

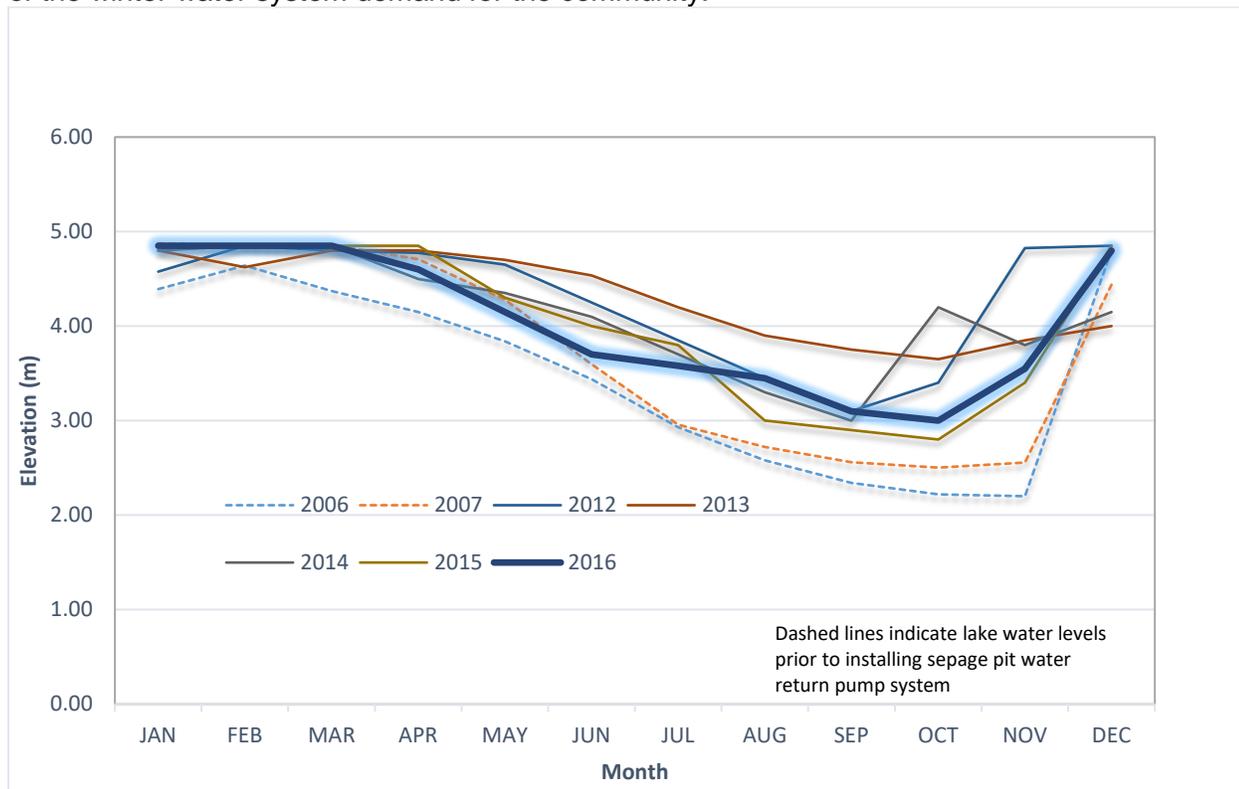


The Lyall Harbour Boot Cove water system is primarily comprised of:

- Raw water is obtained from Money Lake, a small, impounded, surface water body that lies within a 94 hectare (230 acre) watershed on private land.
- One earthen dam structure, Money Lake Dam No. 1.
- Treatment equipment including ozonation, two stages of filtration (granular and adsorption), ultraviolet light and chlorine disinfection.
- One steel storage tank (total volume 136 cubic metres or 36,000 USg).
- Supervisory Control and Data Acquisition (SCADA) system.
- Distribution system and supply pipe network (8,390 metres of water mains).
- Other water system assets: 148 service connections and meters, three pressure reducing valve stations, 50 gate valves, 12 standpipes and a small auxiliary generator.

## Water Supply

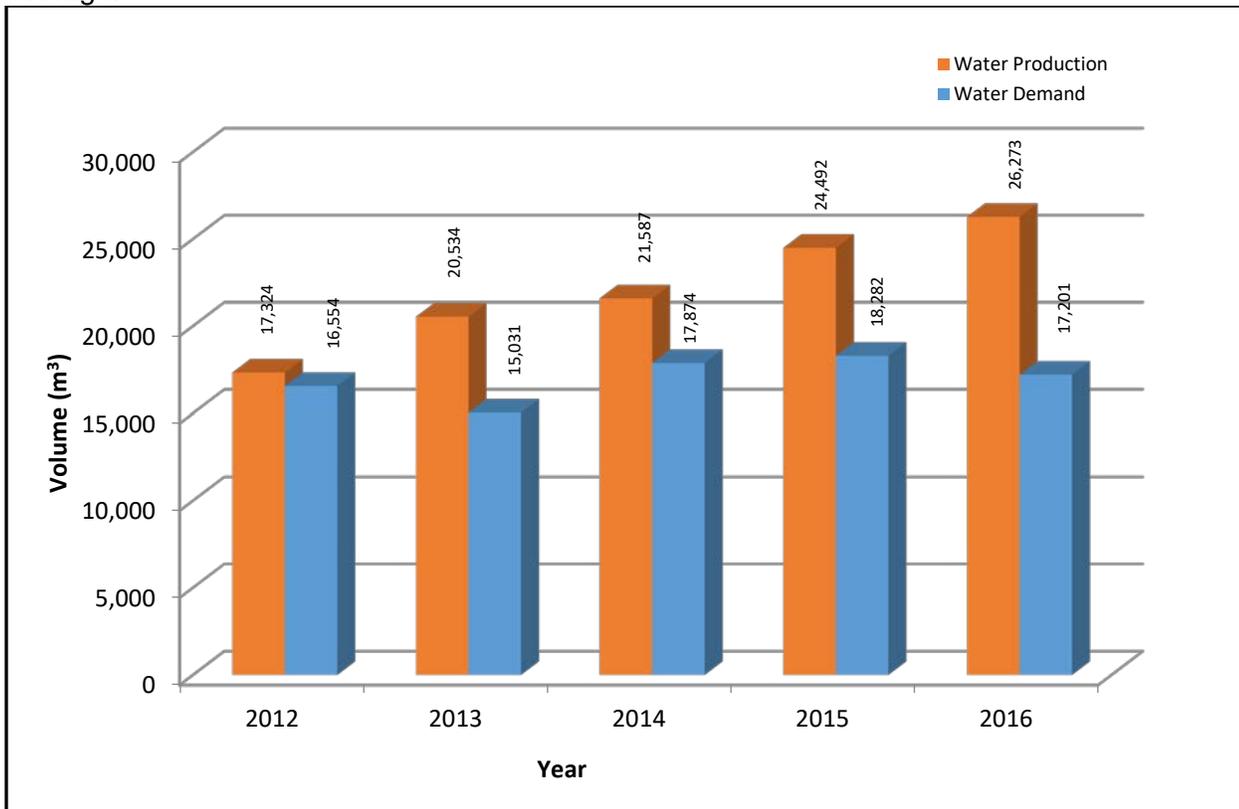
Referring to Figure 2 below, Money Lake surface water supply monthly water levels are highlighted for 2016. Water supply levels for the year are within historical limits. It is important to note that water supply levels in Money Lake, prior to 2008, were historically lower during the summer period. This is the result of the installation of a groundwater seepage spring recirculation pumping system. Excess water from the seepage spring is pumped back to Money Lake in order to keep the Lake as full as possible. The groundwater seepage spring water levels are not monitored. The seepage spring typically provides 100% of the winter water system demand for the community.



**Figure 2: Lyall Harbour/Boot Cove - Money Lake Monthly Water Level**

## Water Production and Demand

Referring to Figure 3, 26,273 cubic meters of water were extracted (water production) from the seepage spring and Money Lake Reservoir in 2016; a 7% increase from the previous year and 31% increase from the 5 five year average. Water demand (customer water billing) for the service totaled 17,201 cubic meters of water; a 6% decrease from the previous year and a 3% increase from the five year average.



**Figure 3: Lyall Harbour/Boot Cove Water System Annual Water Production and Demand.**

The difference between annual water production and annual customer demand is referred to as non-revenue water and can include water system leaks, water system maintenance and operational use (e.g. water main flushing, filter system backwashing), potential unauthorized use and fire-fighting use. As previously noted, operational water use increased beginning in 2013 when the new water treatment plant became operational.

The 2016 non-revenue water represents about 35% of the total water production for the service area. However, almost 20% the non-revenue water can be attributed to operational use which included a significant volume of water flushed from the system as a result of the boil water advisory event during the first quarter of 2016. Therefore, the non-revenue water associated with system losses is approximately 15% which is considered typical for most potable water distribution systems of this size.

## Drinking Water Quality

Since November 2012, the new water treatment process has a raw water source of predominantly seepage water collected from below the Money Lake dam, which is supplemented with flows from the lake during peak summer demand. Overall, water quality met the *Guidelines for Canadian Drinking Water Quality (GCDWQ)* throughout 2016 except for periodic exceedances of some aesthetic water quality objectives such as pH, turbidity, temperature and iron/manganese. However, there were occasional elevated levels of disinfection by-product concentrations which indicate some deficiencies in removing organic compounds by the treatment process. A precautionary Boil Water Advisory was issued on March 17, 2016 following a positive *E.coli* test result from one sample in the distribution system. Two immediate resamples from the same location tested negative for *E.coli* and total coliform bacteria and as a result the Boil Water Advisory was lifted on March 19, 2016.

The data below provides a summary of the water quality characteristics in 2016:

### Raw Water:

- The raw water exhibited overall low concentrations of total coliform bacteria with higher concentrations during the summer and fall months when the seepage water is supplemented with lake water. Generally the raw water was free of *E. coli* bacteria; only during the summer months, low *E.coli* concentrations were occasionally detected in the raw water entering the treatment plant.
- In one parasite sample a low concentration of *Cryptosporidium* oocysts was detected (2.8/100 mL).
- The raw water had naturally high concentrations of iron and manganese especially during the late summer/fall season. Elevated iron and manganese concentrations in Money Lake are compounded by the ground passage of the seepage water.
- The median annual raw water turbidity was lower than in previous years with 1.33 NTU. The highest recorded raw water turbidity in 2016 was 5.0 NTU on February 25, 2016.
- The raw water was slightly hard (median hardness 43.0 mg/L CaCO<sub>3</sub>).
- The natural total organic carbon in the source water is relatively high (median 6.4 mg/L).

### Treated Water:

- The treated water was bacteriologically safe to drink even though the system was on a short term Boil Water Advisory due to an *E.coli* positive result in March, 2016. Immediate resamples did not confirm any bacterial contamination of the drinking water and it was concluded that the original positive result was likely a sampling error.
- The treated water turbidity (cloudiness) was usually well under the GCDWQ turbidity limit of 1.0 NTU with a few peaks reaching just 1 NTU (peak 1.08 NTU on September 20, 2017).
- The treated water total organic carbon (TOC) was high with an annual mean of 6.4 mg/L. There is currently no guideline in the GCDWQ for TOC levels, however TOC levels > 2 mg/L indicate a potential for disinfection by-product exceedances. TOC levels > 4 mg/L are usually a precursor for high disinfection by-product concentrations.
- One out of four tests exceeded the maximum acceptable concentration (MAC: 100 µg/L) for the disinfection by-product THM with 146 µg/L. Another test result was right on the limit. The annual average THM concentration was just below the limit of 100 µg/L (90 µg/L) The HAA disinfection by-product MAC of 80 µg/L was exceeded on one occasion (117 µg/L), however the annual average for this parameter remained well under the MAC (41 µg/L). Bromate concentrations, a potential disinfection by-product when using ozone, were consistently below the MAC of 10 µg/L. The health risk from these disinfection by-products over the MAC is from chronic exposure over many years. Exceedances seem more regular during the winter months when water consumption is low, the water age in the pipes is high and organic matter has had time to accumulate in the

dead end pipe sections. The high organic content entering the plant was insufficiently reduced with the existing treatment system and therefore the primary cause for the elevated THM concentrations. CRD staff is developing strategies to increase the efficiency of the treatment system in terms of organic compound removal. Regular flushing of the dead end pipe sections during the low flow periods could also reduce the risk of disinfection by-product exceedances.

- The pH of the treated water was consistently below the aesthetic objective range of pH 7 to 10.5 as per GCDWQ (annual median pH 6.72).
- The treated water had on one occasion an exceedance of the aesthetic objective for iron. Elevated iron concentrations can lead to discolouration of the drinking water which can be a nuisance for the customers.

Water quality data collected from this drinking water system can be reviewed on the CRD website:

<https://www.crd.bc.ca/about/data/drinking-water-quality-reports/southern-gulf-islands-water-quality-reports/lyall-harbour-boot-cove-water-quality-reports>

## **Operational Highlights**

The following is a summary of the major operational issues that were addressed by CRD Integrated Water Services staff:

- February 2016 – Emergency water system leak repair near the recreation center.
- March 2016 – Boil Water Advisory issued by Island Health. A summary of this event was provided in a verbal report at the August, 2016 AGM.
- April 2016 – Emergency water system leak repair near 108 East Point Road
- April 2016 – Temporary repairs to ground water seepage spring recirculation pumping system. The recirculation pumps replenish Money Lake from excess seepage spring runoff.

## **Capital Project Updates**

The Capital Projects that were completed in 2016 included:

1. Re-Caulk Spillway Joints – this project was completed and it included the sealing of the concrete spillway structure joints with a caulking material to prevent undermining or erosion.
2. Equipment Infrastructure Replacement – Phase 1 of the air release valve program was completed which included a total of three valves.
3. Safety Equipment – eyewash and drench hose equipment was installed at the treatment plant to aid the operator should the disinfectant chemical come in contact with the operator.
4. Relocate Shed to Upper Plant – the existing utility storage shed was relocated to the upper water treatment building.
5. Strategic Asset Management Plan – the Strategic Asset Management Plan (study) was delivered to the committee in November of 2016 for its consideration in guiding the future management of the water system.
6. Dam Safety Improvements – Money Lake Dam No. 1 – as a result of the legislated Dam Safety Review (audit) of 2011 conducted by a consultant, a soils investigation and simple seismic assessment was conducted and the results were presented at the November committee meeting. This project also included the installation of piezometers to monitor dam performance and groundwater trends within the dam structure.

## Financial Report

Please refer to the attached *Statement of Operations*. *Revenue* includes parcel taxes (*Transfers from Government*), fixed user fees (*User Charges*), interest on savings (*Interest Earnings*), a transfer from the maintenance reserve account, and miscellaneous revenue such as late payment charges (*Other Revenue*).

*Expenses* includes all costs of providing the service. *General Government Services* includes budget preparation, financial management, utility billing and risk management services. *CRD Labour and Operating Costs* includes CRD staff time as well as the costs of equipment, tools and vehicles. *Debt servicing costs* are interest and principal payments on long term debt. *Other Expenses* includes all other costs to administer and operate the water system, including insurance, supplies, water testing and electricity.

The difference between *Revenue* and *Expenses* is reported as *Net Revenue (expenses)*. Any transfers to or from capital or reserve accounts for the service (*Transfers to Own Funds*) are deducted from this amount and it is then added to any surplus or deficit carry forward from the prior year, yielding an *Accumulated Surplus* (or deficit) that is carried forward to the following year.

Submitted by:	Matt McCrank, M.Sc., P.Eng., Senior Manager, Infrastructure Operations
	Ian Jesney, P.Eng., Senior Manager, Infrastructure Engineering
	Glenn Harris, Ph.D., R.P.Bio., Senior Manager, Environmental Protection
	Amber Donaldson, MA, CPA, CMA, A/ Senior Manager, Financial Services



Integrated Water Services  
479 Island Highway  
Victoria, BC, Canada V9B 1H7  
250.474.9600 [www.crd.bc.ca](http://www.crd.bc.ca)

## CAPITAL REGIONAL DISTRICT

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### Lyall Harbour Boot Cove WATER Statement of Operations (Unaudited) For the Year Ended December 31, 2016

	2016	2015
<b>Revenue</b>		
Transfers from government	108,150	99,285
User Charges	84,518	75,242
Fees and Charges	235	235
Other revenue from own sources:		
Interest earnings	97	40
Other revenue	147	3,807
Total revenue	<u>193,147</u>	<u>178,609</u>
<b>Expenses</b>		
General government services	6,620	6,620
CRD Labour and Operating costs	99,917	105,276
Debt Servicing Costs	40,047	40,031
Other expenses	26,697	20,767
Total expenses	<u>173,281</u>	<u>172,693</u>
<b>Net revenue (expenses)</b>	19,866	5,916
Transfers to own funds:		
Capital Reserve Fund	14,844	-
Maintenance Reserve Fund	1,500	1,500
<b>Annual surplus (deficit)</b>	3,522	4,416
Accumulated deficit, beginning of year	(3,522)	(7,938)
<b>Accumulated deficit, end of year</b>	<u>\$ -</u>	<u>(3,522)</u>

## CAPITAL REGIONAL DISTRICT

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### Lyall Harbour Boot Cove WATER Statement of Reserve Balances (Unaudited) For the Year Ended December 31, 2016

	Capital Reserve	
	2016	2015
<b>Beginning Balance</b>	105,876	12,027
Transfer from Operating Budget	14,844	-
Community Works Funds	-	56,875
Transfers from completed capital projects	1,995	53,734
Interest Income	1,447	490
Transfer to Capital Projects	(25,500)	(17,250)
<b>Ending Balance</b>	<u>98,662</u>	<u>105,876</u>

	Operating Reserve	
	2016	2015
<b>Beginning Balance</b>	6,500	5,000
Transfer from/(to) Operating Budget	1,500	1,500
<b>Ending Balance</b>	<u>8,000</u>	<u>6,500</u>