



WATER CONSERVATION STRATEGY

September 15, 2008



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The Water Conservation Strategy was adopted by Council on September 15, 2008

1. Water Conservation Planning

Water is a very precious resource. We owe it to ourselves to use this resource wisely, minimize any waste, and ensure it is sustainable.

The provincial government recently released its Living Water Smart Plan, encouraging British Columbians to commit to ensuring our water stays healthy and secure. Nanaimo shares in this vision and is committed to continuing existing water conserving initiatives and developing new strategies for promoting additional water conservation.

In 2007, the City completed a Water Supply Strategic Plan. Three primary goals were identified in the plan as follows:

1. Provide Safe Drinking Water
2. Ensure a Sustainable Water Supply
3. Provide Cost Effective Delivery

These goals tie into the overall community goals for viability, environmental protection and sustainable management. Additionally, the Strategic Plan recognizes water as a shared resource, and emphasizes the need for both supply-side and demand-side management initiatives to enhance water conservation measures. These actions ultimately affect the quality and quantity of our water source, and water available for other eco-systems.

This water conservation strategy also directly supports the initiatives of the following guiding documents and regulatory policies:

- **Nanaimo River Water Management Plan** by recognizing the shared needs of others in trying to sustain the water resources and identify management strategies for the optimal long term benefit of all water use interests within the Nanaimo River Basin, including First Nations and downstream fisheries.
- **Living Water Smart, British Columbia's Water Plan**, by recognizing a plentiful amount of clean water is needed for our growing communities, economic growth, healthy food, clean energy and beautiful environment.
- **City of Nanaimo, Official Community Plan (OCP)** by ensuring the community can continue to grow and prosper while maintaining environmental quality, and by developing a conservation mindset towards water use.
- **Community to Community Water Agreement (*between the City of Nanaimo and Snuneymuxw First Nation*)** by acknowledging that water is a shared resource and that both parties are committed to regional water use principles, including conservation.
- **Green Building Code (BC Initiative)** by supporting the use of water saving plumbing fixtures.

The City first developed a Water Conservation Plan in 2003. This document provides an update and expands upon previous efforts.

2. Conservation Goals

The City aims to encourage water conservation through a variety of measures, helping to maintain an efficient and cost-effective system, while providing high quality water to its users as required by the *Drinking Water Protection Act* and accompanying regulation.

The City's conservation goals include:

- Lowering water usage and creating an environment of sustainable water use,
- Educating customers about the value of water,
- Promoting water efficient practices and technology,
- Building new water system capital projects that embrace sustainability initiatives where possible.

To demonstrate commitment to conservation and efficiency measures, the City of Nanaimo has:

- signed onto the provincial Climate Action Charter in 2007,
- changed its' building practices by setting a new council policy to construct new civic facilities over 500 m² to Leadership in Energy and Environmental Design (LEEDTM), Silver or equivalent standards,
- developed a Corporate Climate Action Plan which requires staff to review "business as usual" versus more energy efficient, environmentally friendly, and sustainable choices in its operations, construction practices, and purchases,
- has set a target to reduce our GHG emission levels by 13% of 2001 levels, by 2012.

Efforts like those mentioned above will reduce impacts on creeks and rivers, reduce costs for expensive new water supply storage and treatment infrastructure, and can extend the system to service new communities.

3. Water System Profile

The system that supplies citizens of Nanaimo, South-west Extension Improvement District, and Snuneymuxw First Nation (I.R. #1) with water that originates in a community watershed on the South Fork of the Nanaimo River. In this watershed, Nanaimo holds water licenses for two surface water reservoirs with a total of 19,300 mega-litres of storage capacity. This water is conveyed from the watershed by gravity with twin pipelines to balancing storage reservoirs in the City. The water is disinfected with chlorine gas before reaching customers.

This water system also provides an emergency water supply connection to the Municipality of Lantzville.

As shown in Figure 1., the water system services the City of Nanaimo, South-west Extension Improvement District and Snuneymuxw First Nation (I.R. #1) areas. The population for each area and respective number of homes is detailed.

Fig. 1

Area	2007 Population	Households served
City of Nanaimo (source: BC Stats)	83,469	22,907
South-west Extension Improvement District	221	91
Snuneymuxw First Nation I.R. #1	335	85
Total	84,025	23,083

The build-out population for the water system service area, forecast in the Official Community Plan (OCP), is 187,500. Therefore, it is wise to embark on further conservation measures.

4. Water Demands and Trending

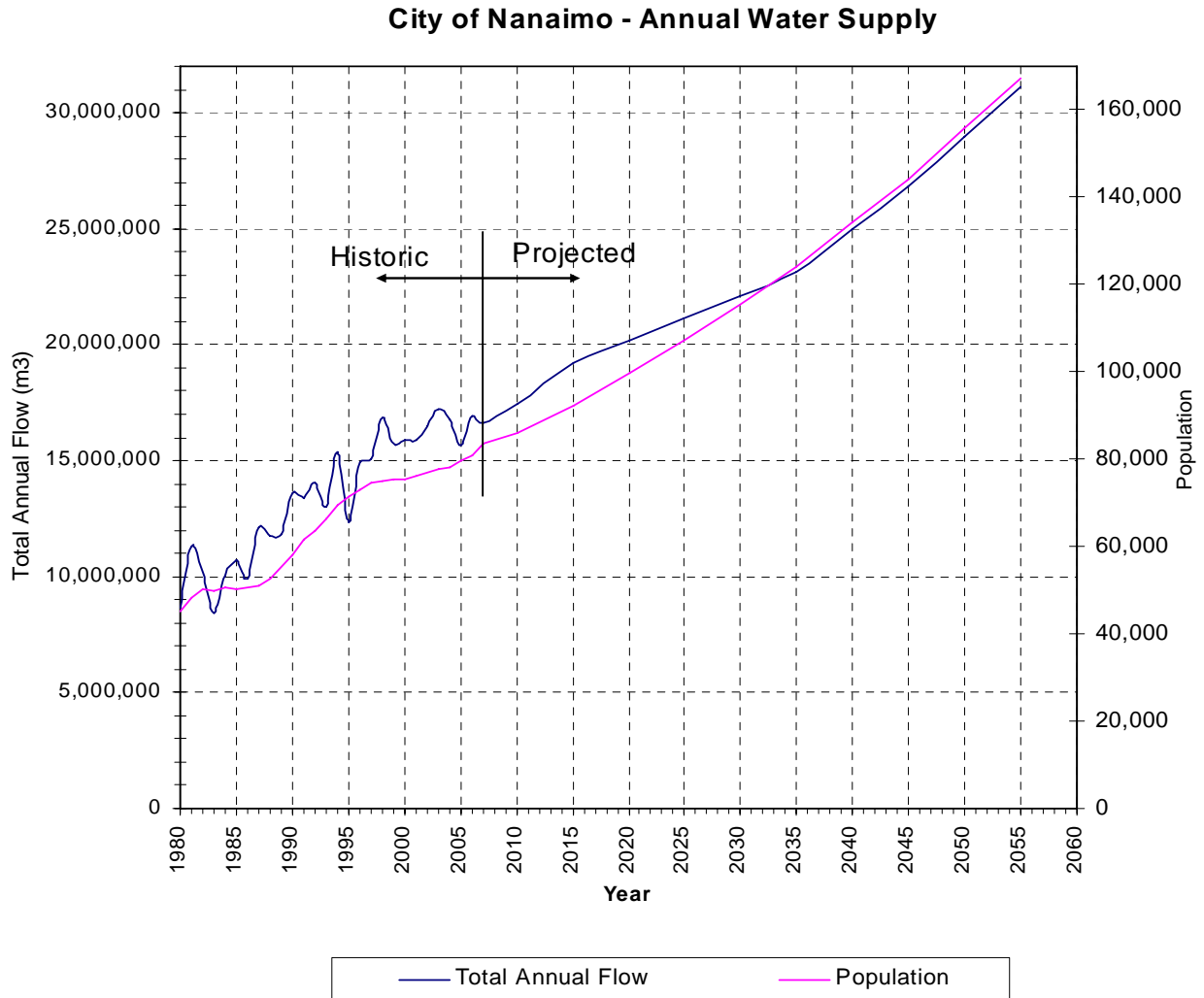
Nanaimo continually measures all mainline system flows and universally meters water connections in an effort to better monitor and evaluate performance. The data helps understand the effects of growth and water conservation measures, and determines if there is more water available for new uses.

The City maintains a month-by-month history of water supplied data and generates the following tables and graphs:

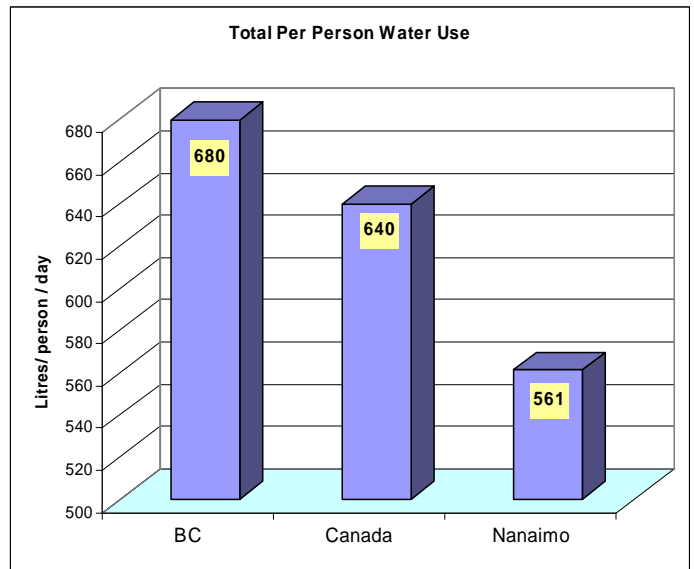
- Water Consumption Trends (Table 1, Appendix A)
- Annual Water Supply (actual and projected demand)
- Peak and Average Day Demand per person

The historical and future projected Annual Water Supply demand is shown in Figure 2, following.

Fig. 2

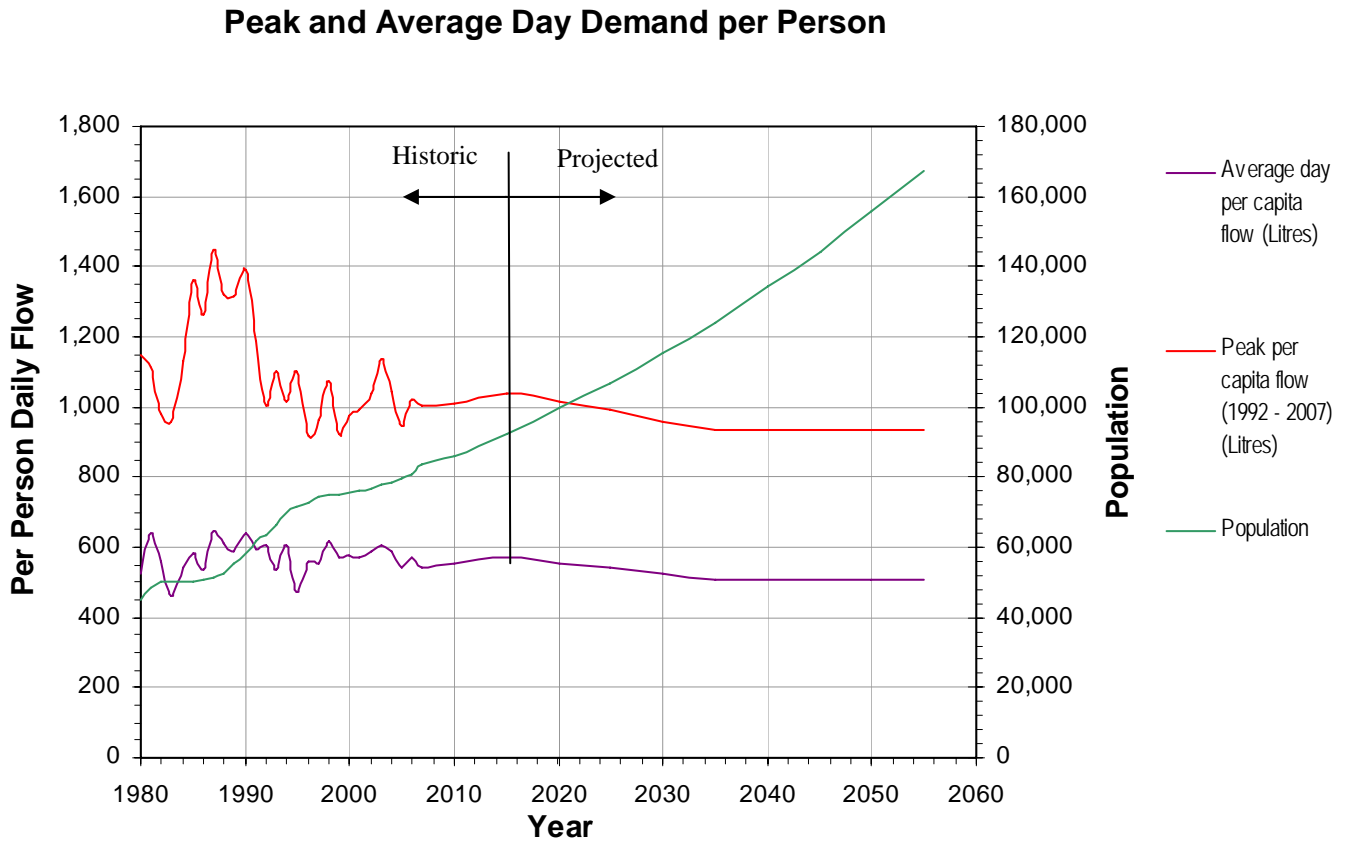


As illustrated in Fig. 3 on the next page, Peak and Average Day Demand per Person graph, peak day demand has declined significantly as a result of implementing expanded block rate billing, universal metering and full-cost pricing. Also shown on the graph is the average water consumption in Nanaimo for the past 4 years, at 561 litres per person per day. This amount includes both residential and non-residential water use (i.e. industrial, commercial, and institutional uses). According to the 2005 statistics, the British Columbia total per person water use was



680 litres per person per day. Nanaimo's consumption is 18% less than the BC average. Natural Resource Canada (1999) states the Canada Total per person water use as 640 litres per person per day, 12% higher than Nanaimo's water use.

Fig. 3



5. Reduction Targets

The City has set a further total water reduction target as follows:

- 15% further reduction in water demand by 2035 to 510 litres per person per day.

The main components of the City's future conservation plans are:

- Educating the Public on water use
- Minimizing Leaks

To *Minimize Leaks*, the City has long range capital plans for system upgrades and maintenance to high standards. A Water Audit Study will be conducted to set a benchmark from which the City can address unaccounted for water uses and system leakage.

To *Educate the Public*, efforts will focus on keeping the public aware of the reasons and techniques for conserving water. The City will be reviewing opportunities for partnering with neighboring communities, the Regional District, water conservation societies, schools and using the media to communicate water conservation.

6. Summer Demand

Peak demand on the water system occurs in summer, and is primarily driven by increased landscape and garden irrigation. Yearly variations in summer demand can come from a variety of sources, but the predominant explanation is related to amounts of precipitation received.

7. Projected Demand

Future water use in Nanaimo is a function of population and commercial growth over the next several years. Assuming population growth and water use per person is consistent with past trends, but allowing for a 15% reduction due to demand-side management initiatives, Nanaimo's water demand is expected to rise from 16,800 million litres in 2007 to 20,000 million litres per year in 2020. Further projections are shown in the Figure 2, Annual Water Supply Growth graph.

8. Existing Supply-Side Management Initiatives and Climate Change

The City has been proactive in implementing supply-side management practices. In trying to understand the potential effects of climate change, and recognizing the shared needs of water for the environment and fisheries, the City has taken the following measures:

- A South Nanaimo River Watershed Yield Assessment was completed in Jan. 2007. The study analyzed historical precipitation and made scientific predictions on available water based on various climate change scenarios. This will assist in design of future projects including storage reservoirs, and a water treatment plant at the needed size while adapting to our changing climate and thinking long term.
- The City operates an all-weather precipitation station near the top of the watershed to gather and trend important information on rain and snowfall. This information is used to manage operation of the watershed storage reservoirs for domestic water and to support fisheries needs.
- The City operates storage reservoirs in the watershed to meet Water License requirements and maintain necessary creek and river releases to assist with Fisheries in accordance with the Nanaimo River Water Management Plan. Pulse releases are also provided with stored water as necessary to assist with fish migration during river low flow periods.
- The City shares in the cost for river gauging stations (South Fork and Jump Creek) with Water Survey Canada.

By being proactive with supply-side management for the past 25 years, the City is in an excellent position to adapt to climate change. Further conservation initiatives will ensure reductions in water use, and that more water is available to share in ecosystems.

9. Existing Demand-Side Management and Water Conservation Measures / Actions

In recognizing the importance of water conservation, the City has implemented several proactive measures to encourage efficient use of water including:

- Universal metering of all service connections (since 1983),
- An expanded block rate billing system (since 1983),
- Full-cost pricing (since 1992),
- Regulation on permitted use and summer watering restrictions,
- Engineering Standards and Specifications that require stringent design and construction practices that aim to maintain an efficient water system (since 1978),
- Public education on the value of water and ways to conserve,
- Computerized water system monitoring using a Supervisory Control and Data Acquisition (SCADA) system (since 1991),
- Start of annual user rate increases to ensure funding sustainability for major capital and ongoing operations (2007).

Further details of these measures follow:

Bylaws

The City of Nanaimo has two bylaws that deal with water management issues and have direct ties to conserving water. These bylaws are:

- a) The Waterworks Rate and Regulation Bylaw 2006, No. 7004 which address the following issues:
- **Water Rates** levied and collected based on proportionate amounts of water consumed per day. The higher the amount consumed, the higher the levy thus, encouraging responsible use of water volumes. Rates are reviewed annually.
 - **Metering** is required of all service connections in accordance with the Manual of Engineering Standards and Specifications (Schedule 'A' of the City of Nanaimo "Subdivision Control Bylaw 1989 No. 3260" and any amendments thereto, and approved by the Department.
 - **Service Connections** addresses that prior to turning on any water from the system, the service pipes, stop cocks and other fixtures on the property conform to standards of the BC Plumbing Code, and that private meter installations conform to the Manual of Engineering Standards and Specifications (Schedule 'A' of the City of Nanaimo "Subdivision Control Bylaw 1989 No. 3260" and any amendments thereto, and approved by the Department.
 - **Regulations** address that only the occupant of real property use water supplied to that property, and that no person shall use, cause or allow water to be wasted from the system by causing or permitting water to run off onto a highway or into a storm sewer system. No person other than the City shall connect to the system.
 - **Permit** requires that no person shall, without a permit, sell or dispose of water; give away City water to any other person; permit water to be taken or carried away by any person; or use or supply water for the use or benefit of others.
 - **Water Use Restrictions** defines four (4) levels of water conservations which are in effect from June 1 to October 31 each year. The bylaw specifies an odd-even address-numbering watering scheme, prohibits watering during peak daytime hours, prohibits washing of driveways or parking lots, and can, depending on severity level, restrict washing of vehicle or boats, and filling of ponds or a swimming pool. Fine amounts are also defined for any person found to contravene the Bylaw.
- b) The Subdivision Control Bylaw 1989, No. 3260 contains standards for the construction of water mains, service connections, water system infrastructure, and deals with disinfection of new systems prior to being brought into service. These standards ensure high construction standards are in place to maintain a tight water system with minimal leakage.

Public Education

- Use of the City's internet site to promote information on:
 - video of 'Water – Our Most Precious Resource',
 - video of 'Protecting Our Watershed',
 - water conservations tips,
 - information on watering restrictions,
 - where are water comes from,
 - water quality and treatment,
 - the Water Supply Strategic Plan.
- Distribute education Brochures / Leaflets:
 - User Rates Comprehensive Example for Water
 - WATER – Conservation and Consumer Audit
- School Presentations / Tours
 - the City provides schools with tours and/or class presentations (average 5 per year) on the water system emphasizing the importance of protecting and using water wisely,
 - the Regional District also undertakes education in local schools with a water-wise component.
- Mobile Billboards
 - information regarding Sprinkling Regulations in effect, is posted on the City's garbage trucks from May to September each year, to promote conservation awareness.

Construction Plans

Annually, through the Five Year Capital Planning process, the City selects old water mains in need of repair or replacement at the rate of \$3.5Million to \$4Million each year. Criteria like pipe size, age, condition, number of leaks, and material type are critically reviewed to ensure the system is maintained in optimum condition.

Water System Monitoring

- Use of the City's computerized Supervisory Control and Data Acquisition (SCADA) system to monitor, alarm abnormal conditions and control water stations and reservoirs thereby, ensuring optimum performance and early detection of leaks or water system malfunctions.

- Maintain system wide hydraulic pressure management (electronic monitoring and alarming soon to be incorporated using SCADA).
- The City maintains 24 hour, 7 day a week public communications at Public Works so that notification of any service leaks, watermain breaks or other issues can be reported and acted upon immediately by staff.

10. Effects of Existing Demand-Side Management Initiatives

Table 2 below illustrates the effects of the most influential conservation initiatives to date - universal metering and the expanded block rate billing system. These measures have contributed to reducing the Average Day per Person Flow by 7% and the Peak Day per Person Flow by 24% .

Fig. 4 Total Per Person Water Use					
Year	Description	Average day per person flow (litres)	Average Day Reduction	Peak day per person flow (litres)	Peak Day Reduction
1983-90	After universal metering and expanded block rate	593		1302	
1991-2003	After full cost pricing	575	3%	1033	21%
2004-2007	Existing conditions	553	4%	1004	3%

11. Future Water Conservation Initiatives

There are several additional initiatives that the City is working towards. Highlights of these initiatives are as follows:

- A Water Audit Study which reviews existing water uses and accounting measures; where and how improvements should be made to quantify water uses, consumption, unaccounted amounts and system leakage. Develop a leak detection program suited to the City's needs. Some items like hydrant flushing, bulk hydrant usage (by contractors), line breaks, fire hydrant usage (by firefighters); watering of boulevards; underground chambers water operated sump pumps; and system blow off lines are recognized as unaccounted for water sources.
- Develop a Water Supply Forecasting Model which incorporates watershed modeling, stake holder input, hydrological data, reservoir operation,

- environmental and fisheries requirements, domestic consumption rates, and reservoir drawdown rates. The model will optimize decision making and supply-side management of the watershed.
- Detailed characterization of water consumption data for all uses (residential, industrial, commercial and institutional), and improved data management.
 - Partner with the Regional District of Nanaimo, the regional wastewater management utility, investigating the potential for the supply of non-potable water from existing or future wastewater treatment plants that would offset the use of City drinking water. Potential uses could include industrial process or cooling water, agricultural or landscape irrigation.
 - Review options to enhance water billing information to further encourage conservation awareness (i.e total water consumed during billing period / number of days = 'X' amount per day vs. Nanaimo's average household consumption per day).
 - Review rebate programs for low flow plumbing fixture replacement – i.e. toilets, shower heads, faucets.
 - Provide workshops and a demonstration garden with interpretive signs for the public illustrating water-efficient landscaping practices (xeriscaping) at the future Water Treatment Plant site or other location. The City will also investigate opportunities to partner with the Regional District of Nanaimo on this initiative.
 - Working with local television, radio and newspapers to promote low flow rebate programs and heighten water wise activities.
 - Water Conservation Signage on Regional District of Nanaimo buses or installed along street boulevards at key locations.
 - Partnering with the Regional District of Nanaimo on their water conservation programs to improve efficiency and consistency to all users in the region.
 - Investigate opportunities for Water Aware Youth Teams to encourage water conservation.

The following tables illustrate typical grouping of the various water conservation initiatives, and serves to illustrate those measures currently implemented ('x'), proposed ('P') and other areas for future consideration. This system of organizing conservation measures (USEPA Water Conservation Plan Guidelines) recognizes that the measures considered can vary depending on the size and capability of the system.

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City of Nanaimo - Water Conservation Strategies

TABLE B.1- Demographics / Rationale	x = imple'd P = prop'd	Proposed Initiative:	Timeframe:	Proposed Funding:	Responsibility:
Demographics					
Population	84,025				
Rationale					
Capacity constraints	x				
Environmental Stewardship	x				
Potential Drought					
Reduce Costs	x				
Other					

TABLE B.2: Regulatory Tools		Proposed Initiative:	Timeframe:	Proposed Funding:	Responsibility:
Legal Tools					
Bylaws	x				
Standards	x				
Regulations	x				
Licensing					
Mandatory restrictions	x				
Planning Tools					
Strategic planning for utility	x				
Land use planning	x				
Watershed management	P	Water Supply Forecasting Model	By 2010	\$100k	WR
Wellhead protection					

TABLE B.3: Economic and Financial Tools		Proposed Initiative:	Timeframe:	Proposed Funding:	Responsibility:
Cost / Benefit analysis					
Metering Study / Pilot					
Pricing structure analysis	x	Ongoing			
Inclined block rate fees	x	Ongoing			
Seasonal rates					
Grants					
Fines (for excess use)	x	Ongoing			
Service charges					

TABLE B.4: Operations and Maintenance Tools		Proposed Initiative:	Timeframe:	Proposed Funding:	Responsibility:
Physical improvements					
Water audits	P	Water Audit Study	By 2013	\$100k	WR
Best management practices					
Low-flow / retrofit program	P	Review Rebate Programs	By 2010	\$50k	WR, F
Leak detection	P				WR, PW
Xeriscaping	P	Workshops for public	By 2015	\$15k	WR, RDN, Parks
Sector demand study	P	Water Use by sector	By 2009	\$30k	WR, F
Water re-use program		BC Plumbing Code	By 2020		
Climate comfort systems					
Water supply improvements					
Computer upgrades	x	Ongoing			
Emergency Response Plan	x	Ongoing			
Watershed protection	x	Ongoing			
Residential upgrade programs					
ICI programs					
Agricultural programs					
Pilot programs or projects					
Metering					
Residential metering	x				
Commercial / Industrial	x				
Agricultural / irrigation	x				

TABLE B.5: Communication and Education Programs		Proposed Initiative:	Timeframe:	Proposed Funding:	Responsibility:
Education for residential users					
Voluntary restrictions					
Media	P	Waterwise, rebates, etc.	By 2010	\$25k	WR
Information with billing	P	Improved Billing Info.	By 2009	\$20k	WR, F
Publications	x				
Community events					
Outdoor advertising	x				
Internet	x				
Workshops and seminars					
Eco-education programs					
Focus groups					
Citizen committee / task force					
Public opinion survey					
Referendum					
Voluntary low flow / retrofits					
Education for ICI Users					
Media					
Information with billing					

Publications					
Workshops and seminars					
Internet					
Focus groups					
User committees / task force					
School Programs					
Curriculum / school programs	P	Education programs	By 2013	\$30k	WR, PW, SD, WCS
Publications	P	Lesson plan materials	By 2013	\$20k	WR, PW, SD, WCS
Contests for students					
Special activities					
Student representatives					
Class tours of water facilities	x				

TABLE B.6: Market Development Tools		Proposed Initiative:	Timeframe:	Proposed Funding:	Responsibility:
Lead-by-example					
Efficient operations	x				
Low-flow / retrofit programs					
Water efficient landscaping	P	Demonstration garden	By 2013	\$75k	WR, RDN, CP, Parks
Early detection / repair of leaks	x				
Reduced water pressure	x				
Greywater recycling		BC Plumbing Code	By 2020		
Employee education					
Education for elected officials					
Conservation library					
Partnership / Cooperation					
Public Private Partnerships					
With other governments	P	Share conservation efforts	By 2010	\$30k	WR, RDN
With other utilities					
With local businesses					
With major users					
Pilot programs					
C / B analysis of partnerships					

Abbreviations under **Responsibility**

Water Resources Dept. = WR, Public Works Dept. = PW, Community Planning = CP,
City Finance Dept. = F, Regional District of Nanaimo = RDN, City Parks Dept. = Parks
School District = SD, Water Conservation Society = WCS

12. Water System Studies / Links to other Initiatives

The *Drinking Water Protection Act* which came into force in May 2003, places a great deal of responsibility on the water supplier to ensure quality, and necessitates a strategy to deal with water quality issues before they become hazardous to public health.

The *Act* makes the water supplier directly liable for their water systems, and places responsibility on them to guarantee a safe supply of potable water. This also requires water suppliers to work carefully to protect the sustainability of their water resources in the years to come, and ensure conservation measures help to ensure this outcome.

As a result, the City has had several recent studies completed all which recognize the changing focus to more environmentally friendly initiatives, renewability, sustainability and construction and operational efficiencies.

These studies are:

- **Water Supply Strategic Plan** (Jan. 2007)
 - the plan maps out the direction to deal with water quality, capacity and reliability issues for the next 50 years, while considering changes in Provincial drinking policies and regulations in recent years. Recommends key strategies for demand-side management and water conservation.

- **South Nanaimo River Watershed Yield Assessment** (Jan. 2007)
 - analyzes the available water in the watershed resulting from precipitation and makes scientific predictions on available water based on various climate change scenarios. This will assist in designing future projects like reservoirs more closely to the actual needed size, while adapting to our changing climate and thinking long term.

- **Water Treatment Plant Siting Study** (Jan. 2007)
 - Sites the future treatment plant so that minimal loss in head occurs from the existing water system, avoiding the need for a pumping.

- **Water Treatment Plant Conceptual Design** (April 2008)
 - The conceptual process design has included provisions for on-site recycling of off-specification water and re-introduction to the treatment process, as well as, on-site treatment and disposal of all other process liquid waste products.

Appendix A

WATER CONSUMPTION TRENDS
Water Resources Division



Year	Total Annual Flow (m3)	Average Daily Amount (m3)	Peak Day Demand (m3/day)	Population	Annual Change in Population (%)	Total Water Use per person per day (Litres)	Peak per capita flow (1992 - 2007) (Litres)	Annual Change in Per capita consumption	Annual Change in Per capita consumption	Peak	Annual Change in Water Supply (%)	Comments
OVERALL AVERAGE	13,599,270	37,258	69,307		2.24	569	1,016	Average	Peak		7.53%	(per ca flow is 1992 - 2007)
1977			47,591			578	1,218					per capita flow 1980-1991
1978			52,863									
1979												
1980	8,630,769	23,646	51,755	45,000		525	1,150					
1981	11,301,475	30,963	53,697	48,268	6.8	641	1,112	22.1%		-3.3%	-10.5	
1982	10,223,227	28,009	49,299	50,123	3.7	559	984	-12.9%		-11.6%	-21.5	
1983	8,413,778	23,051	47,917	50,000	-0.2	461	958	-17.5%		-2.6%	-21.5	Completed metering program. Expanded Block Rate Billing implemented.
1984	10,030,424	27,481	57,115	50,463	0.9	545	1,132	18.1%		18.1%	16.1	
1985	10,696,159	29,305	68,596	50,383	-0.2	582	1,361	6.8%		20.3%	6.2	
1986	9,907,095	27,143	64,076	50,687	0.6	535	1,264	-7.9%		-7.1%	-8.0	
1987	12,111,364	33,182	74,091	51,152	0.9	649	1,448	21.1%		14.6%	18.2	
1988	11,779,545	32,273	69,693	52,714	3.0	612	1,322	-5.6%		-8.7%	-2.8	
1989	11,858,625	32,489	72,474	55,218	4.5	588	1,313	-3.9%		-0.7%	0.7	
1990	13,633,143	37,351	80,909	58,167	5.1	642	1,391	9.1%		6.0%	13.0	
1991	13,396,364	36,702	73,182	61,708	5.7	595	1,186	-7.4%		-14.7%	-1.8	
1992	14,056,109	38,510	64,091	63,711	3.1	604	1,006	1.6%		-15.2%	4.7	(refer to Appendix 'C'). More accurate
1993	13,032,432	35,705	73,182	66,507	4.2	537	1,100	-11.2%		9.4%	-7.9	U-sonic flowmeters installed at Reservoir #1
1994	15,339,364	42,026	70,909	69,640	4.5	603	1,018	12.4%		-7.5%	15.0	in 1991.
1995	12,315,455	33,741	78,636	71,353	2.4	473	1,102	-21.6%		8.2%	-24.6	
1996	14,921,032	40,880	66,818	72,950	2.2	560	916	18.5%		-16.9%	17.5	
1997	15,045,589	41,221	71,818	74,637	2.3	552	962	-1.4%		5.1%	0.8	
1998	16,837,587	46,130	80,455	75,007	0.5	615	1,073	11.4%		11.5%	10.6	
1999	15,749,457	43,149	69,545	75,237	0.3	574	924	-6.7%		-13.8%	-6.9	
2000	15,897,546	43,555	73,636	75,559	0.4	576	975	0.5%		5.4%	0.9	
2001	15,891,620	43,539	75,455	76,185	0.8	571	990	-0.9%		1.6%	0.0	
2002	16,472,427	45,130	79,545	76,758	0.7	588	1,036	2.9%		4.6%	3.5	
2003	17,239,767	47,232	88,341	77,676	1.2	608	1,137	3.4%		9.7%	4.5	
2004	16,740,754	45,865	81,784	78,271	0.8	586	1,045	-3.6%		-8.1%	-3.0	Peak Day - July 23
2005	15,695,437	43,001	75,295	79,616	1.7	540	946	-7.8%		-9.5%	-6.7	Peak Day - August 8; Duke Point main shutdown all year.
2006	16,955,205	46,453	82,589	80,949	1.6	574	1,020	6.2%		7.9%	7.4	Peak Day - July 24; Duke Point main shut down all year.
2007	16,607,813	45,501	83,863	83,469	3.0	545	1,005	-5.0%		-1.5%	-2.1	Peak Day July 13 (Pop from BC Stats)
2008												

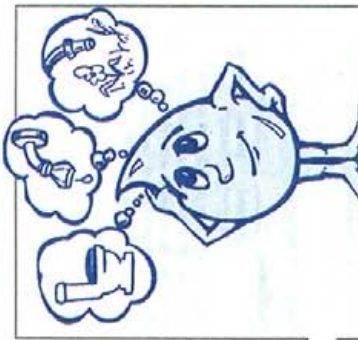
Population (bold numbers) data is based on Census population and does not include population equivalents for Industrial / Commercial / Institutional uses. Therefore, the industrial and commercial water use is included in the per capita demand.

Appendix B



City of Nanaimo

WATER CONSUMER AUDIT CONSERVE AND PRESERVE



The Wise Use of Water Program is sponsored by the City of Nanaimo. Questions? Call us at 736-5222

How much water do you use?

When you fill a glass with water, you know exactly how much water you have used. But do you know how much water it takes to flush a toilet, run a dishwasher, take a shower, or water your lawn?

Your water meter says it all.

Your water meter measures the total amount of water used by your home. First, locate your water meter. Most meters are installed at the property line. Determine whether the meter measures in cubic metres (m³), cubic feet or gallons (this information will be displayed on the front face of the meter).

To measure water use in your home, take a meter reading just before and just after you flush the toilet, take a shower, or run the dishwasher. Make sure that no one else in the house is using water during your experiment or your reading will be incorrect. It is best to measure appliance water use by taking readings from your meter.

1 m³ = 35.3 ft³
1 m³ = 220 imperial gallons
1 m³ = 1,000 litres



Measuring toilet water.

Shut off the valve in the toilet tank supply line and mark the water level in the reservoir. Flush the toilet. Now, re-fill the reservoir to the marked level using a graduated container to determine how much water is needed to flush the toilet.

Why pay for water you don't use?

To determine whether you have a leak in your household water system, take a water meter reading at night and again early in the morning, making sure that no one in the house used any water throughout the night. If the reading is significantly different the next morning you may have a leak somewhere. Consult a plumber and repair the leak immediately.



WATER SAVER IDEAS

- Hand Dishwashing** – 18 minutes with tap running half open uses 25 gallons. Washing and rinsing in sink or dishpan uses only five gallons.
- Washing Hands** – 1.5 gallons for a one minute wash. Wash hands with moist towels in kitchen and bathroom. Save water by the gallon.
- Automatic Dishwasher** – 11 to 14 gallons full cycle; 8 to 9 gallons short cycle.
- Accumulate dishes**, run only when full.
- Shower** – 12 gallons per minute. With flow restrictor: 3 gallons per minute. To cut down even more, wet down, soap up, rinse off or "shower with a friend."
- Faucet Dripping** – 15 to 21 gallons per day. It's easy to put in a new faucet washer and it costs just a few cents.
- Bath** – 36 gallons full tub; one-third still gets you clean. Make sure drain is closed before turning on.

REMEMBER the WISE USE OF WATER will save you money and help improve our environment.

For more information: "Water No Time To Waste – A Consumer's Guide to Water Conservation" is available at local book stores for \$1.95, or from: C.C.C., Ottawa, Canada K1A 0S9. Telephone: (819) 956-4802. Fax: (819) 994-1498

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WATER AUDIT WORKSHEET

Read your meter at the beginning of the week and again one week later. Note readings and calculate the total volume you have used during the week shown below. Use the information contained in this pamphlet to calculate the amount you use on each activity and fill in the form below.

Metered Volume _____ = _____
 end meter reading _____
 start meter reading _____
 metered volume _____

Please note: if your meter measures in cubic feet to convert to litres, multiply by 28.31

Volume	Number	Total Litres
Showers _____	x _____	= _____
Toilet flushes _____	x _____	= _____
Baths _____	x _____	= _____
Laundry _____	x _____	= _____
Dishwashing _____	x _____	= _____
Lawn watering _____	x _____	= _____
Car washing _____	x _____	= _____
Other activities (please specify each) _____	x _____	= _____
_____	x _____	= _____
_____	x _____	= _____

Total Volume Measured* (add total litres volume) _____
 Miscellaneous _____ = _____
 metered volume _____
 miscellaneous volume* _____

Keep a copy of your records and use this information to calculate water and dollar savings as you learn to use water wisely! REMEMBER the WISE USE OF WATER will save you money and help improve our environment.

P amper yourself and save!

Using less water doesn't always mean doing without. Because Canadians waste a lot of water, we can easily cut back without changing our lifestyles. Simply by changing our water habits and by installing water-saving devices we can all help improve our environment.

Water-saving devices on toilets, showerheads and faucets can reduce water use by as much as 40%, thereby saving your money in energy, water and wastewater charges.



T he low-flush wins!

Low-flush toilets use a smaller tank and a specially designed bowl to give the same flush power but with a lot less water. A model using four to ten litres per flush is your best choice if you really want to save water.

For example a four-litre flush means an 80% to 90% reduction in water use over the standard toilet. And a 35% reduction in total indoor water use!

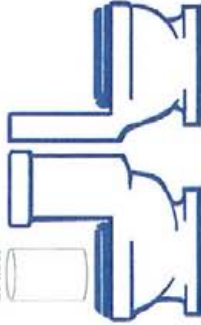
D am your toilet!

Your toilet is by far the biggest water-guzzling appliance in your house. Saving water in the toilet tank is best done by displacing some of the water in the tank so that it uses less water per flush.

Don't put rocks or bricks in your toilet tank because they can break down over time and cause damage. Try putting a two-litre plastic bottle filled with water or pebbles for weight into the tank.

The best choice is a set of commercial toilet tank dams, which are partitions you place in the tank to hold back some of the water. With toilet tank dams, you will see between 25% and 40% less water - as much as you would displace by using five plastic bottles!

20 litres



G reat showers without the waste.

Switch to a low-flow showerhead and you'll save water without giving up your bathroom pampering.

Most plumbing supply and hardware stores carry water-saving showerheads. Specially designed "low-flow" showerheads cut down on the amount of water used without affecting the quality of the shower.

R educe water flow from your faucets

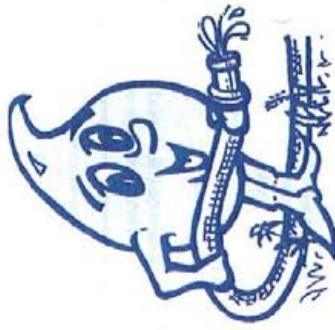
low-flow faucet aerator can reduce the flow of water from your tap by 25%. Aerators provide the direct flow needed to fill a glass or rinse your toothbrush. Spray tap/aerator combinations are excellent for washing and rinsing dishes. Choose the one that best suits your needs.

A good sprinkler uses less water

When watering your lawn and garden, use hand-held hose for watering or use a

sprinkler that delivers large flat droplets to reduce waste and unnecessary evaporation. Choose a sprinkler that suits the size and shape of your lawn and garden.

By using an automatic timer on your sprinkler, you can program it to water your lawn only as much as it needs and at the right time of the day.



REMEMBER the WISE USE OF WATER will save you money and help improve our environment.

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Appendix C



Rate Structure

To encourage water conservation, the charge per gallon of water increases with consumption.

~ simply put ~

The more you use, the more you pay

“Normal Consumption”

Water consumption varies greatly from one house to the next, depending on the number of people living in the home and their water usage habits.

Lawn and garden watering, sprinkler systems, pools and car washing can all increase water consumption considerably.

Typical winter consumption might be:

- 1 or 2 occupants 100-200 gal/day
- 3 or 4 occupants 150-250 gal/day
- 5 or more 250 plus gal/day

~ To check for water leaks ~

- Check taps, toilet, etc. to ensure no water is running
- Read and record meter reading
- Refrain from using any water for an extended period of time, such as overnight
- Read and record meter reading again

If the meter has moved, there may be a leak and a need to consult a plumber.

SEWER AND GARBAGE

Basic Rates

Sewer and garbage collection charges are based on an annual fee. This fee is allocated to each statement based on the number of days in the billing period.

Charges for Additional Units

Houses with secondary suites are charged for additional sewer and garbage service.

Service is Mandatory

Every house connected to the City's sewer system must pay the sewer user fee.

All residential property owners of four units or less must pay for basic garbage collection and recycling service. Basic service currently allows for the disposal of one standard-sized can or bag of garbage every week, plus curbside blue and yellow bag recycling for newspaper, cardboard, plastic and tin every other week.

Extended Garbage Service

One additional container of garbage every week can be collected by purchasing \$2 garbage tags at any of the following locations:

- Nanaimo City Hall
- Nanaimo Rec Centres
- Cash Plan at Harbour Park Mall
- Shopper's Drug Marts
- Nanaimo Rexall Postal Outlets
- Northridge Husky
- Wal-Mart Lottery Ctr
- Central Drugs, Beban Plaza
- Jingle Pot General Store
- Co-op Gas Bars
- Uplands Convenience Store
- Mac's Convenience Store
- Thrifty Foods - Longwood
- Fairway Market
- Quality Foods
- Food Country - Tenth Street
- Pharmasave Stores
- More than Movies, Boundary Avenue
- Pharmasave, Chase River

To Contact Us

General Inquiries

Nanaimo City Hall
455 Wallace Street
Nanaimo BC V9R 5J6
Call: 250-754-4251

Online: www.nanaimo.ca

User Rate Statements:

Call: 250-755-4416 or 250-754-4251
Email: userrates.info@nanaimo.ca

Sewer/Water Service or Garbage Collection & Recycling:

Call: Public Works at 250-758-5222

Disconnections and Reconnections:

Call: Building Inspection Division at 250-755-4425



Understanding your USER RATE STATEMENTS For Water, Sewer and Garbage

OUR USER RATE SYSTEM—WATER, SEWER & GARBAGE BILLING

What do we mean by User Rates?

The City of Nanaimo charges residents for water consumption, sewer and garbage collection through a user rate system. Residents pay for what they use through fees. In other words, the more you use, the more you pay. The City of Nanaimo believes that this type of system helps promote conservation.

When do charges start?

Charges for water consumption start as soon as the water meter is installed on a property. Sewer and garbage charges start once the property has occupancy.

How do I stop charges?

In order to stop water, sewer and garbage charges, a disconnect permit must be purchased from the City's Building Inspection Department located at 238 Franklyn Street. This will result in the water meter being removed or locked.

To resume services a reconnect permit must be purchased. Current fees for both disconnect and reconnect permits are \$100.00.



When am I billed?

Statements for water, sewer and garbage user rates are sent out about once every four months.

Water meters are read once every four months. The City is divided into 16 billing areas. All bills within a certain billing area being mailed out at the same time.

Where and when do I pay?

- In person at City Hall
- Through either of the City's 2 payment plans - Equal Payment Installment Plan or Auto Debit Plan
- Most Financial Institutions in Canada
- Through PC Banking and Telebanking (contact your financial institution for details)
- Shopper's Drug Mart (Harewood store only)
- Through regular mail

A five percent discount applies if payment is received at a payment location on or before 4:30 p.m. on the discount date printed on the Statement of User Rates. If you choose to mail your payment, please allow sufficient time for it to reach City Hall by the discount eligibility date.

To assist those leaving for extended vacations, the City also accepts pre-payments and post-dated cheques.

What if ownership changes?

The City does not read meters when ownership changes hands. The user rate account stays with the property. The statement of adjustments you receive from your lawyer or notary should show any necessary adjustments made to your account. Please contact them directly if this adjustment was not done.

What if bills aren't paid?

Unpaid water, sewer and garbage user rates are carried forward to the next Statement of User Rates. Any unpaid user rate amounts on December 31 are automatically transferred to tax arrears and interest is calculated daily.

MEASURING WATER USAGE

Three types of meters, measuring water either in gallons, cubic metres and cubic feet, are in use throughout the City. Most meters measure cubic metres but the City uses gallons to show your daily consumption.

To convert:

Cubic metres to gallons—multiply by 220

Cubic feet to gallons—multiply by 6.229

The City of Nanaimo has a "User Pay" philosophy in order to promote conservation. Simply put ~ the more you use, the more you pay.

Appendix D



2008 WATER USE REGULATIONS NOTICE

NO WATERING BETWEEN 10:00 AM and 4:00 PM

EVEN NUMBERED HOMES, APARTMENTS, STRATA UNITS, MOBILE HOMES, ETC. - Residence unit number or address number ending in an even number - Watering is allowed on even days of the month (June 2, 4, 6, etc.)

ODD NUMBERED HOMES, APARTMENTS, STRATA UNITS, MOBILE HOMES, ETC. - Residence unit number or address number ending in an odd number - Watering is allowed on odd days of the month (June 1, 3, 5, etc.)

As summer approaches, we would like to remind you that **WATER USAGE RESTRICTIONS** come into effect **JUNE 1, 2008** and will end **SEPTEMBER 30, 2008**.

These restrictions are intended to ensure that **ALL** residents receive an adequate supply of water throughout the summer months and that sufficient reserve supplies are available should they be required for emergency fire fighting purposes.

PLEASE NOTE: Parking lot or driveway washing is not permitted and washing of automobiles will only be permitted on regular watering days within the allowable hours.

Your cooperation is appreciated. Should you have any questions or require any assistance, please call: