watutco Water System Assessment – Rev. 4	October 3, 2018
	FILE NUMBER
	2211-47462-00

1. Introduction

Watutco Water System (WWS) is a privately owned and operated small water supply/distribution system serving the Watutco Local Service Area (WLSA) north of Courtenay, BC. The system currently provides water supply to 128 residential (127 permanent and one seasonal) lots and two commercial operations. The maximum number of connections authorized for the service is 134 (Watutco Enterprises Ltd., 2013, 2014, 2015).

Water to the WWS is supplied by an infiltration gallery and a shallow well located within Pacific Playgrounds recreation site adjacent to the Oyster River. The raw water source is under direct influence of surface water. Dual disinfection (UV and chlorination) is currently used as the only form of treatment.

As part of the ongoing raw water quality monitoring programs, health risk assessments, and review and update of regulatory requirements associated with small water systems, the WLSA is required to upgrade its current water treatment to comply with the Vancouver Island Health Authority's (VIHA) treatment objectives of the 4-3-2-1-0 policy (VIHA, 2016). These objectives provide treatment requirements that address microbiological parameters, such as enteric viruses, pathogenic bacteria, Giardia cysts and Cryptosporidium oocysts. The general objectives are:

- 4-log reduction or inactivation of viruses;
- 3-log reduction or inactivation of Giardia and Cryptosporidium;
- two treatment processes for surface water or ground water under direct influence of surface water;
- less than or equal to one nephelometric turbidity unit (NTU) of turbidity; and
- no detectable E. Coli, fecal coliforms, and total coliforms.

These drinking water treatment objectives provide a minimum performance target for water suppliers to treat water to produce microbiologically safe drinking water. Depending on specific situations, the actual level of required treatment will depend on the identified risks and may require greater levels of treatment.

2. Study Objective

The WWS owner is currently in negotiations with the Comox Valley Regional District (CVRD) over the transfer of the system operation to the CVRD. Consequently, the CVRD has commenced an engineering

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review of the WWS to verify the feasibility of transferring ownership of the water system and licenses. This study was commissioned to provide the CVRD with sufficient information in support of an informed decision regarding the future status of the WWS.

3. Scope of Work

The study scope included the following:

- quantity and quality characterization of Watutco's raw water source to the extent possible and subject to the availability of historical data;
- condition assessment of Watutco's water intake infrastructure (i.e., infiltration gallery and well) considering the previously completed work (McElhanney, 2014);
- a short-term capacity testing/assessment of Watutco's water intake infrastructure (i.e., infiltration gallery, well, and supply pump) under hydraulic stress;
- identification and assessment of water infrastructure upgrade options and operational scenarios including a cost-benefit analysis. These options are described in more detail in Section 10; and
- recommendation of a preferred option and asset upgrade/replacement requirements for the preferred option.

4. Watutco Water System

The WWS intake consists of an infiltration gallery and shallow well located adjacent to the Oyster River followed by a dual disinfection process employing UV light and chlorination. Disinfected water is supplied to the Watutco distribution network via a duplex lift station housing two booster pumps each rated for 15 L/sec (McElhanney meeting minutes, January 4, 2017). The water distribution system currently operates without a water storage tank that is typically provided to equalize variations between the daily and hourly water consumption, and to provide storage for fire-fighting purposes and contingency.

The Watutco water distribution network is interconnected with an adjacent Black Creek/Oyster Bay (BCOB) water distribution system, however, the two systems are currently valved off and operate independently of each other.

The WWS currently has three water licenses totalling 144,361 m^3/yr (Water Licenses Report, BC Government, 2015).

5. Black Creek/Oyster Bay Water System

For comparison, BCOB water license for the river intake is 497,797 m^3/yr (Water Licenses Report, BC Government, 2015 and CVRD, 2017). Information on the BCOB water license for the groundwater wells has not been provided. Consequently, the total licensed flow for the BCOB system could not be calculated.

The BCOB system extracts water from two sources, the Oyster River through an infiltration gallery known as Well 2A/2B, and from groundwater through CVRD Wells 1 and 4 also known as PW1 and PW2. The summary of the estimated BCOB system water source capacity is provided in Table 1 (Koers, 2010, 2014).

Table 1 Black Creek/Oyster Bay System Water Source Capacity

Source	Wells	Capacity	Max. Capacity (without safety factor) (L/sec; m^3/yr)	Effective Capacity (with 20% safety factor) (L/sec; m^3/yr)
Oyster River	2A and 2B	License	42.1 (1,327,666)	33.7 (1,062,134)
Groundwater	1 and 4	Combined	33.3 (1,050,149)	26.6 (840,120)
Total			75.4 (2,377,815)	60.3 (1,902,254)

The combined capacity of CVRD Wells 1 and 4 in Table 1 is based on a long-term sustainable combined yield as recommended by EBA Engineering Consultants Ltd. in the February 2004 Water Supply Study. Groundwater wells 1 and 4 operate year-round while Wells 2A/2B supplement water supply only during summer months with historically high water consumption.

The effective operational capacity (i.e., limit) of the BCOB intakes in Table 1 is estimated at 80% of the estimated maximum capacity based on a safety factor of 20%.

In 2015, GW Solutions (GWS) conducted a 24-hr pumping test on CVRD Well 4 to assess the well seasonal (i.e., summer) performance/yield and aquifer response due to observed extremely low flows in the Oyster River over 2014 and 2015 summer months. The results of this test are summarized in Table 2.

Table 2 Yield Estimates for Groundwater Wells 1 and 4

Yield Scenario	Well 1 (L/sec; m^3/yr) (Note 1)	Well 4 (L/sec; m^3/yr) (Note 1)	Well 1 (L/sec; m^3/yr) (Note 2)	Well 4 (L/sec; m^3/yr) (Note 2)
Max. Capacity (without safety factor)	20 (630,720) (1,728 m^3/d)	6.9 (217,598) (596 m^3/d)	13.5 (425,736) (1,166 m^3/d)	2.7 (85,147) (233 m^3/d)
Effective Capacity (with 30% safety factor)	14 (441,504) (1,210 m^3/d)	4.8 (151,373) (415 m^3/d)	9.5 (299,592) (821 m^3/d)	1.9 (59,918) (164 m^3/d)

Notes:

Note 1 - When Wells 1 and 4 are pumped individually, i.e., not together

Note 2 – When Wells 1 and 4 are pumped simultaneously resulting in the combined capacity of 16.2 L/sec (1,400 m^3/day; 510,883 m^3/yr) and 11.4 L/sec (985 m^3/day; 359,510 m^3/yr) without and with a safety factor, respectively.

It may be noted that the combined effective seasonal capacity of Wells 1 and 4 was reduced by 57% from 26.6 L/sec (2,298 m^3/d) (Table 1) to 11.4 L/sec (985 m^3/d) (Table 2) based on the 2015 pump test. The GWS report concluded that neither Well 1 or 4, individually or combined, will be able to meet the BCOB system peak summer demand of 23.1 L/sec (2,000 m^3/day) without a supplemental water source (other

than the Oyster River) should extremely low seasonal flow trends in the Oyster River continue in the future.

GWS also recommended that CVRD should operate only Well 1 individually and never in concert with Well 4. To meet BCOB summertime demand from groundwater supplies, an additional well would be required to be drilled outside of the effective radii of influence of Wells 1 and 4.

6. Watutco Water System Condition Assessment

The Watutco water system assessment was completed by McElhanney in 2014. This assessment was limited to distribution system components downstream of the existing booster station. In general, the existing distribution system was found to be in good condition considering the age and unknown maintenance history.

Visual assessment of the Watutco water infiltration gallery has not been possible and practical during the work on this study due to budgetary and timeline constraints.

7. Watutco Water Intake Structure Capacity Testing

7.1 Pump Testing on July 20, 2017

A short-term capacity testing/assessment of Watutco's water intake infrastructure (i.e., infiltration gallery, well, and supply pump) under hydraulic stress was conducted on July 20, 2017. The test was conducted over approximately a two-and-a-half-hour period. The main objective of the test was to estimate the maximum sustainable hydraulic yield of the intake structure under hydraulic stress conditions. Test results are provided in Appendix 1.

During the test, the regular water consumption in the Watutco community was averaging 81% of the licensed amount (refer to Section 4) calculated over the entire year.

In addition to regular water consumption, two additional pumps were used to stress the well. Based on the test results, the average combined capacity of these two pumps during the test was 58.8 m^3/hr, ranging from 49 m^3/hr to 89.6 m^3/hr.

The total water draw, including the regular water consumption and additional water draw by pumps, was averaging 4.4 times the licenced amount, ranging from 3.6 (when one pump was operating) to 6.4 (when two pumps were operating). Water level in the test well dropped by one meter during the test duration until the test was eventually interrupted due to concerns that it might affect regular water supply to the community.

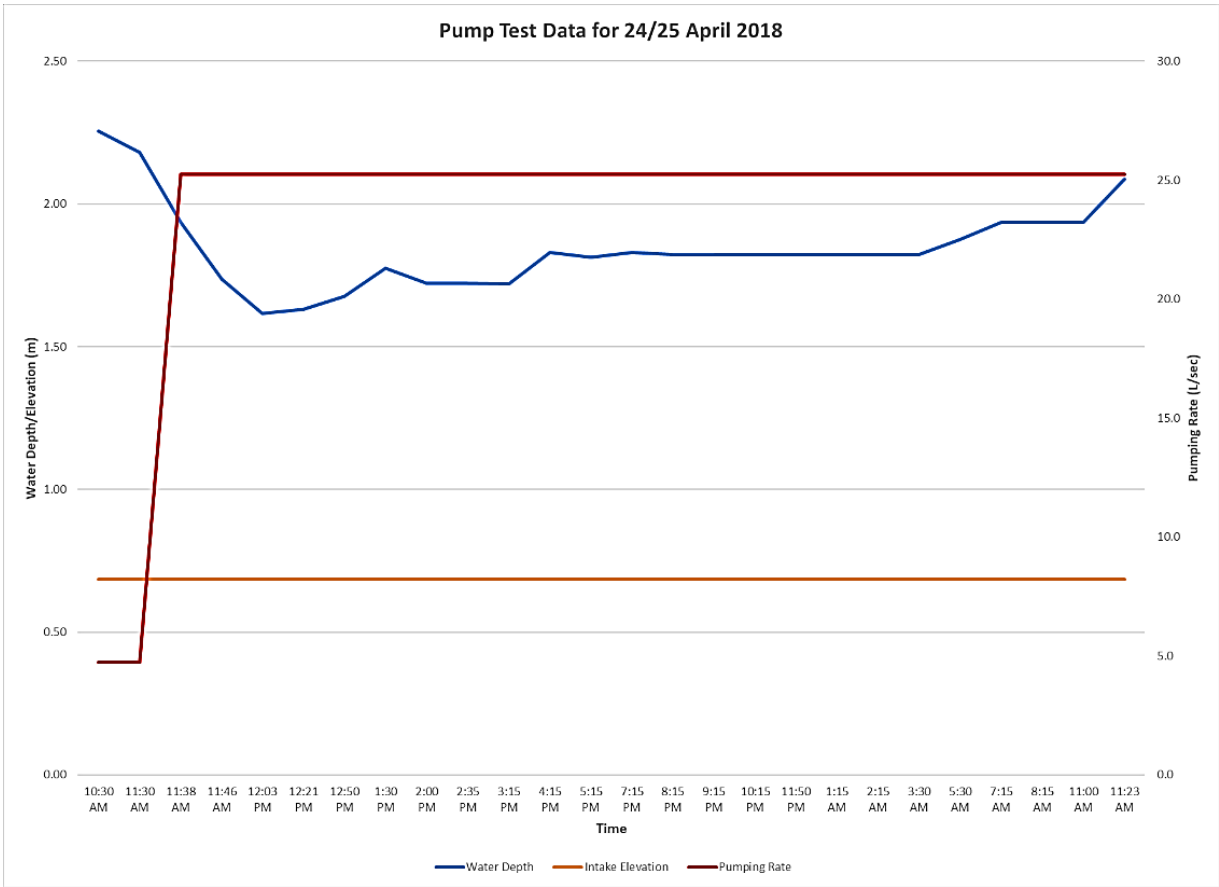
The results (Appendix 1) indicate an unsustainable operation at tested flows as the well yield equilibrium has not been achieved. As expected, the results show a steeper drawdown curve when two pumps were operating compared to a single pump.

7.2 Pump Testing on April 24 to 26, 2018

Another pump test to assess the capacity of Watutco's water intake infrastructure at low flows was attempted between April 24 and 26, 2018. The initial test (Test #1) was conducted over a 25-hr period from 10:30 am (Apr 24) to 11:23 am (Apr 25). The subsequent test (Test #2) was conducted over a 3-hr period from 11:55 am to 2:51 pm on April 26, 2018.

The drawdown water level in the test well stabilized after approximately one and a half hours at a pumping flow rate of 91 m^3/hr during Test #1 (Refer to Figure 1). The maximum observed drawdown was 0.64 m. No water level changes were observed at the intake gallery during test duration.

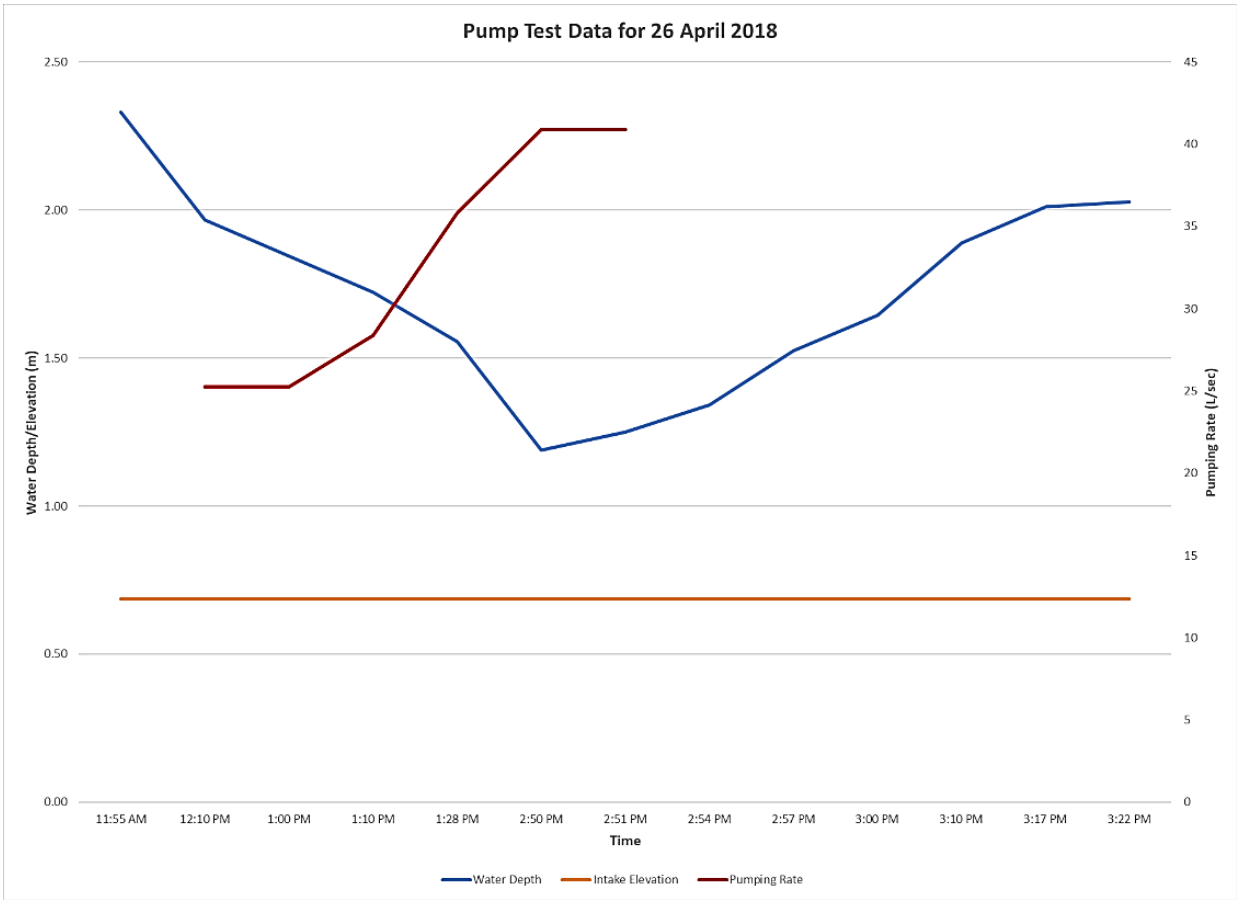
Figure 1 Pump Test Data for 24/25 April 2018



The drawdown water level in the test well stabilized after approximately three hours at an increased pumping flow rate ranging from 91 m^3/hr to 157 m^3/hr during Test #2 (Refer to Figure 2). The maximum observed drawdown was 1.14 m coinciding with the maximum flow rate. No water level changes were observed at the intake gallery during test duration.

During both tests, the regular water supply to the Watutco community was averaging approximately 60% of the licensed amount (refer to Section 4) calculated over the entire year.

Figure 2 Pump Test Data for 26 April 2018



The results of the well testing are inconclusive at this time. The test conducted on July 20, 2017 should be repeated at a lower test flow rate to estimate the maximum sustainable hydraulic yield of the intake structure under hydraulic stress conditions.

The test conducted in April 2018 is not representative of low flow conditions in the catchment area as drawdown levels stabilized at higher flows compared to the 2017 test. The test was conducted too early in a year and should be repeated during a drier summer period towards the end of July and August, as commented above.

7.3 Pump Testing on August 18 to 19, 2018

Another pump test was conducted on August 18 and 19, 2018 following recommendations from the previous testing attempts. The test was initiated at 9:00 am on August 18, 2018 with an initial flow of 90 m^3/hr. The flow dropped to 46 m^3/hr after 36 minutes of pumping at 9:36 am when the pump(s) lost prime (refer to Figure 3). The observed water level elevation above the water intake was 0.37 m when the pump(s) lost prime (refer to Figure 4).

Figure 3 Pump Test Data for 18/19 August 2018

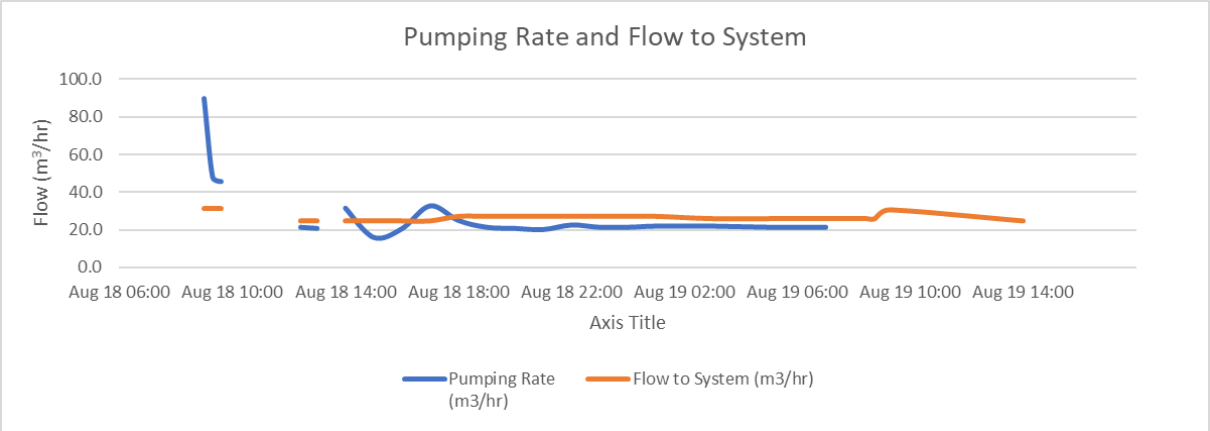
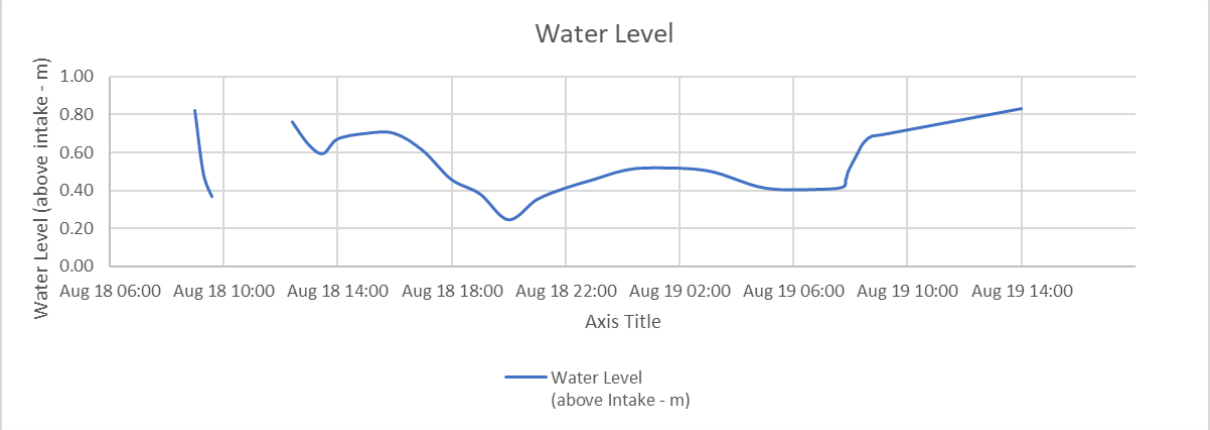


Figure 4 Pump Test Data for 18/19 August 2018



The second attempt was initiated at 12:25 pm on August 18, 2018 and ended at 7 am on August 19, 2018. During initial 4.5 hours of pumping the flow was increased from 21 m^3/hr to 33 m^3/hr causing the water level elevation above the intake to drop from 0.76 m to 0.24 m (refer to Figure 4). The flow rate was then reduced to approximately 22 m^3/hr (refer to Figure 3) and the level stabilized between 0.4 m and 0.5 (refer to Figure 4).

During the same period, water demand in the WWS was 27 m^3/hr. Hence, the total combined flow from the water intake at which the system reached equilibrium was 49 m^3/hr. Based on the pump test results, this flow seems to be the system maximum capacity during summer operating conditions that would still maintain water level in the Oyster River approximately 0.4 to 0.5 m above the intake structure.

8. Watutco Water System Historical Data

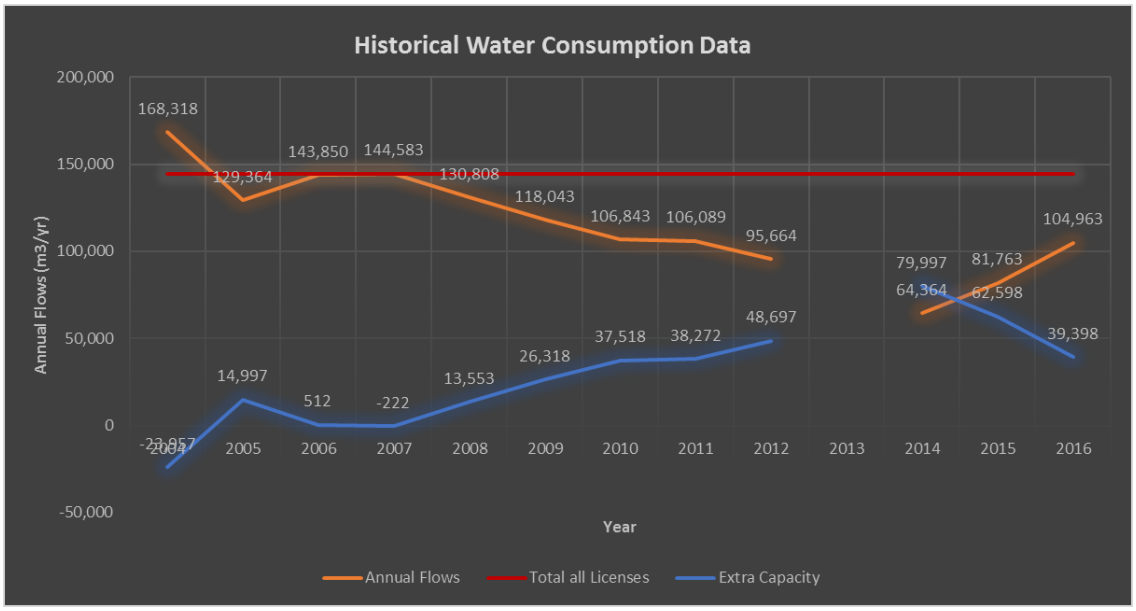
The WWS historical flow data were provided by the CVRD and other sources for the period between 2004 and 2016, however, with the inconsistent level of detail. Data included monthly and annual flows between 2004 and 2012, and annual flows between 2014 and 2016. Flow data for 2013 were incomplete and were not considered in this study. Daily and hourly flow data were not provided.

Available daily raw water quality data, mainly turbidity and pH, were provided by the CVRD for 2015 and 2016. Sporadic E.Coli and fecal coliform data were also provided for 2015 and 2016. No other raw water quality data were provided.

8.1 Flow Data

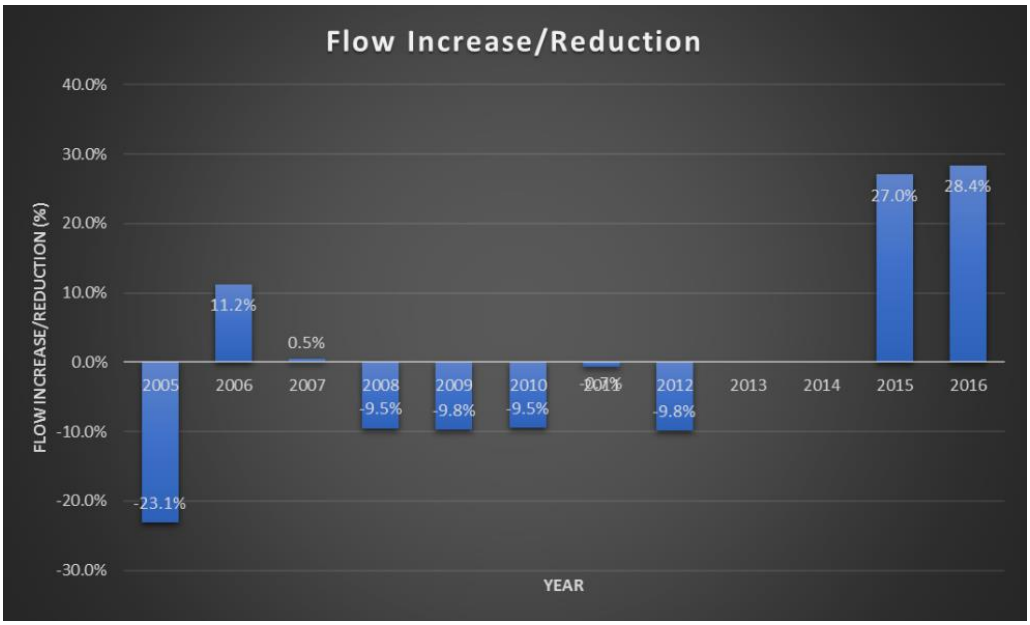
Historical WWS annual flow data are shown in Figure 5. The declining water use trend between 2008 and 2012 was reversed after 2014. The figure also shows the extra annual capacity available relative to the water license after the Watutco water demand had been met.

Figure 5 Historical Annual Water Consumption Data



The magnitude of annual flow increase and reduction is shown in Figure 6. With the exception of 2011, the declining annual water use trend between 2008 and 2012 was approximately 10% per year. However, the trend reversal is noticeable after 2014 resulting in approximately 27% to 28% annual water use increase. The Watutco water license was violated twice in 2004 and 2007 (refer also to Figure 5).

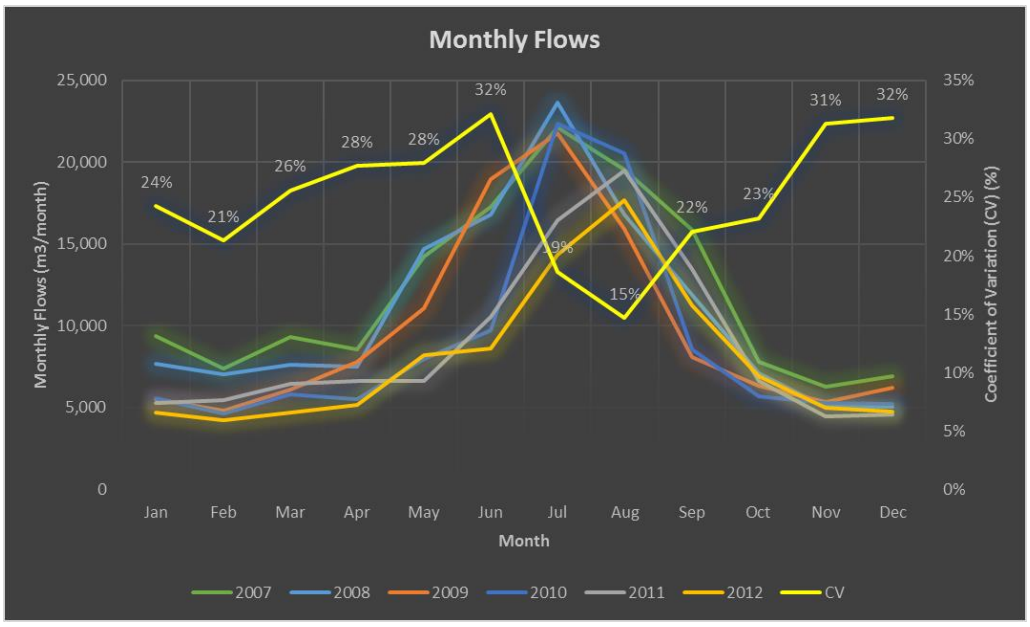
Figure 6 Magnitude of Flow Increase/Reduction



Monthly flow distributions for the period 2007-2012 are shown in Figure 7. The maximum water use occurs during summer months in July and August with a noticeable shift to August peaks after 2010.

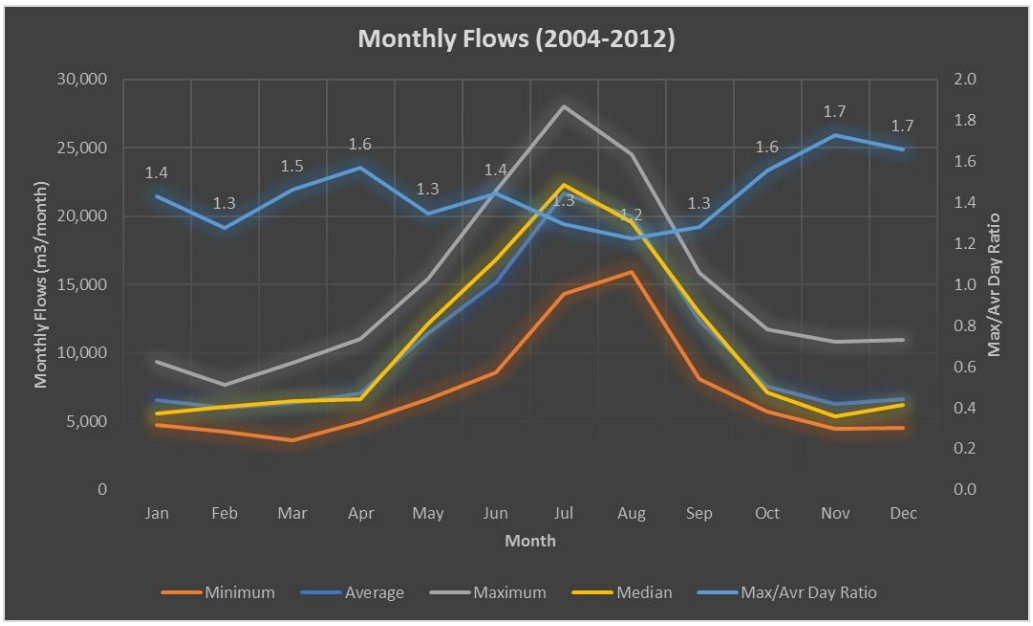
The coefficient of variation (CV) shown in Figure 7 is calculated based on the entire available flow data (i.e., sample) from 2004 to 2012. Based on the CV distribution, water consumption over the summer months is more predictable than during the rest of the year. The average CV for the entire sample is 25%

Figure 7 Monthly Flow Distributions (2007-2012)



Characteristic monthly flows (e.g., minimum, average, maximum, and median) based on the entire available flow data (i.e., sample) from 2004 to 2012 are shown in Figure 8.

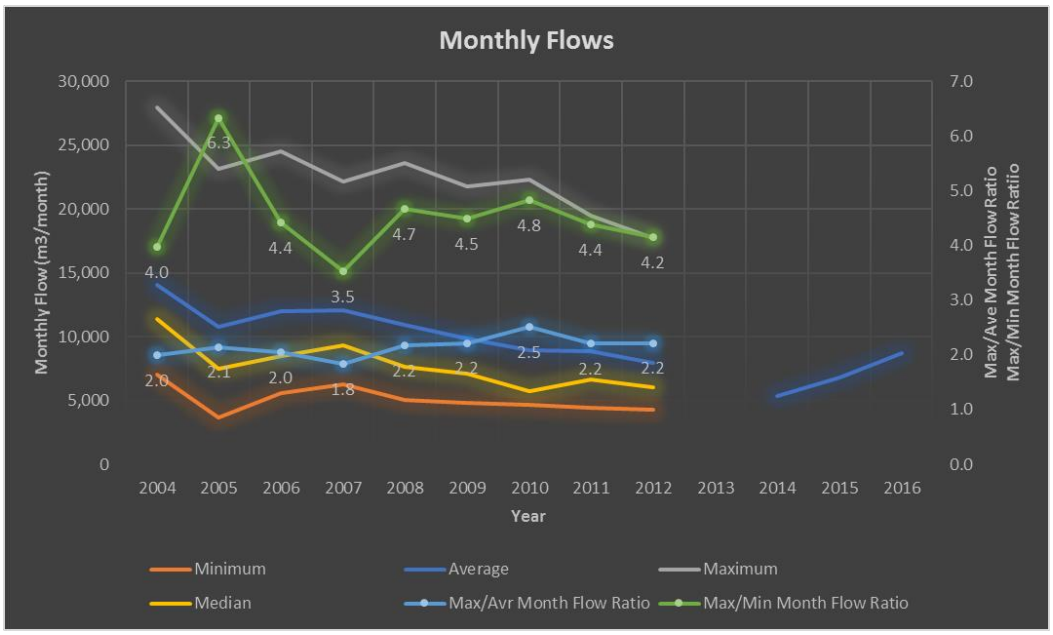
Figure 8 Monthly Flows (2004-2012)



As daily flow data were not available, the maximum to average flow ratios shown in Figure 8 were calculated based on the average and maximum monthly flows averaged over the entire month as the best estimate. The range of the maximum to average day flow ratios is from 1.2 to 1.7, averaging 1.4. In reality, this ratio can be higher due to data limitations and the calculation methodology used to estimate maximum day flows. For example, the range of max/ave day ratios for the adjacent BCOB community is from 2.05 to 2.48 based on the data from 2005 to 2009 (Koers, 2010).

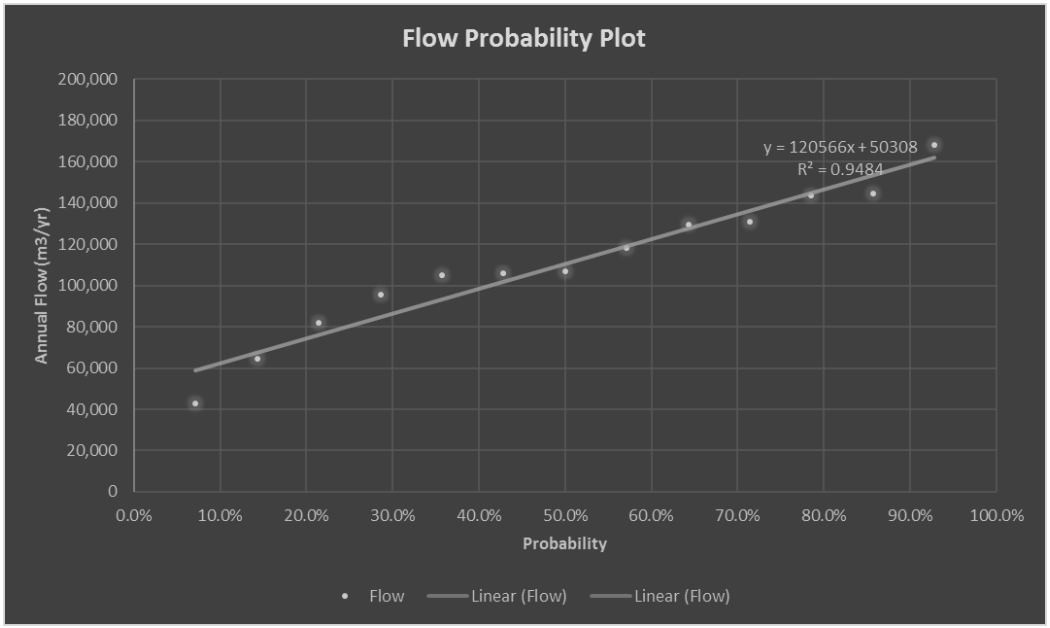
Characteristic monthly flows (e.g., minimum, average, maximum, and median) in each year, based on the entire available flow data (i.e., sample) from 2004 to 2012, are shown in Figure 9. The range of the maximum to average month flow ratios is from 1.8 to 2.5, averaging 2.1. Likewise, the range of the maximum to minimum month (i.e. seasonal) flow ratios is from 3.5 to 6.3, averaging 4.5. This range demonstrates variations in seasonal water usage.

Figure 9 Monthly Flow Data (2004-2012)



The empirical probability plot of annual flows is shown in Figure 10. The plot demonstrates that the WWS complied with the water license approximately 80% of the time and violated the water license during 20% of the time. This plot can be used to estimate the exceedance probability of any annual flow based on the historical (empirical) flow data. For example, probability that the average annual flow (i.e., 116,221 m^3/yr) over the 2004-2016 period will be exceeded is approximately 45%.

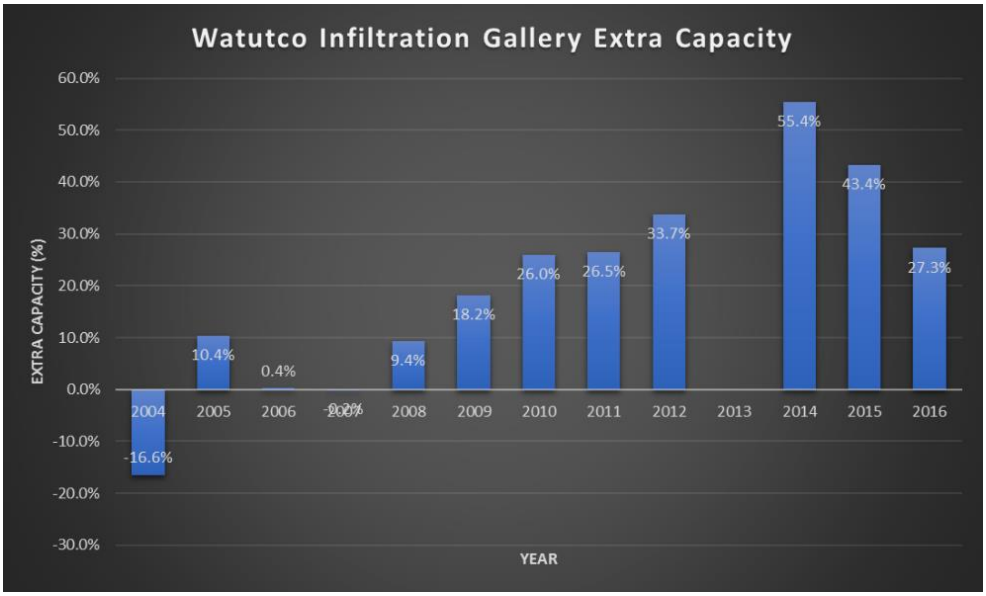
Figure 10 Flow Empirical Probability Plot



8.2 Excess Capacity

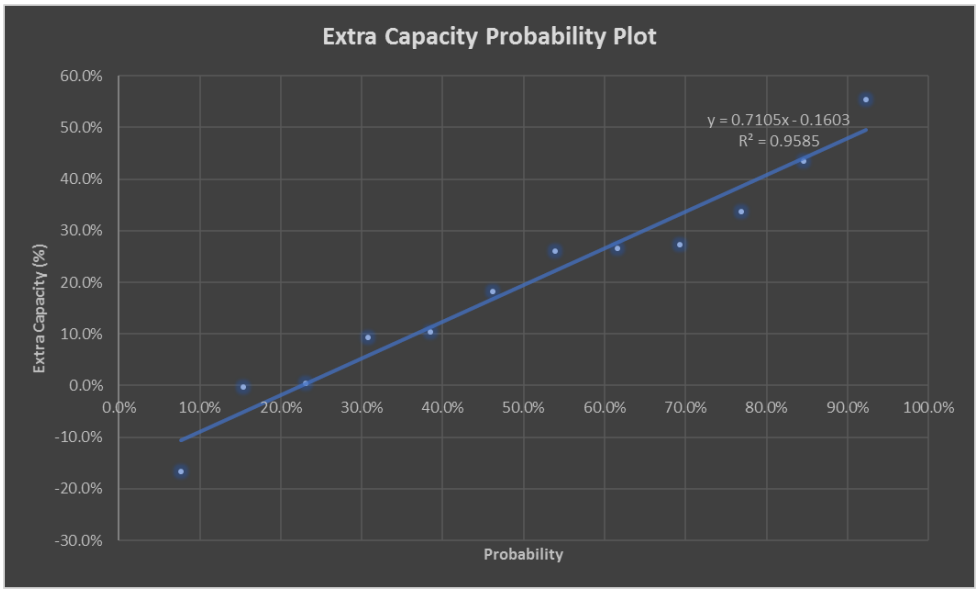
The excess capacity of the Watutco intake relative to the water license is shown in Figure 11. This extra capacity was determined in terms of annual cubic meters (refer to Figure 5) that remained available after the Watutco water demand had been met.

Figure 11 Watutco Infiltration Gallery Extra Capacity



The empirical probability plot of extra capacity at the Watutco water intake is shown in Figure 12. For example, this plot predicts that the probability of excess capacity exceeding the 2016 excess capacity of 27.3% is less than 40%. The average excess capacity over the 2004-2016 period is 19.5%. Probability that this capacity will be exceeded is approximately 50%.

Figure 12 Extra Capacity Probability Plot



8.3 Comparison of Watutco and BCOB Historical Water Consumption Data

For comparison, the historical (metered) annual and maximum daily water use data for Watutco and BCOB are shown in Figure 13 and Figure 14, respectively. The average Watutco/BCOB water consumption ratio is 29% based on data shown in Figure 13.

Figure 13 Watutco and BCOB Annual Water Consumption Data

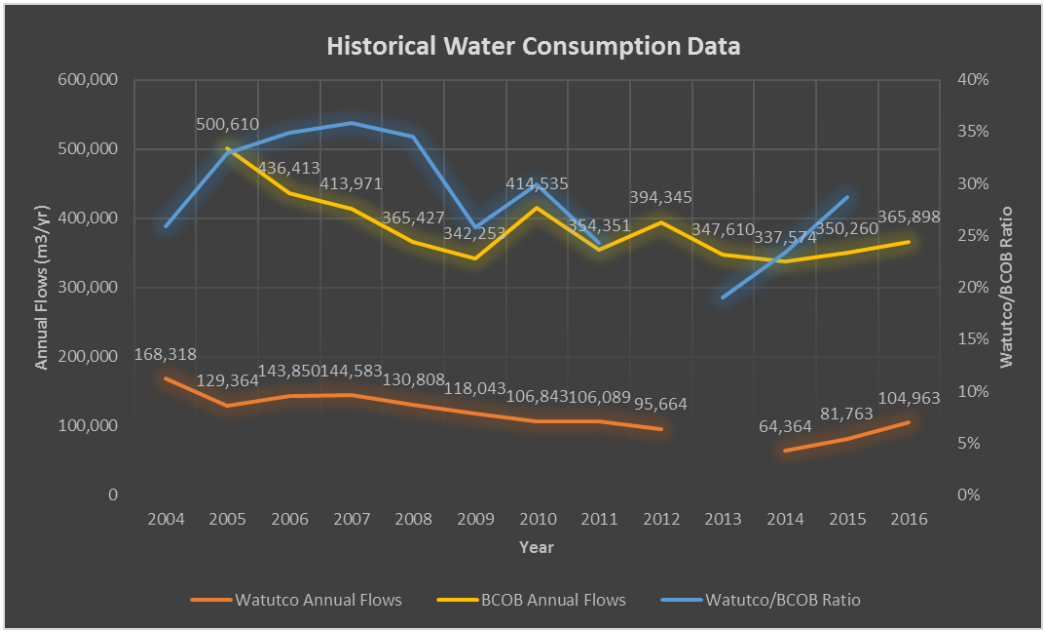
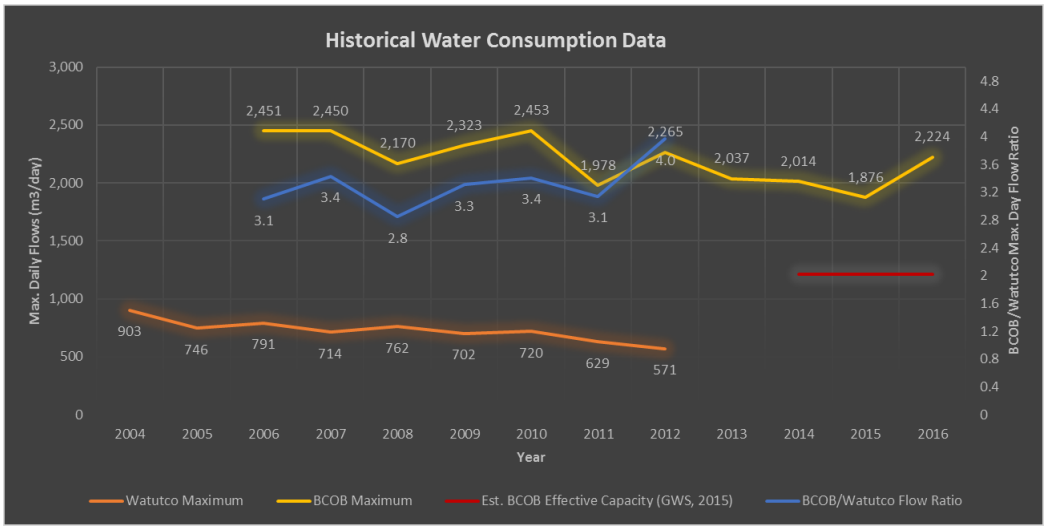


Figure 14 Watutco and BCOB Maximum Daily Water Consumption Data



The effective seasonal capacity of the BCOB ground water wells in Figure 14 is based on GWS, 2015 estimates (Table 2).

Figure 14 indicates that the maximum daily flows for both the BCOB and Watutco water service areas are steady with slight variations.

The maximum daily flow for the BCOB system is approximately 2,000 m^3/day. In recent years, the Comox Valley Regional District has occasionally been required to operate both the ground water wells and the infiltration gallery together (refer to Section 5), to keep up with system requirements during high seasonal water demand. Currently, the BCOB infiltration gallery is fully compliant with the Island Health surface water treatment objectives. Figure 14 also demonstrates that BCOB groundwater wells cannot currently meet the BCOB water demand during high seasonal (summer) water use without an additional water source.

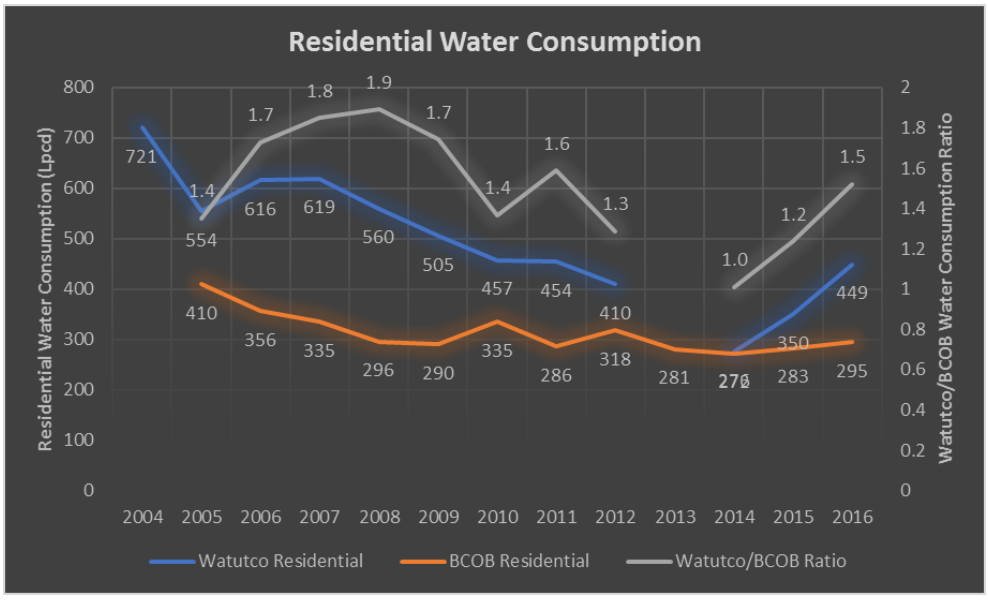
The maximum daily flow for the Watutco system is currently approximately 600 m^3/day. A gradual declining trend of water use data for Watutco can be observed based on data shown in Figure 14.

Currently, the total maximum daily flow of the Watutco and BCOB systems is approximately 2,800 m^3/d.

8.4 Water Use Rates

Residential water use data are shown in Figure 15. The average water use rates are calculated based on the annual revenues provided in water utility annual reports and financial statements between 2013 and 2015 assuming that both residential and commercial customers pay the same water usage fee (Watutco Enterprises Ltd., 2013, 2014, 2015). Based on these reports, the water usage split between residential and commercial users is 58 % vs. 42%, respectively. For comparison, the water usage split between BCOB residential and commercial users is 75 % vs. 25%, respectively (Koers, 2010). The water use rate calculation is based on the residential occupancy of 2.9 people/home and 128 lots. The same occupancy was used for Black Creek/Oyster Bay by Koers (2010).

Figure 15 Average Water Use Data



For comparison, BCOB water use data are also shown in the same figure. It may be noted that average water consumption in the WLSA is considerably higher than in Black Creek/Oyster Bay. A review of historical records for the BCOB local service area shows that the maximum day demand for residential connections has ranged from 590 to 730 Lpcd (Koers, 2010).

The reason for such a variance in water usage is unknown but can attributed to a combined effect of water leaks in the distribution system, higher operating pressures, or population habits (i.e., increased water use for watering lawns, etc.). The system leakage could not be estimated due to the unavailability of daily and hourly historical flow data.

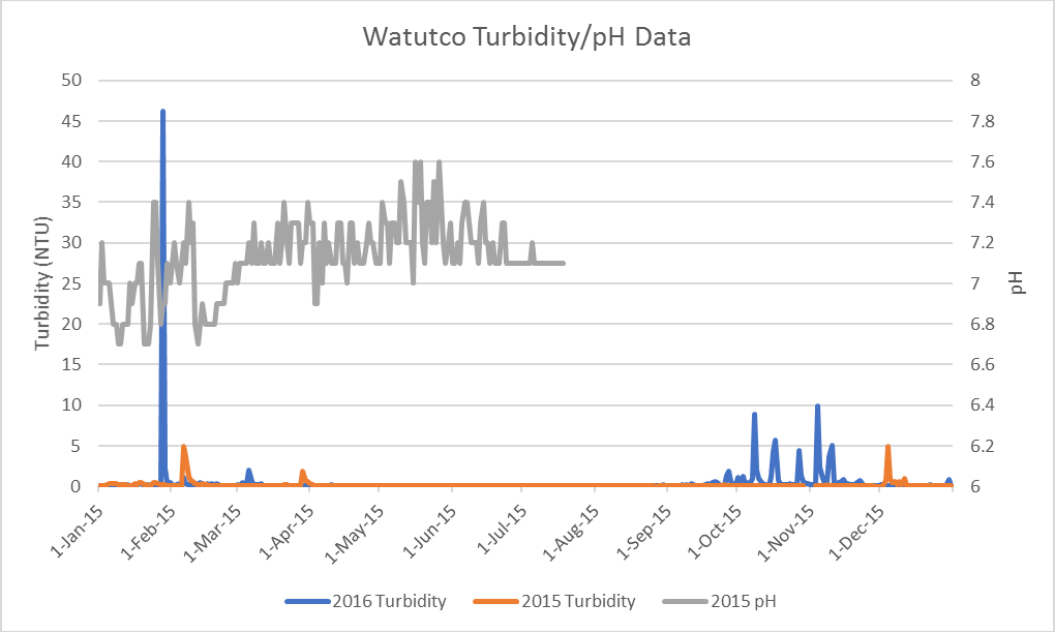
8.5 Water Quality Data

8.5.1 Watutco Water System

Available raw water quality data at a Watutco infiltration gallery are summarized in Figure 16. The same graph showing a better resolution of turbidity data below 1 NTU is shown in Figure 17.

In general, raw water turbidity is very low. Turbidity spikes typically occur during heavy rains and high Oyster River flows over wet fall/winter months from late January to early March and from late September to early November (refer to Figure 17). During these months water usage is at its lowest rate compared to the rest of the year (refer to Figure 7 and Figure 8). The ratio of max. month/Feb and max. month/Oct water usage is shown in Figure 18.

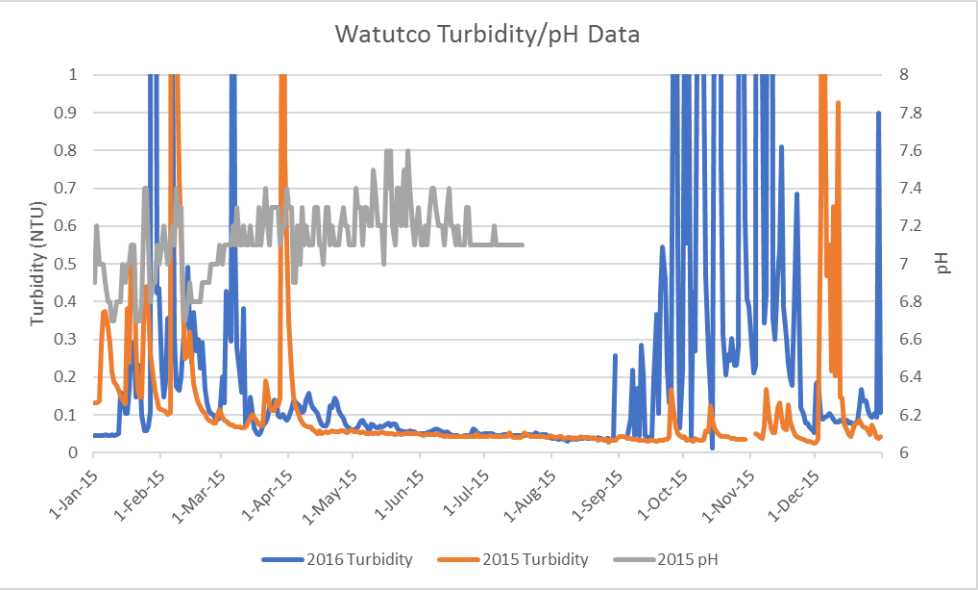
Figure 16 Raw Water Quality Data



However, the frequency of turbidity data exceeding 1 NTU is noticeable in 2016 compared to 2015. Observed turbidity frequencies of interest based on the 2015/2016 turbidity data are provided in Table 3.

The VIHA's 1 NTU turbidity quality objective was exceeded 6 and 22 days in 2015 and 2016, respectively. Turbidity stayed below 1 NTU for the duration of 355 and 338 days in 2015 and 2016, respectively. Likewise, turbidity stayed below 0.3 NTU for the duration of 11 and 10 months in 2015 and 2016, respectively.

Figure 17 Raw Water Quality Data



The pH data range is 6.7 to 7.6. Summarized E.Coli and total coliform data based on the samples taken from the Watutco water distribution system are provided in Table 4 and Table 5, respectively.

Figure 18 Max. Month/Feb and Max. Month/Oct Water Usage Ratios

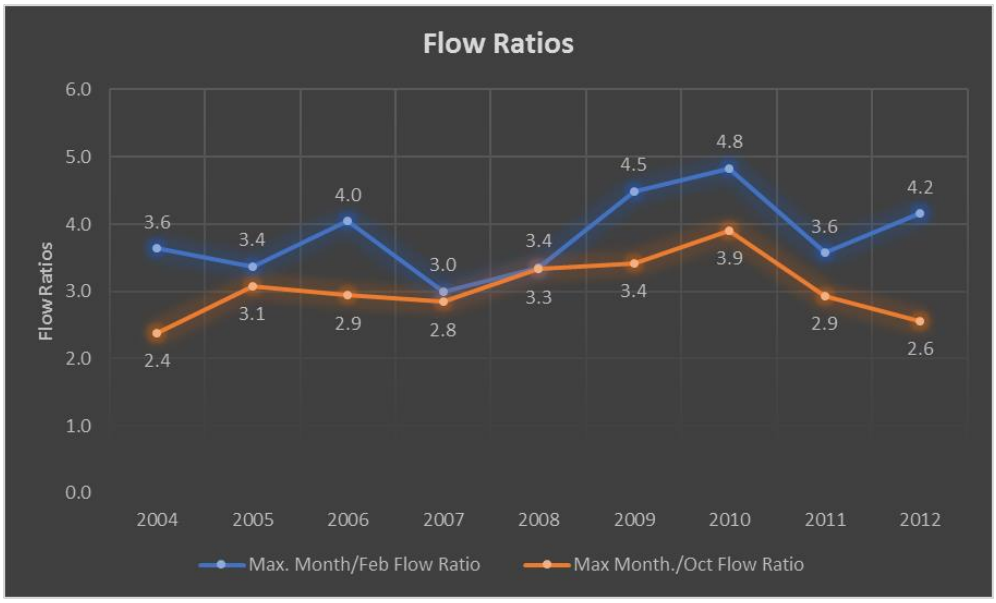


Table 3 Turbidity Frequencies

Turbidity Count	2015	2016
Total Turbidity Count (days/yr)	361	360
Turbidity Count < 1 NTU (days/yr; %/yr)	355 (98.3%)	338 (93.9%)
Turbidity Count < 0.3 NTU (days/yr; %/yr)	334 (92.5%)	298 (82.8%)
Turbidity Count < 0.1 NTU (days/yr; %/yr)	272 (75.3%)	198 (55.0%)
Turbidity Count > 1 NTU (days/yr; %/yr)	6 (1.7%)	22 (6.1%)

Table 4 E.Coli Data

Year	2015		2016	
Location	Taft Pl.	McLarey Rd.	Taft Pl.	McLarey Rd.
Total # of Samples (#/yr)	28	29	35	35
E. Coli Count (#/100 mL)	all samples < 1	all samples < 1	all samples < 1	all samples < 1

Table 5 Total Coliform Data

Year	2015		2016	
Location	Taft Pl.	McLarey Rd.	Taft Pl.	McLarey Rd.
Total # of Samples (#/yr)	28	29	35	35
Total Coliform Count (#/100 mL)	all samples < 1	27 samples < 1 1 sample < 14 1 sample < 3	all samples < 1	all samples < 1

These results indicate that all E.Coli counts in 2015 and 2016 at both Taft Pl and McLarey Rd locations were negative. All 2015 fecal coliform counts at Taft Pl and 2016 fecal coliform counts at Taft Pl and McLarey Rd were also negative. Total coliforms were detected in only two out of 29 samples at McLarey Rd in 2015, as indicated in Table 5, but all meet criteria as specified in Section 9.

No other raw water quality data were provided for the Watutco water system.

8.5.2 BCOB Water System

Available 2016 raw water quality (turbidity and pH) data at a BCOB infiltration gallery (Oyster River) are summarized in Figure 19 and Figure 20 (CVRD, 2016).

In general, raw water turbidity is consistently below 0.2 NTU, averaging 0.05 NTU, and without seasonal turbidity spikes (Figure 19). The pH range is between 6.5 and 7.4, averaging 7.1 (Figure 20).

Figure 19 2016 Oyster River Turbidity Data

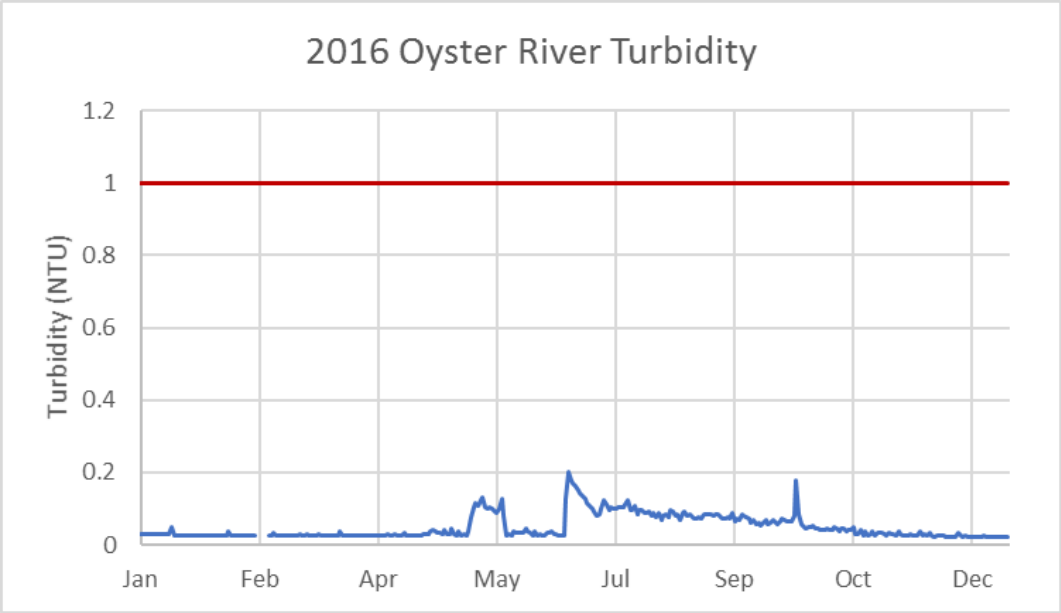
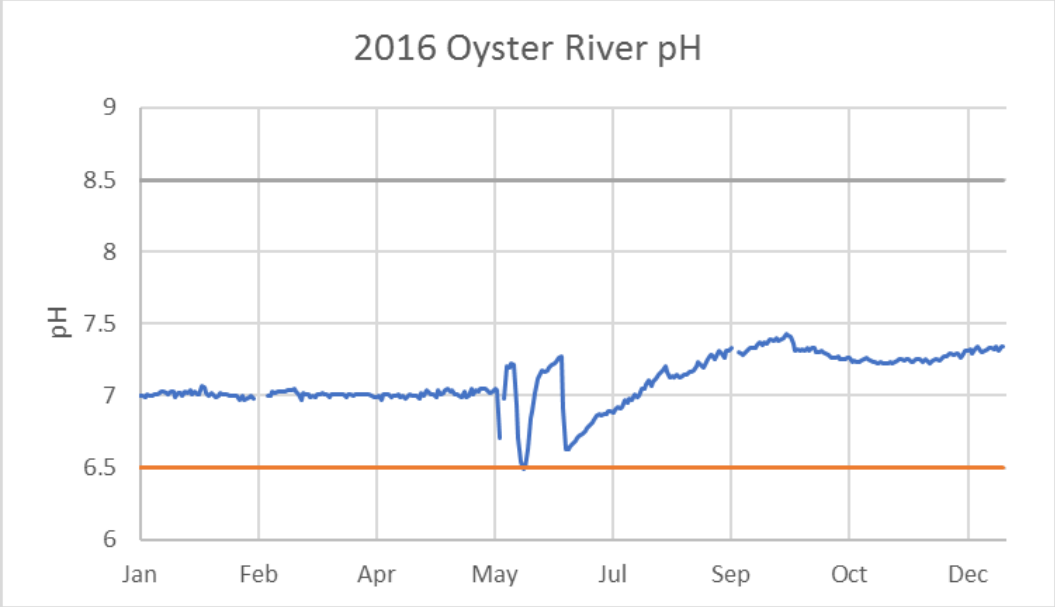


Figure 20 2016 Oyster River pH Data



9. Regulatory Requirements

In addition to VIHA's treatment objectives of the 4-3-2-1-0 policy outlined in Section 1, a water supply system may be permitted to operate without filtration if the following conditions for exclusion of filtration are met, or a timetable to implement filtration has been agreed to by the drinking water officer:

- Overall inactivation is met using a minimum of two disinfection methods, providing 4-log reduction of viruses and 3-log reduction of Cryptosporidium and Giardia.
- The number of E. Coli in raw water does not exceed 20/100 mL, or if E. coli data are not available, less than 100/100 mL of total coliform in at least 90% of the weekly samples from the previous six months. The treatment target for all water systems is to contain no detectable E. Coli or fecal coliforms per 100 ml. Total coliform objectives are also zero based on one sample in a 30-day period. For more than one sample in a 30-day period, at least 90% of the samples should have no detectable total coliform bacteria per 100 ml and no sample should have more than 10 total coliform bacteria per 100 ml.
- Average daily turbidity levels measured at equal intervals (at least every four hours) immediately before the disinfectant is applied are around 1 NTU, but do not exceed 5 NTU for more than two days in a 12-month period.
- A watershed control program is maintained that minimizes the potential for fecal contamination in the source water. (Health Canada, 2003).

Based on the 2015 and 2016 Watutco intake raw water quality data, the first three criteria above have been met (refer to Section 8.5.1). The last condition, restricting use in the watershed to minimize the potential of fecal contamination or elevated turbidity is typically challenging. Elevated turbidity in the Oyster River is typically due to heavy rainfalls in the early spring and late fall and reflects watershed characteristics.

10. Water Management Options

Three water management options have been evaluated as outlined below:

Option1 – Status quo from the operational perspective wherein the Watutco water system remains separate from the BCOB system thus becoming a separate local service area owned and operated by the CVRD. In this option, the existing Watutco water treatment works will have to be upgraded with the addition of a filtration treatment as imposed by VIHA.

Option 2 – Interconnection of the Watutco and BCOB systems wherein raw water is transferred from the Watutco intake to the BCOB treatment works for treatment and subsequent distribution. This raw water transfer must not compromise filtration deferral for the BCOB system currently in effect.

Option 3 - Interconnection of the Watutco and BCOB systems wherein the bulk water is supplied by the BCOB infiltration gallery and groundwater wells. In this option, the Watutco raw water intake works would become de facto defunct.

10.1 Required Upgrades

The required system upgrades in each of the three options outlined above are summarized in Table 6 below.

Table 6 Required Upgrades

Option	Upgrade WTP	Add Treated Water LS	Add Filter Backwash LS	Add Reservoir (Clearwell)	Upgrade Water Distribution System (Note 1)
Option 1	Yes	No; Reconfigure existing booster LS and add forcemain	Yes	Yes (Clearwell)	No
Option 2	No	No - if gravity interconnection is possible; add gravity water main; Reconfigure existing booster LS or use groundwater well pumps and add forcemain, if gravity interconnection is not possible	No	Yes (Reservoir)	No/Maybe
Option 3	No	No	No	Yes (Reservoir)	No/Maybe

Notes:

Note 1 – Requires installation of water meters for all Watutco customers (CVRD, 2017)

WTP – Water Treatment Plant

LS – Lift Station

Option 1 – In this option, the existing water treatment process requires upgrade with the addition of direct filtration complemented with chemical addition, i.e., coagulation, flocculation, and pH adjustment. This upgrade is not negotiable as it was imposed by VIHA. Based on the Watutco intake raw water characterization data, direct filtration is suitable for this application and is typically effective as long as raw water turbidity is below 15 NTU (refer to Section 8.5.1). Filtered water will flow into a 1,000 m^3 clear well (McElhanney, 2016) and then will be transferred with the existing, however, reconfigured booster pumps/piping to the distribution system. This option will require addition of a small lift station for filter backwash transfer. An assumption was made that the existing Pacific Playgrounds wastewater treatment plant would accept this wastewater stream subject to further negotiations between the parties and a mutually acceptable agreement. Filter backwash from a water treatment facility is compatible for co-treatment in either a primary or secondary wastewater treatment facility.

Based on the water quality data, transfer of filter backwash would be required less than a month in a calendar year when raw water turbidity is greater than 1 NTU and when the filtration treatment would be required. The need for, and timing of, the treatment operations can be determined based on the continuous monitoring of turbidity in the Watutco infiltration gallery. As the target of the filtration treatment is to reduce turbidity below 1 NTU, year-round operation of the filtration process, i.e., even when raw water turbidity is below 1 NTU, would not benefit the system operation. Operational conditions of the filtration plant should be negotiated with VIHA considering the range of options, such as, for example: operation only when needed or seasonal operation during wet weather in anticipation of increasing turbidity, should VIHA require a greater level of comfort.

In Option 1, upgrades to the water distribution network will not be necessary. However, installation of water meters for all Watutco customers will be required (CVRD, 2017).

Option 2 – In this option, the BCOB system water supply is supplemented by water transfer from the Watutco infiltration gallery. This option is based on an assumption that anticipated future climate trends will not affect the yield of the Watutco intake. Raw water transfer from the Watutco intake must not compromise filtration deferral for the BCOB system currently in effect. If gravity connection of the two intakes is not possible, then either the reconfigured existing booster lift station or groundwater well pumps can be used to transfer raw water supplies from the Watutco intake to the BCOB system through a new forcemain. As the Watutco water distribution system currently operates without a system reservoir, a new 1,000 m^3 water tank will have to be added to the system. As the Watutco and BCOB water distribution networks are currently interconnected, but valved off, upgrades to the water distribution system may or may not be required subject to additional system modelling. Installation of water meters for all Watutco customers will be required (CVRD, 2017).

Option 3 – In this option, the BCOB system water supply is supplemented by an additional groundwater well. Bulk water to the both systems is supplied by the combined BCOB water sources. In this option, the Watutco raw water intake works would become de facto defunct. As the Watutco water distribution system currently operates without a system reservoir, a new 1,000 m^3 water tank will have to be added to the system. As the Watutco and BCOB water distribution networks are currently interconnected, but valved off, upgrades to the water distribution system may or may not be required subject to additional system modelling. Installation of water meters for all Watutco customers will be required (CVRD, 2017).

11. Option Assessment

11.1 Discussion

Option 1

Upgrade of the existing Watutco water treatment with the addition of direct filtration would enable the WWS to continue operation as a self-sufficient, separate local service area and independently of the BCOB system. This is the current operational model. This upgrade would qualify for 2.5 log removal credit (99.7%) of Giardia and Cryptosporidium, and 1 log removal credit (90%) of viruses (Health Canada, 2012).

Based on the water quality data provided in Table 3, it may be noted that year-round filtration treatment is not required and that the filtration system would be required to operate less than a month in a calendar year. When the raw water turbidity is below 1 NTU, the filtration treatment will not be required. Consequently, return on this investment during either as-needed, seasonal, or year-round water treatment plant operation would be very low. It is important to caution, however, that the frequency of turbidity excursions could increase in the future thus extending the need for water treatment. The CVRD should continue with the current practice of ongoing monitoring and verification of the raw water quality data for re-assessment of the treatment requirements.

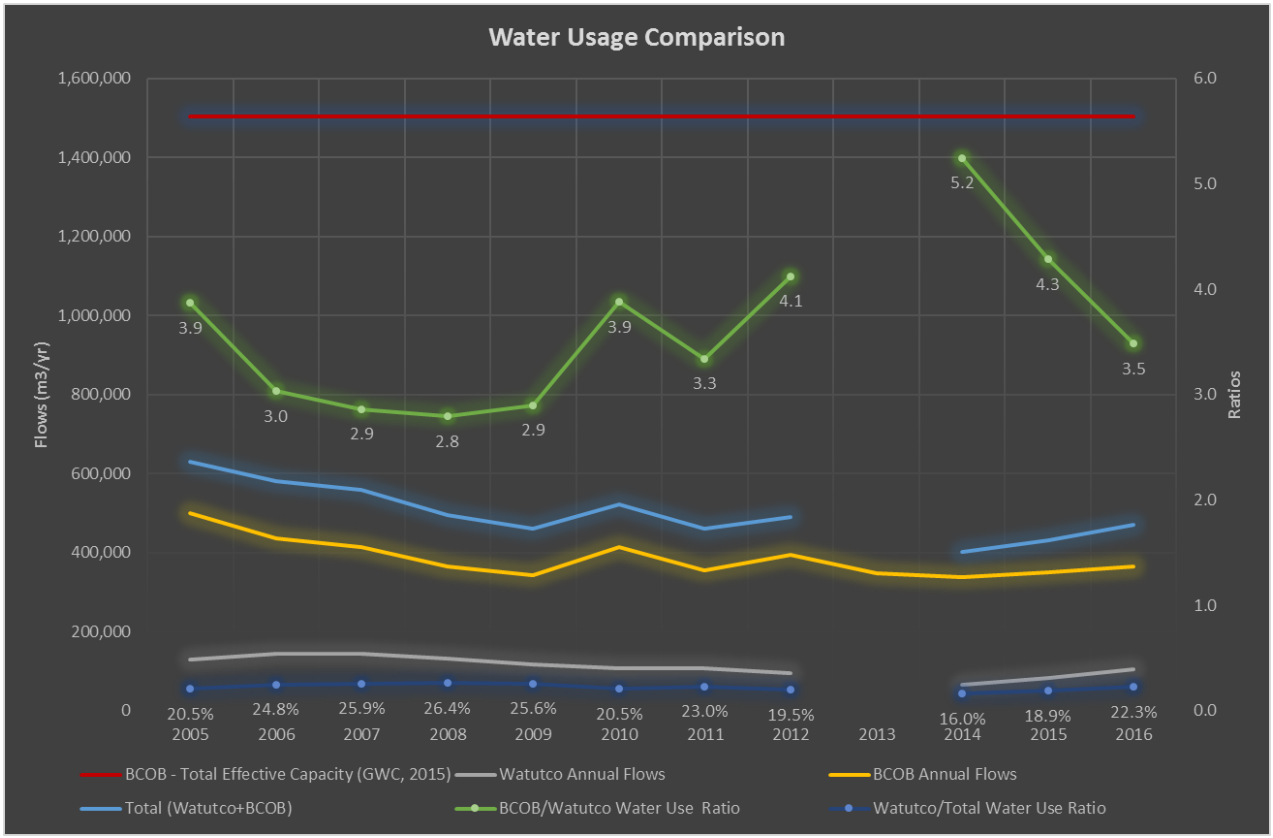
Implementation of Option 1 is subject to system upgrades outlined in Table 6.

Option 2

In this option, raw water transfer from the Watutco intake must not compromise filtration deferral for the BCOB system currently in effect; otherwise, the option would be considered impractical. According to available data provided in Table 3, this water transfer will be possible approximately 11 months a year, i.e., when the raw water turbidity of the Watutco source is below 1 NTU. However, this inter-service water transfer will not be required most of the year, with the exception of summer months. The transfer will not be also allowed during heavy rains and high Oyster River flows over wet fall/winter months from late January to early March and from late September to early November (refer to Figure 17). Water demand in these months is, however, very low (refer to Figure 18) compared to the rest of the year and the BCOB water sources will be able to meet the demand of the both local service areas over the winter period without the inter-service transfer.

Water usage in the Watutco and BCOB local service areas, based on the annual 2005-2016 water consumption data, is shown for comparison in Figure 21. This data indicates that the average ratio of the BCOB to Watutco water usage is approximatively 3.6. An average water usage in the WLSA relative to the total annual Watutco/BCOB water consumption is approximatively 22%.

Figure 21 Water Usage Comparison



The total estimated effective capacity of the BCOB water sources in Figure 21 includes the Oyster River and ground water sources.

This data indicates that the BCOB system can meet the current annual water demand of both the Watutco and BCOB service areas either with or without the water transfer from the Watutco source most of the year with the exception of a dry summer season (Figure 14) provided that the administrative (i.e., licensed) capacity is not exceeded. This administrative capacity is not shown in Figure 21 due to the lack of information. However, water license transfer from the Watutco water system would further increase the total administrative capacity limit of the joint system.

In 2014 and 2015, the BCOB system experienced seasonal capacity constraints due to dry summers and minimal winter snow pack. In 2014, the Oyster River almost dried up over top of the infiltration gallery forcing the implementation of stringent watering restrictions and mixing of the two water sources (refer to Table 1) to keep up with the demand and provide adequate storage for fire flows. CVRD typically operates the system with only one source in service at a time. A similar drought situation was faced in 2015 when the two water sources were combined again. The BCOB water system would benefit from the water transfer from the Watutco water source during high-consumption summer months to improve the overall water distribution strategy and mitigate summer water shortages provided that the anticipated climate changes will not affect Watutco intake. Inter-service water transfer may be an attractive alternative should the combined BCOB water sources be unable to meet the community demand due to capacity limitations caused by the anticipated climate change effects.

Inter-service water transfer alone; however, may not be sufficient to meet high seasonal water demand requirements of the both communities. As the current capacity limitation of the Watutco treatment/pumping system is 15 L/sec (1,300 m^3/day), the total combined water supply by Watutco and BCOB water systems would be 2,510 m^3/day (i.e., 1,300 m^3/day + 1,210 m^3/day (Table 2)). This may not be sufficient to meet current maximum daily demand of 2,800 m^3/day and future projections depending on the safety factor used for the estimate of BCOB groundwater wells effective capacity (Table 2).

Koers (2010) reported an estimated annual water demand increase in the BCOB system of approximately 25% at full build-out relative to the current water usage. Considering that climate change effects will likely have reoccurrence in the future, the ability of the BCOB system alone to meet high seasonal water demand and mitigate drought conditions will become questionable without an additional water source.

Implementation of Option 2 is also subject to system upgrades outlined in Table 6.

Option 3

Option 3 is very similar in many aspects to Option 2. In this option, however, there is no water transfer from the Watutco source to BCOB. The entire water supply for the both communities is provided by the BCOB water sources. The discussion related to Option 2 applies also to this option. Implementation of Option 3 is also subject to system upgrades outlined in Table 6.

11.2 Costs

Estimated costs of the required system upgrades identified in Table 6 are provided in Table 7. These costs are Class D study level cost estimates with an accuracy range of ±50% with a confidence interval of 90% in accordance with *Budget Guidelines for Consulting Engineering Services, Consulting Engineers of British Columbia, 2009*. Class D is a preliminary cost estimate which, due to preliminary information, indicates the approximate magnitude of cost of the proposed project, based on the project's broad

requirements. It may be used for planning purposes in developing long-term capital plans and for preliminary discussion of proposed capital projects.

Table 7 Estimated Upgrade Costs

Component	Option 1	Option 2	Option 3
WTP Upgrade (Note 1)	$500,000	-	-
Reconfigure Booster LS (Note 2)	$20,000	$20,000	-
Gravity Main/Forcemain (Note 3)	-	$50,000	-
LS (Backwash) (Note 4)	$30,000	-	-
Backwash Main (Note 5)	$30,000	-	-
Reservoir/Clearwell (Note 6)	$700,000	$350,000	$350,000
Water Distribution System (Note 7)	-	$30,000	$30,000
Water Meters (Note 8)	$156,000	$156,000	$156,000
Capital Improvements Cost Charges (Note 9)	-	$787,540	$787,540
Total	**$1,436,000**	**$1,393,540**	**$1,323,540**

Notes:

Note 1 – Indicative cost based on broad project requirements and the potential range of water treatment plant design flows up to 15 L/sec.

Note 2 – The existing Watutco booster lift station will require to be reconfigured to accommodate either Option 1 or 2.

Note 3 – Either a new gravity main or forcemain will be required for water transfer from the Watutco water source to BCOB.

Note 4 – A new lift station will have to be added to handle filter backwash.

Note 5 – A new forcemain will be required to convey filter backwash to a Watutco wastewater treatment plant.

Note 6 – An in-ground, below-grade concrete tank (clearwell) is the preference for Option 1. Filtered water would flow by gravity into this clearwell; Options 2 and 3 can be upgraded with an above-grade bolted steel tank.

Note 7 – Assumes minor modifications to the existing distribution networks, e.g., more interconnection points.

Note 8 – Based on 130 connections and $1,200/connection (CVRD, 2017)

Note 9 - Based on 130 connections and a connection fee of $6,058/connection (CVRD, 2017)

WTP – Water Treatment Plant

LS – Lift Station

The annual operating revenue for the Watutco water system is $88,340 as reported by Watutco Enterprises Ltd. (2013, 2014, 2015). Revenues from the residential and industrial users are $51,426 and $36,914, respectively. The annual residential water system user fee is approximately $396/yr based on the residential revenue and 130 connections.

12. Recommendations

We offer the following recommendations:

- When neither option has a tangible financial advantage in terms of capital costs, combining Watutco and BCOB service areas (Option 2) provides more operational flexibility and reliability in light of uncertainties associated with anticipated climate changes;
- This option integrates the Black Creek/Oyster Bay and Watutco communities into one service area;
- Mitigates seasonal demand variations and enables water transfer when the water is most needed during the summer season;
- Does not affect nor compromise filtration deferral for the Black Creek/Oyster Bay system currently in effect;
- Water transfer during high-consumption summer months improves the overall water distribution strategy due to excess water capacity available at the Watutco intake.
- Meets current water needs of the both Black Creek/Oyster Bay and Watutco communities. Future needs may require an additional water source and water treatment works upgrade;
- Improves operational reliability with the addition of additional system storage;
- Water license transfer to the BCOB system increases the total licensed water intake; and
- Based on the pump test conducted over the 2018 dry summer season, the flow of approximately 50 m^3/hr seems to be the maximum capacity of the Watutco water intake structure during summer operations. This flow would maintain water level in the Oyster River approximately 0.4 to 0.5 m above the intake structure.

13. Closure

Should you have any additional questions or require further clarifications, please do not hesitate to contact the undersigned at your convenience.

Sincerely,

McELHANNEY CONSULTING SERVICES LTD.

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2015 Water Utility Annual Reports and Financial Statements – File No. 0321338, Watutco Enterprises Ltd., 2016.

2014 Water Utility Annual Reports and Financial Statements – File No. 0321338, Watutco Enterprises Ltd., 2015.

2013 Water Utility Annual Reports and Financial Statements – File No. 0321338, Watutco Enterprises Ltd., 2014.

Water Licenses Report, BC Government, 2015.

Flow and Water Quality Data, Comox Valley Regional District, 2015/2016.

APPENDIX 1
WELL CAPACITY / PUMP TEST

Hydrant Test Results

APPENDIX 1 - WELL CAPACITY / PUMP TEST

McElhanney

495 6th Street, Courtenay, BC V9N 6V4
Phone 250-338-5495

PROJECT NAME: WATUCO WELL REVIEW
PROJECT #: 2211-47462-00
MUN. FILE #:
DATE: 20-Jul-17
OWNER: Watuco
LOCATION: Pacific Playgrounds Resort
PAGE: 1 of 1

Time	Depth to water suface (m)	Pumphouse flow meter (USGPM)	Portable pump output (l/s)	Total Well Draw (l/s)	Total Well Draw (m^3/hr)	Notes
11:40am	2.60	60	13.6	17.4	62.6	Start test. 3" and 4" pumps both running to manifold.
11:41am	2.70	61	13.6	17.4	62.8	
11:45am	2.75	60	13.6	17.4	62.6	
11:47am	2.80	60	13.6	17.4	62.6	
11:49am	2.80	77	13.6	18.5	66.4	
11:52am	2.80	66	13.6	17.8	64.0	
11:55am	2.82	54	13.6	17.0	61.2	
12:00pm	2.86	47	13.6	16.6	59.6	
12:05pm	2.90	55	13.6	17.1	61.5	
12:10pm	2.90	70	13.6	18.0	64.9	
12:15pm	2.94	64	13.6	17.6	63.5	
12:20pm	2.95	50	13.6	16.8	60.3	
12:25pm	2.97	55	13.6	17.1	61.5	
12:30pm	2.99	60	13.6	17.4	62.6	
12:35pm	3.00	61	13.6	17.4	62.8	
12:40pm	3.10	56	13.6	17.1	61.7	
12:45pm	3.02	60	13.6	17.4	62.6	
12:50pm	3.01	63	13.6	17.6	63.3	
12:55pm	n/a	n/a	n/a	n/a	n/a	Pump error. 4" pump out of fuel. Noted 3" pump not flowing.
1:50pm	3.00	52	24.9	28.2	101.5	Restarted test. 3" and 4" pumps running to ground.
1:55pm	3.14	61	24.9	28.7	103.5	
2:00pm	3.22	68	24.9	29.2	105.1	
2:05pm	3.32	62	24.9	28.8	103.7	
2:10pm	3.43	68	24.9	29.2	105.1	
2:15pm	3.53	51	24.9	28.1	101.2	
2:18pm	3.57	48	24.9	27.9	100.5	Low level alarm noted. 3" pump turned off.
2:20pm	3.57	54	13.6	17.0	61.2	4" pump only.
2:25pm	3.58	56	13.6	17.1	61.7	
2:30pm	3.61	58	13.6	17.3	62.1	
2:35pm	3.61	63	13.6	17.6	63.3	Recharge not noted. 4" pump turned off.
2:40pm	3.46	53	0.0	3.3	12.0	Domestic (internal) usage only.
2:45pm	3.34	51	0.0	3.2	11.6	
2:50pm	3.25	57	0.0	3.6	12.9	
3:00pm	3.10	58	0.0	3.7	13.2	
3:15pm	2.95	58	0.0	3.7	13.2	
3:25pm	2.86	60	0.0	3.8	13.6	

Appendix B

Watutco Water Service Acquisition Governance and Acquisition Options for New Water Service Review

Prepared for the Comox Valley Regional District
by Colin Stewart, Stewart McDannold Stuart

November 22, 2016

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Comox Valley Regional District South Sewer Service Committee

Watutco Water Service Acquisition
Comox Strathcona Regional District Governance
Options for New Water Service

1.0 Introduction

The Comox Valley Regional District is in the process of considering the acquisition of a water utility, Watutco Corp. to serve lands within Electoral Area C (Black Creek Oyster Bay).

2.0 Executive Summary

2.1 Service

I recommend that, subject to negotiations of a satisfactory agreement for the acquisition of the water system that the regional district establish a service area to fund the cost of acquisition of the Watutco water system.

Depending on the purchase price for the utility system negotiated between the regional district and the water utility, the regional district may need to adopt a loan authorization bylaw as a companion bylaw to the service establishing bylaw. Under the *Local Government Act*, the two bylaws may be subject to a single process of electoral area approval.

Given the limited number of connections for the water system, I recommend that consent of the electors to the service establishment be obtained by having the Board authorize asset by way of petition under section 347 of the *Local Government Act*.

If there are advantages to combining the water supply component of the Watutco system with the Black Creek Oyster Bay water system, a separate water supply service could be established to provide for cost recovery of that aspect of the water service for tax payers in a combined service area, leaving the distribution systems each in a separate service.

2.2 Administration and Operation

- It is recommended that the regional district consider administration and operation of the service by regional district staff under the guidance of the Board through the electoral services committee.

2.3 Acquisition Process

Our recommendation would be for a voluntary willing buyer/willing seller acquisition of assets, if possible

3.0 Background

3.1 Watutco Enterprises Ltd.

Watutco Enterprises Ltd. was incorporated in 1973 as a corporation originally under the *BC Company Act* (now the *B.C. Business Corporations Act*). It is a profit making venture controlled by its shareholders.

In 2004, in a decision of the British Columbia Environmental Appeal Board, appeal number 2003-WAT-018(a), Watutco Enterprises Ltd. was described as a subsidiary of Pacific Playground Holdings Ltd. The decision noted that Watutco Enterprises Ltd. was the holder of Water Works licenses on the Oyster River under conditional water license 50466 for 54,500 gallons a day and conditional water license 59087 for 10,000 gallons a day to supply properties set out in certificates of public convenience a necessity 62/1975 and 487/1983.

You have advised that the Watutco serves 128 households and 2 commercial premises.

4.0 General Regulatory Context and Considerations

4.1 Regulation of Private Distribution of Water: the Comptroller of Water Rights

For regional districts acquiring water systems, the goal of the regional district is usually to acquire and operate a water system as a regional district service established under a regional bylaw, rather than to acquire a stand-alone corporation to be operated as a separate water utility. There are a number of legal and political considerations. From a legal perspective is the fact that the operation of a water utility through a separate corporate entity would be subject to the regulatory authority of the Comptroller of Water Rights under the *Water Utility Act*.

In contrast, regional districts providing a water service within their boundaries, are exempt from the general jurisdiction of the comptroller in this circumstance.

Operating a water system through a utility corporation would limit the Board's control over the water utility, as the utility would be under the direction of its own separate board of directors. While the regional district could control the board of directors by way of appointment of regional directors to sit on the Board such an arrangement means there is no lessening of administrative burden on regional

directors by virtue of operating the system through the utility corporation. Income tax would be payable on corporate profits generated from the water system operation which could reduce any perceived economic benefit of operating a service through a corporation. Appropriate accounting advice would have to be obtained prior to a decision to acquire the Watutco Enterprises Ltd. and with a view to continuing the operation of the utility as a separate corporation.

Far more common would be the acquisition of the assets of the utility and the operation of the assets further to a regional district service established by a service establishing bylaw. Such an arrangement, however, might not be immediately appealing to Watutco Enterprises Ltd., if it is a significantly profitable business entity. As a business entity, it has a facto monopoly within its utility service area, and if its business has been successful in generating significant profits, then there is a business value that would include the goodwill and the potential for future business revenue that might not necessarily be captured in a straight analysis of the appraised value of the business assets. This means that an offer by the regional district to simply acquire the assets based on the appraised value of the assets might not be accepted as sufficient to the Board of Directors of Watutco who may prefer, instead, to sell the business as a business enterprise to another corporate entity, particularly one that has an interest in the acquisition of water systems on Vancouver Island, such as Epcor Water Services Inc. Much depends, of course, on a business case analysis but this situation did occur with one of our other regional district clients which had been interested in acquiring a small water utility.

4.2 Structuring a Business Acquisition

There are two approaches to the acquisition of the assets of a business:

(a) The first is the acquisition of the shares in the business which transfers ownership of the business corporation from one shareholder to another. The new shareholder steps into the place of the former business owner and assumes all of the property of the business together with its liabilities and claims associated with the business. Employees remain the employees of the business corporation unless the employment relationship is terminated which could trigger liability for damages in lieu of reasonable notice. Due diligence is required prior to such acquisition to determine the extent to which the business is subject to outstanding claims, debts, and risks as well as debts and accounts receivable.

(b) The second method of acquiring a business (and the one most commonly used by local governments assuming control of a private water system) would be acquisition of the assets of the corporation identified as being necessary to successfully operate

the water system. Assuming that the corporation delivers clear title to the assets (verification of which requires due diligence searches and appropriate covenants of warranties in the purchase agreements) the level of risk to the local government is generally lower than with a share purchase acquisition, as the local government is not assuming the business, with all its attendant business risks, but is only assuming title to the assets themselves. There can, of course, be risks associated with such assets, in the nature of financial charges that attach to the assets or problems with the property and infrastructure. These risks are manageable under a service contract.

5.0 Service Governance Options

There are a variety of options available to regional districts in relation to service governance. These options include the following principal models:

5.1 "Traditional" Service Bylaw:

Under this model a regional district establishes one or more services by establishing bylaw adopted under Section 338 of the *Local Government Act*. In the case of the Watutco Water System, a water service established for the purpose of acquiring, operating, and construct or extending the water system (if this is considered likely) would be the recommended service to be established by bylaw. As the service would be located within a single electoral area, then there would only be one person entitled to vote under Section 209(1) of the *Local Government Act* in relation to matters involving the administration and operation of the service.

5.2 Service Operated by Commissar

Another alternative approach would involve the establishment of a service commission to either advise on the operation of the service (an advisory commission) or to take on delegated authority with respect to the service and become the body charged with making many of the ordinary day to day decisions regarding service administration and operation. This option will be discussed further in section 6.3 below.

5.3 Service Operated through a Corporation

Operation of the service through a corporation, is discussed above.

6.0 Traditional Regional District Service Bylaw

6.1 Regional District Service Bylaw Adoption

Regional district service bylaws are adopted under Division 3 of Part 10 of the *Local Government Act*. The requirements for an establishing bylaw are prescribed in section 339(1) of the *Local Government Act*. In the case of a water service, the exemption from having to specify a maximum requisition amount under 339(1)(e) is not available and so the maximum requisition must be set out.

Most establishing bylaws require some form of elector approval under section 342 of the *Local Government Act* this could be obtained by way of ascent of the electors voting in a "referendum" under section 344. Alternatively, in a situation such as this, participating area approval for an establishing bylaw may be given if the Board receives a sufficient petition in accordance with section 347 of the *Local Government Act*.

6.2 Advantages

The advantages of a traditional service bylaw approach are the following:

(a) There is a high level of familiarity with services operated accordingly to this model, as they constitute the vast majority of regional district services operated by regional districts throughout the province.

(b) The regional district has the authority and capacity to borrow and the regional district qualifies for senior government grants.

(c) A water service operated by the regional district directly under a service establishing bylaw would not be subject to the regulatory and supervisory jurisdiction of the BCUC, which would impose additional cost burdens on tax payers.

(d) The regional district is not subject to income tax payable on the profits that would be generated by a corporation, and its interests in land are not subject to real property taxation, which is different from the case of a private utility.

6.3 Disadvantages:

There are few disadvantages to this model in the case of a water service contained in a single electoral area, with the exception that the voting rules in relation to the service are determined by statute rather than by the establishing bylaw

6.4 Operation of Service through Commission:

An option used in connection with service delivery within some regional districts is the use of a commission to provide for administrative and operational

decisions an input into other decisions that need to be made in relation to the service. There is authority under Sections 229(1) and 263(1)(e) of the *Local Government Act* to establish commissions to operate regional district services, undertake operation, and enforcement in relation to the Board's exercise of its regulatory authority, and manage property or an interest in property held by the regional district. Sections 229(1) and 263(1)(e) provide authority to the regional district to delegate its powers, duties, and functions to officers, employees, its committees or its members or "to other bodies established by the Board" which would include a commission. Under the commission model, the CVRD Board would continue to be the corporate public authority ultimately responsible to the service, but day to day decision making would be handled by the commission.

(a) Advantages:

Delegation of authority to a commission allows for the creation of a model that permits some distance between the elect officials on the Board and the commission members as determined by the Board (which may include a method of selection that relies on a form of election among the electors within the service area). Given that the voting rule under Section 207(5) means that on matters of administration and operation of the service all directors would have a vote, there may be some value in establishing a commission to consist of at least 3 members which may include the area director and two representatives of the community. This model would result in a creation of a separate body whose composition could include community representation and which would be charged with responsibility for administration and operation of the service, leaving only a limited number of decisions in the hands of the full Board under Sections 208(1) and 210(1) of the *Local Government Act*. Under the commission model, the regional district would remain entitled to the full benefit of MFA interest rates on borrowing and remain fully eligible for grants from senior governments for any infrastructure works that might be eligible. Commission authority can be revoked or altered by the Board.

(b) Disadvantages:

There may be a perception by the Board that it has created a body with a life and direction of its own, leading to a sense of "loss of control" and, in some situations, to a level of conflict between members of the community and the regional district. The more the commission is dominated by persons other than elected officials, the greater the risk of a commission striking a position at odds with the elected officials. In the capital regional district, some of these conflicts between local "committees"

exercising delegated authority have become quite difficult from time to time. Another perceived disadvantage is that commission authority can be revoked or altered by the Board. This could cause apprehension among community representatives appointed to the commission who may feel that they aren't free of domination from Board members who do not represent their particular community.

As the Comox Valley Regional District does not typically operate its smaller service by means of a commission, unless the community expresses a keen desire to assume this responsibility, it may be more straight forward and consistent with the operation of other services for the Board to manage the service itself, through the electoral area services committee.

7.0 Stand-alone service or service combined with the existing Black Creek Oyster Bay water system

7.1 Connecting the two systems, with source water from the Watutco system supplied to the Black Creek Oyster Bay treatment facility prior to distribution.

In that case, the Regional District might wish to have separate services for the water distribution infrastructure, but a single service covering both service areas for water supply (essentially 'bulk water'). Under this scenario, there would be three separate service areas, with one overarching service providing for cost recovery for water treatment and sources of water.

Each of the two new services (Watutco Distribution and BCOB –Watutco water supply) would have to be established through adoption of establishing bylaws.

7.2 The two systems become connected with the Black Creek Oyster Bay system supplying water to the Watutco system.

Similarly, if the Black Creek Oyster Bay system becomes the bulk water supplier for both systems, then this aspect of the function could be established as a separate service of water supply including both areas, with cost recovery from both the Watutco service area and the Black Creek Oyster Bay service area for the purpose of recovering the costs of the system.

Cost recovery mechanisms available under the *Local Government Act* are set out in section 378 of the *Local Government Act* and include as follows:

"378(1)

(1) A regional district may recover the costs of its services by one or more of the following:

(a) property value taxes imposed in accordance with Division 3 *[Requisition and Tax Collection]*;

(b) subject to subsection (2), parcel taxes imposed in accordance with Division 3;

(c) fees and charges imposed under section 397 *[imposition of fees and charges]*;

(d) revenues raised by other means authorized under this or another Act;

(e) revenues received by way of agreement, enterprise, gift, grant or otherwise.

(2) Parcel taxes may not be used to recover all or part of the costs of a regulatory service.

(3) In the case of a service for which an establishing bylaw is required, if all or part of the costs are to be recovered by one or more of the methods referred to in subsection (1) (a) to (c), the establishing bylaw must indicate which methods are to be used."

Please note that section 378(3) requires the cost recovery methods to be set out in the establishing bylaw.

In the case of a water system, the most common methods for recovering the costs of water supply would be property value tax or parcel tax. The most common methods for recovery costs of a water distribution system would be property value tax, or parcel tax in combination with water rates, where the properties are metered.

7.3 Single Combined Service

As an alternative to splitting the services, it would also would be possible to combine the two service areas into a single service for water supply and distribution. This would be particularly attractive if there was no significant difference in costs of operating the infrastructure of the two systems. On the other hand, if one of the systems required an upgrade, tax payers within the service area of the other system might not be inclined to support the amalgamation of the two service areas as they could feel as they are being made to shoulder a portion of a cost burden that should properly be borne by the residents in the service area that requires the expensive upgrade.

A determination of which route the Regional District should go would depend on a closer examination of the condition of the Watutco system and the Black Creek Oyster Bay system and whether, in fact, it is materially more expensive to upgrade one system as opposed to the other.

8.0 Acquisition Options and Considerations

Unless a due diligence examination of the business affairs of the Watutco Enterprises Ltd. water utility reveals a surprising profitability for the water utility, and the regional district believes that the residents of the water service area would accept a situation where they generate profit for the CVRD through their water rates, my recommendation would be to focus on an acquisition process that would result in the establishment of a regional district water service by way of an establishing bylaw, with the assets currently held by the Watutco water utility (including any easements and statutory rights of way) being transferred to the regional district, as considered necessary for the proper administration and operation of the water utility. In order to secure the acquisition of the water utility in the overall public good, it might be necessary for the regional district to acquire both the assets themselves and the shares in the utility, with a view to winding down the utility. These decisions must be made with appropriate accounting advice as there may be tax implications accruing on the transfer of share assets or capital assets to the regional district. The arrangement with the least ornery income tax burden should be strongly considered as the burden of taxation is not one that the current shareholder will want to assume and so would end up being a burden on the local tax payers. However, in the long run, the owners of property in the service area are likely to benefit from public ownership of their water service which means more control over their source of water, and more secure long-term water supply and a governing authority that is responsible to the community rather than to a shareholder.

8.1 Negotiated Sale and Purchase

A negotiated sale of the assets of Watutco is recommended over an expropriation. A negotiated sale would permit the CVRD to acquire the land, interests in land and works and chattel assets of Watutco that the CVRD considers necessary for the proper operation of the service.

8.2 Expropriation

If a negotiated sale proves impossible, the Regional District does not have the authority to expropriate a “business” in the sense of requiring Watutco to sell the business to the Regional District “as a going concern”.

Section 289(1) of the *Local Government Act* sets out the core expropriation authority for a regional district and is worded as follows:

> "289(1) For the purpose of exercising or performing its powers, duties and functions, a regional district may expropriate real property or works, or an interest in them, in accordance with the *Expropriation Act*."

"Real property" is of course real estate or land and improvements on the land. The *Community Charter* defines "real property" as "means land, with or without improvements so affixed to the land as to make them in fact and law a part of it."

So, the core power to expropriate relates to land and buildings.

While section 289 provides the Regional District with the authority to expropriate, the authority is limited to land of works. This would certainly be broad enough to include pipes, water distribution lines, pump stations, reservoirs and other elements of infrastructure the Watutco uses to supply water to customers. It would not include assets such as vehicles, office equipment, tools and other things that would normally be thought of as "chattels". An expropriation of Watutco's real property and works would be essential to the operation of the water system by the Regional District in substitution for Watutco. The Regional District would have to compensate Watutco in accordance with the provisions of the *Expropriation Act.* Compensation payable to a profitable business (which one assumes Watutco is) would be significant.

Section 31 of the *Expropriation Act* creates the basic formula that is to be used to determine compensation and states that an owner whose property is subject to expropriation is entitled to the market value of its interest in the land taken plus "disturbance damages".

Section 31 of the *Expropriation Act* reads as follows:

> "31 (1) The court must award as compensation to an owner the market value of the owner's estate or interest in the expropriated land plus reasonable damages for disturbance but, if the market value is based on a use of the land other than its use at the date of expropriation, the compensation payable is the greater of
>
> (a) the market value of the land based on its use at the date of expropriation plus reasonable damages under section 34, and
>
> (b) the market value of the land based on its highest and best use at the date of expropriation.
>
> (2) If not included in the market value of land determined in accordance with section 32, the following must be added to that market value:

(a) the value of a special economic advantage to the owner arising out of his or her occupation or use of the land;

(b) the value of improvements made by an owner occupying a residence located on the land.

(3) If there is more than one separate interest in the land expropriated, the value of each interest must, if practical, be established separately."

You will note, in particular, that section 31(2)(a) points to recognition of a "special economic advantage" to an owner arising out of his or her occupation or use of land. In the case of a water utility, one could certainly imagine a case being made for "special economic advantage" that arises because of the regulated monopoly enjoyed by the private utility.

Section 32 requires a market value to be determined as "the amount that would have been paid for it if it had been sold at the date of expropriation in the open market by a willing seller to a willing buyer".

However, in the case of land that is the property of a water utility, it is not just land that would have the usual market value, but could represent a special value to the owners of the utility as it is set up and configured in such a way as to provide a water service under a regulated monopoly which assures the utility of a reasonable return in the way of profit.

Section 34(1) of the *Expropriation Act* speaks specifically to the assessment of disturbance damages. When land is expropriated from a business, disturbance damages generally refer to costs associated with relocating the business and lost profit during the relocation. However, disturbance damages are not necessarily limited to these costs, and in the case of a water utility (as distinct from a coffee shop or a clothing store) "relocation" is not a simple option. The "business" will lose the ability to function as a business serving water to the residents of French Creek if it loses its lands and works unless it finds another utility system to purchase.

Section 34(4) deals specifically with businesses that cannot be relocated:

> "If the court determines that it is not feasible for an owner to relocate his or her business, there may be included in the compensation that is otherwise payable, an additional amount not exceeding the value of the goodwill of the business."

As it is very unlikely that Watutco could simply relocate its business, Watutco could potentially be entitled to an additional award for goodwill, which should be

calculated and understood before the Regional District makes any decision to proceed with expropriation. The general approach to calculating goodwill is to determine the capitalized earnings of the business and subtract the value of the assets used to carry on the business. Basically, this involves establishing the net income of the business by deducting income tax from gross profit and then applying a multiplier. The multiplier that is applied varies from case to case. The multipliers used in past cases have varied from three to seven times annual net income, depending on profitability of the business and how likely that profitability is to continue into the future. In the case of a water utility, again, because of the nature of the business being a monopoly regulated with a view to sustaining the viability of the utility from a economic perspective, the expert analysis of the value of the goodwill may tend toward the higher range. However, I must caution that I am not expert in the valuation of business enterprises and that appropriate appraisal advice would need to be obtained so that the Regional District might have a sense of the damages to which Watutco could be entitled as a result of an expropriation.

Section 34(3) of the *Expropriation Act* deals with what happens in the case of the relocation of the business. As it seems unlikely that Watutco would be in a position to relocate this business I have not examined this question in detail for the purpose of this opinion.

We would also note that the general method of calculating compensation for land that is expropriated (being the market value) does not apply if the market value of the land in question is based on a use of the land other than its use on the date of expropriation. If that is the case, then the owner is entitled to the greater of:

(a) market value based on its use at the date of expropriation plus disturbance damages; and

(b) market value based on the highest and best use at the date of expropriation (section 31(1)).

Accordingly, if the highest and best use of Watutco's land is not as a water utility, but is, for example, as residential land, and if the value of residential land would be higher than the value of the land as a water utility plus all disturbance damages, then the Regional District would have to pay the higher amount. Again, this is something that would have to be determined with the assistance of qualified real estate appraisal expertise.

Other Costs

In addition to the above direct compensation costs, the Regional District would have to pay other costs incurred during the expropriation process, both on its own behalf and also on behalf of Watutco. These could include:

- **Appraisal costs** (for both the value of the land and the value of goodwill if the business cannot be relocated)

These costs are likely to be many thousands of dollars in the case of a complex situation such as a private water utility. The Regional District would likely have to pay for both its own appraisals and appraisals eventually done by Watutco.

- **The Regional District's legal costs**

These can be significant, particularly if the compensation offered by the Regional District is not accepted by Watutco and Watutco applies to the BC Supreme Court for determination of the compensation. This would require a court hearing which might last several days.

- **Watutco's legal expenses**

Under the *Expropriation Act*, the expropriating authority is obliged to pay all the reasonable expenses of the owner, including the owner's legal expenses. If the expropriation moves to a hearing, then the owner's legal expenses will be significant. Even without a hearing, it has been our experience that the legal expenses of the owner's lawyers are considerably higher than the expropriating authority's legal expenses as there is every incentive to pursue every argument and avenue for compensation.

All of which is respectfully submitted,

_____

Colin Stewart