



Making a difference...together

**REPORT TO LYALL HARBOUR / BOOT COVE WATER LOCAL SERVICE COMMITTEE  
MEETING OF WEDNESDAY 26 OCTOBER 2011**

---

**SUBJECT      WATER CONSERVATION PLAN**

**ISSUE**

A water conservation plan, endorsed by the Lyall Harbour/Boot Cove Water Local Service Committee, is required as a condition of the Municipal Rural Infrastructure Fund grant agreement for the water system upgrade project.

**BACKGROUND**

The Lyall Harbour/Boot Cove Water Service was awarded a federal/provincial infrastructure grant in 2007 for up to \$852,800 to upgrade the water system. The grant contribution agreement establishes as a condition of payment that a water conservation plan be endorsed by the Committee and submitted to the province. The plan is required to include the following information:

- Current water consumption
- Water reduction target
- Current and planned water conservation measures
- Current and planned climate change mitigation and adaptation strategies
- Implementation cost, schedule and responsibility
- Linkages to other regulatory mechanisms, policies and plans

Staff have prepared a draft Lyall Harbour/Boot Cove Water Conservation Plan for review by the Committee (Attachment 1).

**ALTERNATIVES**

1. That the Lyall Harbour/Boot Cove Water Local Service Committee endorse the Lyall Harbour/Boot Cove Water Conservation Plan.
2. That the Lyall Harbour/Boot Cove Water Local Service Committee receive this report.

**IMPLICATIONS**

**Alternative 1**

The Lyall Harbour/Boot Cove community has already invested approximately \$115,000 in water conservation through the installation of household water meters. Water demand has decreased by about 25% since 2007, the year before the metering project was launched. The attached plan sets water demand targets that will likely be achieved without additional effort or expense, through gradual replacement by homeowners of existing household fixtures (mainly toilets) with new fixtures that meet current water efficiency standards.

Although further reducing water demand can yield benefits by reducing carbon emissions, improving source water quality and maintaining greater water reserves for droughts or other emergencies, the water

source has sufficient capacity to meet current demand and anticipated growth.

The plan is based on an adaptive approach, where demand is routinely monitored and the level of effort and budget are adjusted over time to maintain steady progress toward a desired future target. If water demand per capita does not gradually decrease over the next five years as expected, there may be a need to implement new conservation programs to meet the proposed targets.

Alternative 2

If a water conservation plan is not endorsed by the Committee, the CRD will be unable to fulfill its obligations under the grant contribution agreement and may be required to forfeit grant funding.

**CONCLUSION**

The attached Water Conservation Plan will meet the requirements of the federal/provincial grant agreement, and provides a framework for an adaptive strategy to accommodate growth in the community.

**RECOMMENDATION**

That the Lyll Harbour/Boot Cove Water Local Service Committee endorse the Lyll Harbour/Boot Cove Water Conservation Plan.



---

Tim Tanton, MPA, P.Eng  
Senior Manager, Infrastructure Engineering



---

J.A. (Jack) Hull, MBA, P.Eng.  
General Manager, Integrated Water Services  
Concurrence

CS/TT/lis



# Lyall Harbour / Boot Cove Water Service WATER CONSERVATION PLAN – DRAFT FOR COMMITTEE REVIEW

C. Sunderland  
October 2011

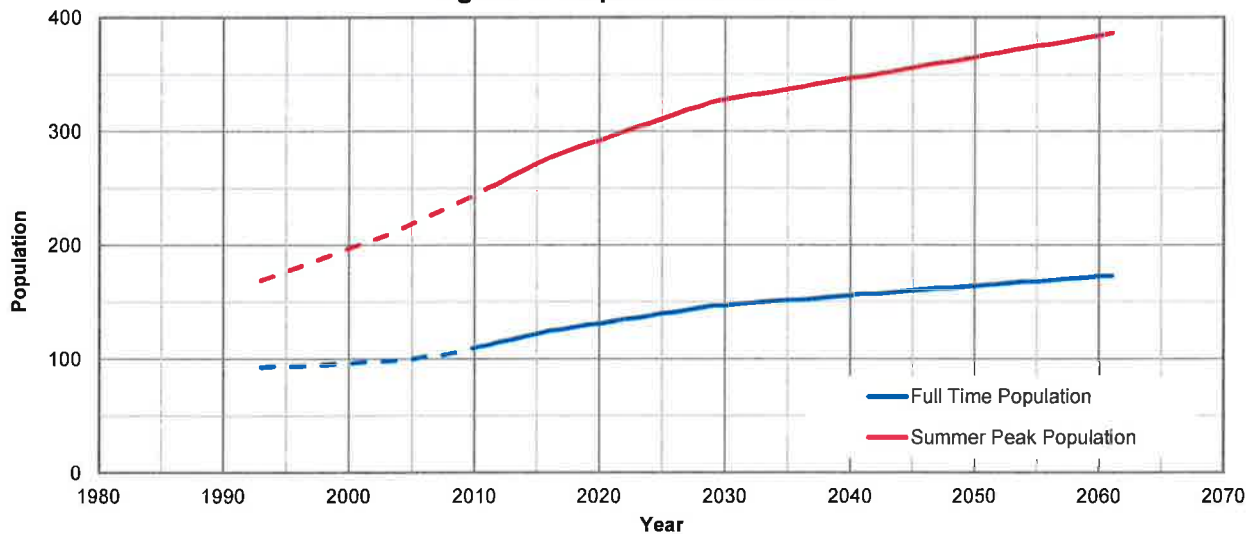
As a condition of the Municipal Rural Infrastructure Fund grant awarded for upgrades to the Lyall Harbour/Boot Cove water system, this Water Conservation Plan identifies targets and opportunities for sustainable water use in the Lyall Harbour/Boot Cove community.

## Population and Potential Growth

The Lyall Harbour/Boot Cove Water Service Area includes 171 taxable folios, of which 145 are connected to the water system. Of the 145 connections, 16 are business or institutional and the remainder are residential. Of the 129 residential connections, five are estimated to serve two dwellings each. On this basis, it is estimated that there are presently 134 dwellings in the service area.

Population is difficult to accurately determine, and fluctuates seasonally. Based on water usage data, approximately 80 accounts are unused in winter, indicating there may be approximately 50 full-time residences in the service area. At the time of the 2006 census, Saturna Island had a population of 359 and 426 dwellings, giving an average household size of 0.84. It is thus estimated that the full-time resident population of the service area is about 113. It is expected that the population at least doubles in the peak summer months of July and August. A peak month population of 250 for the Lyall Harbour/Boot Cove service area is assumed for the purpose of this Plan.

Figure 1. Population Forecast

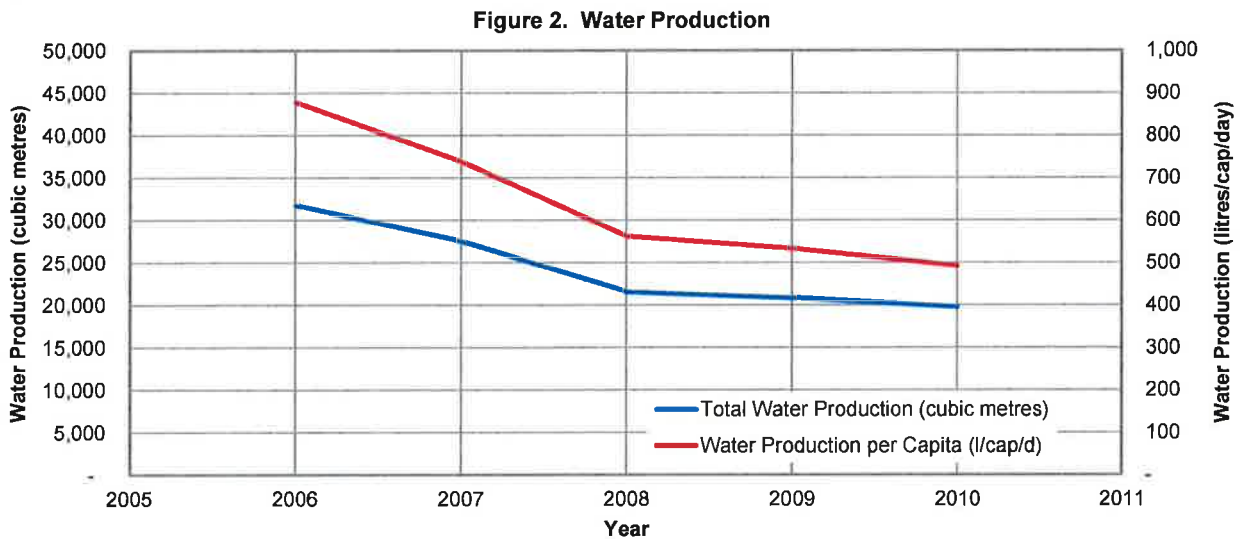


There is significant potential for population growth within the existing Lyall Harbour/Boot Cove Water Service Area. The 26 undeveloped folios in the area will likely be connected to the water system in the future. On average, two new connections have been completed annually since 2001. The Islands Trust governs land use on Saturna Island. Its environmental protection mandate and supporting land use bylaws and policies strictly limit new development, and effectively prohibit subdivision for new development on Saturna Island. However, secondary dwellings are allowed on residential parcels. Thus it is estimated that the absolute maximum number of households in the existing area may be about 300.

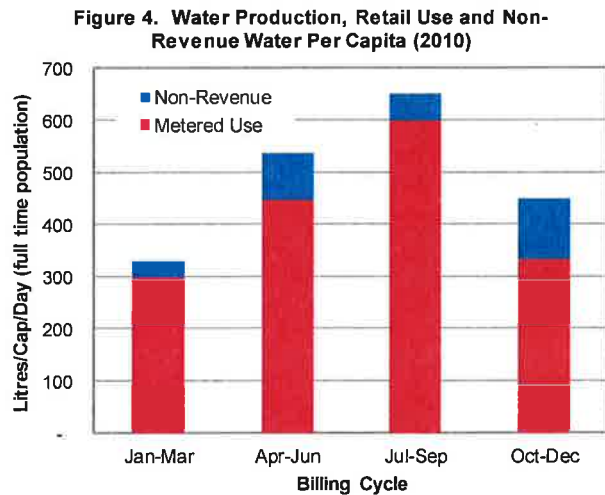
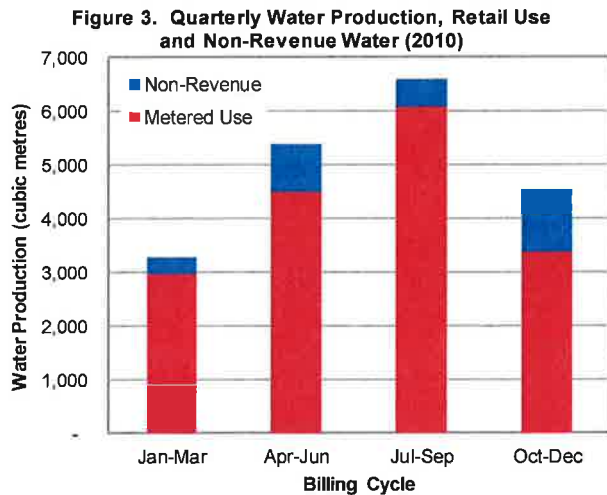
There is also potential for an increase in average household size, although there are no apparent drivers for such an increase in order to predict a significant change. Expansion of the service area is subject to approval of the Capital Regional District Board (normally following a recommendation by the local service committee) and is neither expected nor included in these projections. Population on Saturna Island grew at an average rate of 2.5% annually between 1996 and 2006. In 2001, CRD Regional Planning Services forecast a 43% increase in the population of the Gulf Islands between 1996 and 2026. Based on the foregoing, population is forecast to grow as shown in Figure 1.

**Current Water Demand**

Water treated and supplied to the distribution system is measured monthly. Total annual water production and water production per capita (full time population) for the years 2006-2010 is shown in Figure 2.



Customer water meters were installed in 2009 as part of the grantable project, and have been read every three months since January 2010. Quarterly water production, retail demand and non-revenue water (the difference between measured production and measured customer usage) in 2010 are shown in Figure 3 (total cubic metres) and Figure 4 (litres per capita per day based on full time population).



The annual average retail water demand (i.e. water use measured through customer meters) in the Lyall Harbour/Boot Cove Water Service Area in 2010 was 422 litres per capita per day (lpcd). Total production

averaged 492 lpcd in 2010, with a balance of 70 lpcd of non-revenue water. However, given the highly seasonal population and the difficulty in measuring summer population, it is suggested that winter water demand is a more meaningful measure of relative water efficiency. The average winter water demand in 2010 (Quarters 1 and 4) was 390 lpcd, including 318 lpcd retail usage and 72 lpcd non-revenue water.

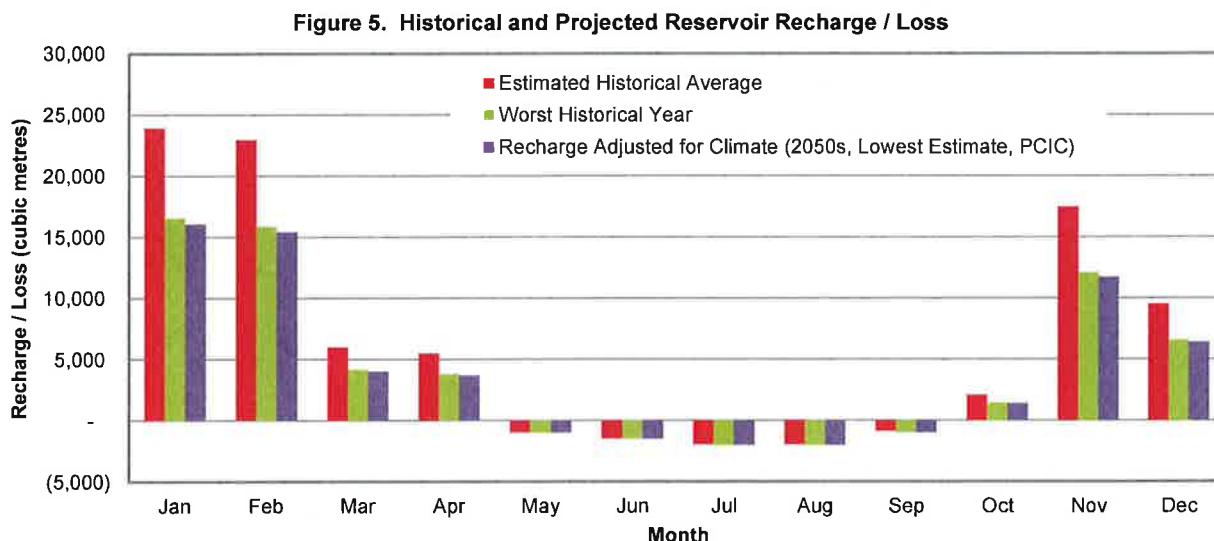
The seasonal variation in water demand is primarily the result of the seasonal increase in occupancy in summer. Increased tourist use of non-residential facilities likely accounts for a small proportion of seasonal demand, and irrigation may also account for a small proportion. Generally, few residents of the southern Gulf Islands irrigate residential landscapes with tap water.

**Water Supply Capacity**

The water source for the Lyall Harbour/Boot Cove Water Service is Money Lake No. 1, for which the CRD holds licenses to abstract 100,541 cubic metres per year and to store 57,945 cubic metres. The historical water supply available from the Money Lake No. 1 catchment is significantly less than the licensed capacity, estimated to be 65 acre-feet (80,000 cubic metres) annually (R.H. Edwards, 1994). Assuming this represents an average year, and based on annual precipitation records for the period of 1970-2002 at Mayne Island (Environment Canada), recharge in the driest year would be 66% of average, or 53,000 cubic metres. Actual available storage (live storage) in Money Lake No. 1 is 70,000 cubic metres (Ministry of Environment).

**Climate Change Adaptation and Mitigation**

Precipitation trends are expected to change in coming decades. For the CRD region, by the 2050s, annual precipitation is likely to increase, but probable scenarios based on Global Climate Model projections range from a decrease of 3 percent to an increase of 12 percent (Pacific Climate Impacts Consortium). For the purpose of this analysis, it is assumed that the worst case annual recharge would be 3% less than the driest year on historical record, or 51,000 cubic metres. Estimated and forecast monthly reservoir recharge and loss rates are shown in Figure 5.



If water demand per capita, including non-revenue water, remains at the 2010 level of 492 lpcd, forecast population growth would increase the total annual water demand to about 30,500 cubic metres by 2061. The current water source is expected to be capable of meeting this projected demand in the driest forecast year (accounting for climate change), with a maximum seasonal reservoir drawdown of 35-40% of capacity. On this basis, the current water source is expected to be adequate to serve the needs of the community for at least the next 50 years without demand reduction measures.

The Lyllal Harbour/Boot Cove water system has an inherently low carbon footprint due to its elevated source, which requires no electrical energy for pumping water to deliver it to customer connections at adequate service pressure. The upgraded system is designed to retain the full benefit of the hydraulic energy available from the elevated source, requiring no pumping to supply, treat or distribute water to the community. However, reducing water use per capita will benefit the community and the environment by:

- reducing the costs and carbon emissions of transporting residuals for disposal
- reducing the costs and carbon emissions of expanding the infrastructure to accommodate growth (e.g. manufacturing, transporting and installing larger watermains)
- maintaining more water storage in reserve for emergencies such as wildfires or extreme drought, which may increase due to climate change
- maintaining higher reservoir levels, thereby improving source water quality in summer

### **Water Demand Reduction Target**

The following water conservation targets are proposed by 2020:

- Reduce annual average water demand per full time, permanent resident to 400 lpcd, including retail use and non-revenue water (2010 demand was 492 lpcd).
- Reduce winter average water demand (October-March) to 300 lpcd (2010 demand was 390 lpcd).

These targets are readily achievable by gradual adoption of current, cost-effective technologies including high efficiency toilets and front loading washing machines. Rainwater harvesting for nonpotable uses and leak reduction may also be implemented cost-effectively as existing infrastructure is replaced and annual costs of water service increase over the next 10-20 years. In order to achieve the conservation targets, the value of water efficient technologies and practices must be effectively communicated to the community.

### **Current and Planned Water Conservation Measures**

A planned adaptive strategy for water conservation is proposed for Lyllal Harbour/Boot Cove, enabling conservation measures to be tailored to meet the changing needs of the community over time. This approach has proven successful for the CRD Greater Victoria water system. The following conservation measures are proposed as elements of a water conservation plan for Lyllal Harbour / Boot Cove:

1. **Universal metering** (current) – As part of the grantable project, each customer connection to the water system was retrofitted with a water meter. The meters have been read quarterly since January 1, 2010. Water demand has decreased from 562 to 492 lpcd (12%) since 2008, the year before the meters were installed.

The ongoing annual cost to read and maintain the meters and to replace them after 15 years in service is estimated to be \$3,000, of which \$1,000 (meter reading cost) is currently budgeted. Recovery of the asset maintenance and replacement costs is expected to be addressed as an outcome of a Strategic Asset Management Plan for the service, scheduled for 2012.

2. **Reporting usage on water bills** (current) – Information about water use has been displayed on water bills since January 2011, raising customer awareness about their water use. Further information is presented at annual general meetings and in community newsletters, enabling customers to compare their own usage with the range and average in their community and others.

The cost of reporting water usage on the water bills is currently budgeted.

3. **Consumption based water billing** (planned for 2012) – It is proposed to introduce a usage charge effective January 1, 2012 that would provide a financial incentive to conserve water.

Inclining block rate structures are commonly used for CRD water services in the Gulf Islands, typically recovering 10-25% of the total cost of service (the remainder is recovered through fixed user charges and parcel taxes).

Such a structure maintains stable revenue for fixed costs, provides a sufficient quantity of water at an affordable cost for essential customer needs, and provides a strong price signal to reduce excessive usage in any of the four billing cycles. This structure has proven well suited to Gulf Island communities with a large proportion of seasonal or occasional users. Based on recent implementation of this structure in other CRD water services, an overall demand reduction of 5-10% may be reasonably expected.

The cost to implement consumption based billing is currently budgeted.

4. **Community Awareness and Education** (current; expand as needed to meet target) – Information about water use and conservation is provided in community newsletters and at typically well attended annual general meetings in August. A more formal conservation awareness program may be implemented by linking information presented by mail and at the AGM with a community homepage on the CRD website that includes:
  - a. water use statistics, and comparison with other areas and benchmarks/targets
  - b. best practice guides (e.g. fixture and appliance standards, rainwater harvesting, leak prevention)
  - c. links to CRD regional water conservation resources
  - d. links to other organizations that provide water conservation resources tailored to the Gulf Islands (e.g. Mayne Island Integrated Water Systems Society, Salt Spring Island Water Council).

The cost of a modest community awareness program including the AGM, newsletters and website content, is currently budgeted.

5. **Distribution Loss Reduction** (current; expand as needed to meet target) – The CRD has monitored overnight minimum flows in the Lyllal Harbour/Boot Cove water system for several years as an indicator of leakage losses. Since customer meters were installed the overnight flow rate has decreased. CRD operators are also now able to monitor the difference between the volume of water treated and the volume measured through customer meters (non-revenue water).

The following measures will be implemented over time as necessary to meet demand reduction targets and manage distribution losses in accordance with industry best practices:

- a. Complete a Strategic Asset Management Plan to prioritize asset replacement based on water losses and other criteria (planned for 2012)
- b. Monitor overall non-revenue water at least annually, and compare against published benchmarks (e.g. IWA Infrastructure Leakage Index)
- c. Add or modify distribution valves to increase zone isolation and measurement to efficiently isolate and repair leaks

The cost of a distribution loss reduction program will be determined based on the outcome of the Strategic Asset Management Plan. It is anticipated that losses may be reduced and maintained to meet conservation program targets within the overall budget of an asset maintenance and replacement program.

6. **Water Conservation Plan Renewal** (2016, and every five years thereafter) – A review of this plan will be conducted approximately every five years to update forecasts and targets, consider new information, and adjust program activities as required to meet targets.

The cost to review and update this conservation plan is anticipated to be roughly \$1,000 every five years, which may be accommodated within the current annual budget for the service.



### **Program Implementation Responsibility, Cost and Schedule**

This Water Conservation Plan will be implemented by CRD staff, under the authority of the Lyall Harbour/Boot Cove Water Service Commission. The Commission has administrative authority delegated by the CRD Board under CRD Bylaw No. 1875, "Lyall Harbour/Boot Cove Water Local Services Committee Bylaw, 1990" for provision of the water service.

The following implementation schedule is proposed:

<b>Item No.</b>	<b>Implementation Year</b>	<b>New Budget Requirement</b>	<b>Note</b>
1	2009 (completed)	\$ 2,000	Estimated annual cost of asset maintenance and renewal
2	2011 (completed)	\$ 0	Included in current budget
3	2012	\$ 0	Included in current budget
4	2012	\$ 0	Included in current budget
5	2013	Unknown	To be determined based on 2012 asset management plan
6	2016	\$ 0	Included in current budget

### **Linkages to Other Plans and Policies**

Water Conservation Plans for CRD electoral area water services will adhere to a similar format. Targets, program measures and knowledge will be shared between these service areas. Where the CRD provides sewer services, the benefits of water conservation for these services will be taken into account. Water Conservation Plans will be linked to Strategic Plans for the services. Where practicable, planning and program implementation will also be linked with the Greater Victoria water conservation and climate action services delivered by the CRD. Knowledge will be shared, and policies and programs will be coordinated, with other stakeholders such as improvement districts, other regional districts, the Islands Trust and the Mayne Island Integrated Water Systems Society and the Salt Spring Island Water Council.

### **References**

1. Saturna Island, Lyall Harbour & Boot Cove Water Supply Feasibility Study. Willis Cunliffe Tait & Company Ltd. 1978.
2. Edwards, Richard H. Lyall Harbour/Boot Cove Saturna Island Water System Water Supply Evaluation and Quality Assessment. Capital Regional District. 1984.
3. Edwards, Richard H. Lyall Harbour – Boot Cove Water Utility Water Availability and Future Requirements. Capital Regional District. 1994.
4. Kay, Jennifer and Bruno Bleic. Outer Gulf Islands Water Allocation Plan. Province of British Columbia. 2000.
5. Walker, Deborah and Colwyn Sunderland. Water Use and Conservation Update 2008. Capital Regional District. 2008.
6. [www.crd.bc.ca/regionalplanning/factsheets](http://www.crd.bc.ca/regionalplanning/factsheets) website. Population and dwelling statistics and forecasts. Capital Regional District. Accessed 24 June 2011.
7. [www.plan2adapt.ca](http://www.plan2adapt.ca) website. "Summary of Climate Variables – Climate Change for CRD Region in 2050s Period". Pacific Climate Impacts Consortium. Accessed 24 June 2011.