

LIQUID WASTE MANAGEMENT PLAN AMENDMENT

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A PLAN TO SUPPORT **SUSTAINABLE
WASTEWATER MANAGEMENT** IN THE
REGIONAL DISTRICT OF NANAIMO

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Our Region

We recognize that we must work together with our community members and neighbours to build a resilient future.

The Regional District of Nanaimo (RDN) provides regional governance and services to Vancouver Island's central east coast. The RDN is British Columbia's third

most populous Regional District, and home to more than 140,000 people. We are situated within the traditional territory of several First Nations, including three that have villages and other lands under their jurisdiction: Snuneymuxw, Snaw-naw-as, and Qualicum First Nations. We are a diverse region made up of a mosaic of distinct communities that also include the municipalities of Nanaimo, Lantzville, Parksville, and Qualicum Beach, as well as seven unincorporated Electoral Areas.

We live in a beautiful region and we will work to keep it that way.

The RDN lies within the Georgia Strait-Puget Sound Basin – one of the most ecologically diverse bioregions in the world. This

includes a variety of interconnected habitats – ranging from marine, coastal, rivers, streams, lakes, wetlands, and estuaries, to fertile forests and mountainous sub-alpine ecosystems – that support an abundance of terrestrial, aquatic and marine life.

Respect for the environment underlies our decisions.

The RDN is recognized among Canadian local governments for its leadership in sustainable community

development and improving services and quality of life for residents, while reducing the local environmental footprint and dependence on limited resources. The mission of the RDN Board is to deliver services in a manner that enhances the environmental, social, and economic well-being of the residents and communities in the region. Our vision is an environmentally, socially, and economically healthy region; resilient and adaptable to change. We will meet current residents' needs without compromising our ability to do the same for future residents. Our Liquid Waste Management Plan (LWMP) is an integral component of our strategy to achieve that mission and vision.

OUR PLAN

The RDN's original LWMP was completed in 1997 and approved by the Minister of Environment, Lands and Parks in 1999. This amendment shows the RDN's commitment to environmental protection, through improvements to treatment quality and highlights our vision to enhance our source control program, reduce per capita water consumption, and continue to economically recover resources from wastewater. This amendment also reflects our desire to continue engaging with First Nations to provide ongoing opportunities to identify adverse impacts as planning and implementation moves forward in the coming months and years.

This amendment was developed through a 5-year collaborative process, and charts our path for the next 20 years and beyond. It is our commitment to manage our liquid resources in a manner that meets the goals and needs of our residents and environment.

OUR GUIDING PRINCIPLES

To achieve the vision and mission set by the RDN Board, the amended LWMP was crafted using three Guiding Principles: flexibility, sustainability and collaboration.

Flexibility is necessary to meet future demands, new environmental criteria and evolving technologies.

Sustainability represents affordable solutions for wastewater management that respect and protect the environment and public health. Our goal is to manage wastewater and rainwater as resources, not wastes.

Collaboration with other levels of government, including First Nations; government agencies; businesses, the public; and other stakeholders will guide the development and implementation of our wastewater management strategies.

OUR REGIONAL PRIORITIES

Protect Human Health and the Environment

We will manage our liquid waste and rainwater resources in a manner that protects human health and the environment, and future generations' access to those resources.



Secondary Upgrades

Federal and provincial laws governing wastewater management require us to achieve a standard of effluent quality that can be achieved through secondary wastewater treatment or better. Currently, French Creek Pollution Control Centre (FCPCC) and Duke Point Pollution Control Centre (DPPCC) provide secondary treatment while Greater Nanaimo Pollution Control Centre (GNPCC) and Nanoose Bay Pollution Control Centre (NBPCC) provide chemically-enhanced primary treatment and must be upgraded in the upcoming years.

The RDN is proposing to amend existing approved plan commitments which have not yet been met. Through this amendment, the RDN is requesting an amendment to the existing approved timelines for secondary treatment upgrades at GNPCC and NBPCC.

The RDN proposes to complete upgrades at GNPCC by 2018 and NBPCC by 2023.

Prepare for Growth

GNPCC and FCPCC are reaching their capacity and must be expanded to accommodate growth in the service areas. Preparing for growth, both through development cost charge (DCC) collection and capital projects planning, is a priority.

Integrated Resource Management

We will take an integrated resource recovery (IRR) approach to liquid waste planning. Our decisions will consider potential energy generation, water conservation and reuse, nutrient recovery, greenhouse gas and odour emissions.

We recognize that water is a shared and interconnected resource and our waste management decisions affect our neighbours and the water resources we all rely upon. The RDN commits to managing our water resources in an integrated manner.

Efficient Services and Asset Management

The RDN is committed to delivering affordable and efficient services to its residents while responsibly managing wastewater infrastructure. We will perform preventative and corrective maintenance, and replace infrastructure when necessary to optimize life expectancy and system performance. To maximize efficiency, the RDN will consider lifecycle costs, resource consumption, ease of operation, adaptability, and worker safety. Capital assets will be designed and managed for the long term.

Meaningful Engagement and Consultation

Meaningful public consultation and First Nations engagement were essential to our LWMP amendment. Through our extensive public consultation process, we were able to inform every household about the LWMP amendment process and invite our residents to

participate directly in the decision-making process. A public evaluation of technical, environmental, social and economic considerations for the secondary treatment timing options, as well as a review of all ten LWMP programs, were integral parts of public consultation. The Draft LWMP Amendment was updated to accommodate feedback from the public. Changes that were made to the draft amendment to accommodate public feedback are summarized in this document.

The RDN also engaged 22 First Nations communities, as identified by the province, to identify and accommodate First Nations' interests. The RDN intends to continue engaging with First Nations after the LWMP amendment is complete. If LWMP-related impacts are identified in the future, the RDN intends to address them in a respectful manner.

Proceedings and results of public consultation and First Nations engagement are summarized in this document and detailed in separate reports which are submitted concurrently with this document.



OUR 10 LWMP PROGRAMS

This amendment organizes specific commitments into ten programs. Within each program are a series of actions which provide the tools to achieve program goals and objectives.

1 PUBLIC WASTEWATER SYSTEMS

Objectives: To increase access to sewer services and reduce the risk to human health and the environment from failing onsite systems.



Key Accomplishments: The RDN works with property owners to establish sewer service in areas where failure of septic systems is identified. Since 2000, the RDN has undertaken sewer servicing feasibility studies in several communities, and undertaken a study identifying village centres with potential for investment in wastewater infrastructure.

Key Commitments: The RDN will establish long term strategies to achieve wastewater servicing in growth containment areas, and for properties with failing onsite systems. Specific work includes: sewer servicing engineering studies for Bowser and Cedar villages; and developing a draft bylaw to allow properties with failing onsite systems to connect to sewer services.

2 PRIVATE ONSITE SYSTEMS

Objective: To protect human health and the environment from failing onsite systems through education and awareness.

Key Accomplishments: The RDN developed a comprehensive and innovative SepticSmart education program delivered on an ongoing basis through workshops and online. This program has been recognized across BC, and forms the basis of similar programs in other jurisdictions. We have recently enhanced the source control component of the program.

Key Commitments: The RDN will continue to update and improve the successful SepticSmart program. We will work with Island Health to develop targeted communications for areas at high risk for groundwater contamination and to limit holding tanks in new developments.



SepticSmart

3 SOURCE CONTROL

Objective: To reduce wastewater contaminants at the source.

Key Accomplishments: The RDN has established a comprehensive bylaw restricting the discharge of waste into our sewers. This bylaw provides an effective regulatory foundation for our source control efforts. Specific SewerSmart education programs have been implemented, targeting dental sector, restaurant sector, households, and garburator use.



Key Commitments: The RDN will continue to enhance the outreach and public education programs. Outreach will target residents, businesses and medical facilities to address pharmaceuticals, personal care products, organics, fat, oil, grease and inflow and infiltration (I&I). We will work with member municipalities to establish source control bylaw(s). We will also work with municipalities, harbour authorities and marinas to develop programs to discourage marine dumping. We will partner with community groups and agencies to promote source control. During the consultation process, participants identified several new opportunities for partnership on source control initiatives.

4 ODOUR CONTROL

Objective: To reduce nuisance odours from our wastewater infrastructure.

Key Accomplishments: Our wastewater facilities are an integral part of our communities, and we recognize the importance of being a good neighbour. The RDN has invested significantly to upgrade odour control equipment and measures at our facilities. Our target is no odour complaints, and at FCPCC we received no complaints in 2011. RDN staff investigate and respond to all complaints within 24 hours.

Key Commitments: The RDN will continue to improve odour control programs, including proactive odour management and incorporating odour control technologies into the design of planned sewage infrastructure. Our target will be zero odour complaints.



FOUL AIR SCRUBBERS AT FRENCH CREEK POLLUTION CONTROL CENTRE



RAINWATER MANAGEMENT – DRINKING WATER & WATERSHED PROTECTION

Objective: To protect our water resources through an integrated wastewater-rainwater-watershed management approach.

Key Accomplishments: In 2008, the RDN implemented the “Drinking Water and Watershed Protection” (DWWP) service. This serves as the foundation of our rainwater management commitments under the LWMP.

The DWWP program focuses on learning more about our water resources to better manage and protect them, ultimately with an integrated watershed management approach. Effective partnerships with community members, government agencies, academia, and business are key to the success of the initiatives under this program.

Specific accomplishments of our DWWP and rainwater management activities include:

- ✓ Team WaterSmart awareness and education initiatives: Participation at community events; Water conservation workshops including: WellSmart, Xeriscaping, Rainwater Harvesting, Efficient Irrigation and Gardening, Stream Protection, Home Greywater Systems), and guidebooks including Rainwater Harvesting Best Practices.
- ✓ Incentive rebate programs including: Low Flow Toilets; Rainwater Harvesting Systems; Well Protection Upgrades; and Sustainable Development.
- ✓ Our Community Watershed Monitoring Network: Partners include the RDN, Community groups and Ministry of Environment collect valuable water quality data from 17 watersheds across the RDN, identifying priorities for action.



DRINKING WATER WATERSHED PROTECTION

- ✓ WaterMap: An online interactive tool that provides public access to water resource information.
- ✓ Expansion of the provincial observation well network in partnership with Geological Survey of Canada and the Province.
- ✓ Development of the first phase of the region wide Water Budget Study, quantifying water availability and demand in order to gain an improved understanding of how population growth, land use and climate change will impact water resources.
- ✓ Approval of a regional Water Conservation Plan.

The RDN also establishes development permit areas under specific Official Community Plans

to protect water resources. Through formation of the W3C: Wastewater and Water Collaborative Meeting, the RDN also meets biannually with municipalities to share information related to advances in rainwater management. As well, member municipalities have introduced a broad range rainwater and stormwater management practices and standards into their development activities.

Key Commitments: The DWWP work undertaken to date provides the foundation for RDN Rainwater commitments in this LWMP amendment. Specific commitments include:

- Continued implementation of the seven programs detailed in the DWWP Action Plan, including Integrated Watershed Management Planning
- Collaboration with member municipalities to establish a Regional Rainwater Management Strategy to ensure conformance with provincial requirements (including eliminating sewer overflows and reducing I&I)
- Implementation of the recently approved Water Conservation Plan and refinement of the Water Budget Study to assist in land use and development decisions.
- Continuation and evolution of water education and incentive programs and watershed monitoring partnerships.

6 VOLUME REDUCTION

Objectives: To reduce wastewater production by promoting water conservation measures.

Key Accomplishments: Volume reduction programs (water conservation in homes and businesses) are carried out under the umbrella of the WaterSmart initiative (as described in Program 5 above). Activities include public outreach, communication, workshops, and rebates to support or enhance water conservation activities across the region. The RDN works with member municipalities to implement programs to reduce flows. Member municipalities establish capital plans to address inflow and infiltration at critical locations within Municipal boundaries. Average water consumption in the RDN has been reduced from 331 L/day in 2009 to 281 L/day in 2013.

Key Commitments: The RDN will continue to develop and implement water conservation measures through the DWWP program, with a target of reducing per capita water consumption by 25% between 2009 and 2030. We will partner with community groups and agencies to promote source control. During the consultation process, participants identified several new opportunities for partnership on source control initiatives.



7 INFLOW AND INFILTRATION

Objectives: To meet provincial standards and reduce the volume of surface and groundwater entering sewer systems to reduce wastewater infrastructure loading and costs.

Key Accomplishments: The RDN works with member municipalities to implement programs to reduce I&I. Member municipalities establish capital plans to address inflow and infiltration at critical locations within municipal boundaries. Combined sanitary-storm sewers have been eliminated.

Key Commitments: RDN will continue work with member municipalities to continue to reduce flows due to I&I and to eliminate any remaining sewer overflows.





POLLUTION CONTROL CENTRES

The RDN operates four wastewater treatment plants. Currently, two provide secondary treatment and two provide chemically-enhanced primary treatment. Provincial and federal laws governing our treatment facilities require secondary treatment or better. Upgrading to secondary treatment will:

- Reduce toxins entering the marine environment
- Reduce potential health and environmental risks
- Help protect fishery resources
- Provide potential opportunities to economically recover resources.

The LWMP authorizes the RDN to find community-driven and cost-effective solutions to protect public health and achieve the required level of wastewater treatment over a reasonable timeframe. This amendment provides updated schedules to upgrade and expand our wastewater treatment infrastructure. Updated schedules were developed in consideration of technical, environmental, social and economic constraints, and through public consultation and First Nations engagement.



Objectives: To meet provincial and federal wastewater treatment standards, recover resources, and protect human health and the environment.

Key Accomplishments: Treatment facilities continue to operate in compliance with our permits and operating certificate, and odour control targets are met. Over the past decade,

the RDN completed numerous reports, studies, technical memos, and engineering reviews in connection with the upgrades and expansions of our pump stations, forcemains, interceptors and treatment plant facilities. These documents addressed effluent quality, energy efficiency, integrated resource recovery, asset management planning, and odour control.

As well, equipment expansion and engineering related to the planned secondary treatment upgrade at GNPCC is underway. Installation and commissioning of a new digester and sedimentation tank were completed in 2013. Engineering for the outfall replacement and secondary treatment are underway.

Key Commitments: The RDN will:

- Comply with permits and operational certificates.
- Complete the outfall replacement project at GNPCC by 2015 and secondary treatment upgrades by 2018.
- Expand secondary treatment capacity at FCPCC as required to address population growth.
- Complete the secondary treatment upgrades at NBPCC by 2023.
- Establish receiving environment monitoring programs in coordination with Ministry of Environment.
- Implement asset management strategies to ensure long term quality and integrity of our wastewater infrastructure.
- Develop a sewer servicing strategy for Nanoose Bay.

To complete secondary treatment upgrades at GNPCC by 2018, the average household tax for residents in the service area will increase by \$7-15 per year from 2014-2022. To complete secondary treatment upgrades at NBPCC by 2023, the average household tax for residents in the service area will increase by \$13-23 per year from 2014-2031.



INTEGRATED RESOURCE RECOVERY

Objectives: To economically recover and utilize resources in wastewater.

Key Accomplishments: Biogas generated in the treatment process at GNPCC is used to fuel boilers, provide heat to processes and buildings and generate electricity.

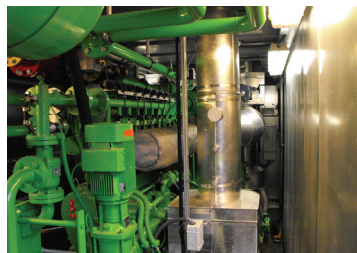
Reclaimed water from the treatment process is used at FCPCC and GNPCC as process and washwater in place of potable water. Treated effluent from FCPCC is used for golf course irrigation. Beneficial effluent reuse lessens the demand on potable water supplies and reduces the volume discharged to the ocean.

The RDN has a district heating agreement-in-principle with School District 68 to provide Hammond Bay Elementary School with heat from treated effluent.

GNPCC is one of the first wastewater treatment plants of its size in Canada to implement cogeneration. The electricity generated is sufficient to power 350 homes.

Key Commitments:

The RDN will undertake a regional study in 2014 to identify integrated resource recovery (IRR) opportunities related to wastewater management in the Regional District. The study will provide the foundation for development of an IRR implementation strategy for the region. Major capital projects will include IRR opportunities where technically and economically practical.



COGENERATION PLANT



BIOSOLIDS

Objectives: To beneficially utilize biosolids produced during wastewater treatment.



BOTTOM SAMPLE AFTER BIOSOLIDS APPLICATION

Key Accomplishments: Since 1999, biosolids generated at RDN treatment facilities have been beneficially reused in agriculture, landfill closures, mine reclamation and forestry. The RDN currently has an innovative partnership with Vancouver Island University (VIU) and SYLVIS Environmental to apply biosolids at VIU's managed woodlot. Application of biosolids at the woodlot has shown to increase tree growth between 50% and 400%.

Key Commitments: The RDN will continue to beneficially reuse biosolids, advance scientific knowledge, and enhance our biosolids education and outreach program.

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GLOSSARY

<i>ADWF</i>	Average Dry Weather Flow. Defined in the Municipal Wastewater Regulation as the daily municipal wastewater flow to a wastewater facility which occurs after an extended period of dry weather so inflow and infiltration are minimized to the greatest extent possible.
<i>ATAD</i>	Autothermal thermophilic aerobic digestion that treats sludge collected from the bottom of sedimentation tanks. The sludge is held in the tanks for 10 to 12 days at 40 to 60°C, during which it is digested and stabilized by thermophilic biological processes. Significant pathogen reduction is achieved in the ATAD tanks resulting in the creation of Class A biosolids under the <i>Environmental Management Act and Public Health Act</i> Organic Matter Recycling Regulation, administered by the Ministry of Environment.
<i>Benchmarking</i>	Benchmarking is an ongoing process of sharing ideas and comparing products, services and practices with those of similar organizations to improve quality and optimize performance. Through benchmarking, the RDN can improve performance and reduce costs. The RDN's Wastewater Services department has been part of the National Water and Wastewater Benchmarking Initiative since 2001. This initiative is a partnership of more than 43 Canadian cities and Regional Districts, working with private environmental consultants to collect and compare data.
<i>Biogas</i>	Biogas refers to the methane and carbon dioxide produced as a by-product of anaerobic digestion. Biogas is a sustainable fuel source used as fuel for heat or to create electricity.
<i>Biosolids</i>	Stabilized municipal sewage sludge resulting from a municipal wastewater or septage treatment process or septage that meets quality criteria for beneficial use under the Organic Matter Recycling Regulation.
<i>Biosolids Class A</i>	Biosolids that meet requirements of Section 6 of the Organic Matter Recycling Regulation for metal concentrations, pathogen reduction processes, vector attraction reduction, pathogen reduction limits, quality criteria, sampling, analyses and record keeping.
<i>Biosolids Class B</i>	Biosolids that meet requirements of Section 8 of the Organic Matter Recycling Regulation for metal concentrations, pathogen reduction processes, vector attraction reduction, pathogen reduction limits, quality criteria, sampling, analyses and record keeping.
<i>BOD and BOD₅</i>	Carbonaceous 5-day biochemical oxygen demand is the rate at which aerobic biological organisms use the oxygen in water or wastewater over a five day incubation period.
<i>Bylaw No. 500</i>	Regional District of Nanaimo Land Use and Subdivision Bylaw provides land use regulations for properties within all electoral areas except Electoral Area 'B' (Gabriola Island) and 'F' (Errington, Coombs, Whiskey Creek & Hilliers).
<i>Bylaw No. 975</i>	Regional District of Nanaimo Pump & Haul Local Service Establishment Bylaw No. 975 establishes a local service area within the RDN for the collection, conveyance, treatment and disposal of sewage from holding tanks. It specifies who is eligible for the reduced septage disposal rate for pump and haul. To be included in this bylaw a property must meet several specifications including property size, zoning and subdivision requirements.
<i>Bylaw No. 988</i>	Regional District of Nanaimo Trucked Liquid Waste Disposal Bylaw No. 988 specifies disposal rates and regulates the discharge of trucked liquid waste into septage disposal facilities operated by the RDN.
<i>Bylaw No. 1224</i>	Regional District of Nanaimo Sewage Disposal Regulation Bylaw No. 1224 establishes a Local Service to provide treatment and disposal of sewage from holding tanks and regulate the collection and conveyance of sewage from holding tanks in a defined area of the RDN.

<i>Bylaw No. 1225</i>	Regional District of Nanaimo Sewer Use Regulatory Bylaw No. 1225 regulates the discharge of waste into all sewers connected to wastewater facilities operated by the RDN. It is the source control bylaw.
<i>Bylaw No. 1543</i>	Liquid Waste Management Planning Service Establishment Bylaw No. 1543 establishes the service of liquid waste management planning in the RDN with a long range budget for the planning and implementation of the updated Liquid Waste Management Plan.
<i>Capital Plan</i>	A ten year budget used to plan expansion and upgrades at RDN facilities.
<i>Cogeneration</i>	A form of resource recovery which refers to the use of biogas (methane and carbon dioxide by-products) to generate both electricity and heat.
<i>Combined Sewer System</i>	Wastewater systems which collect, transport, or discharge a combination of municipal wastewater and stormwater in a single system.
<i>CCME</i>	Canadian Council of Ministers of the Environment. The CCME has developed a Canada-wide strategy for the management of municipal wastewater, wherein risk guidelines for effluent quality have been established.
<i>CCTV</i>	Closed circuit television. A robotic inspection system using closed circuit cameras mounted on portable platforms. Used frequently in the RDN to inspect wastewater systems and identify defects where infiltration can occur.
<i>Class A Cost Estimate</i>	According to the Ministry of Environment <i>Interim Guidelines for Preparing Liquid Waste Management Plans</i> , a Class A Cost Estimate is based on the final design drawings, and specifications.
<i>Class B Cost Estimate</i>	According to the Ministry of Environment <i>Interim Guidelines for Preparing Liquid Waste Management Plans</i> , a Class B Cost Estimate is prepared after site investigations and studies are complete and the major systems defined. It is based on the completion of the preliminary design. It is used for obtaining approvals, budgetary control and design control.
<i>Class C Cost Estimate</i>	According to the Ministry of Environment <i>Interim Guidelines for Preparing Liquid Waste Management Plans</i> , a Class C Cost Estimate is prepared with limited site information and is based on probable conditions affecting the project. It is used to establish a more specific definition of program costs, to obtain approval in principle and for program planning.
<i>Class D Cost Estimate</i>	According to the Ministry of Environment <i>Interim Guidelines for Preparing Liquid Waste Management Plans</i> , a Class D Cost Estimate is a preliminary estimate which, due to little or no site information, indicates the approximate magnitude of cost of the proposed project. This cost estimate may be derived from lump sum or unit costs, based on the construction costs for similar projects. It is used for discussion and preliminary evaluation of options and to initiate the approvals process.
<i>CSSP</i>	Canadian Shellfish Sanitation Program is a federal food safety program, jointly administered by the Canadian Food Inspection Agency, Environment Canada and Fisheries and Ocean Canada. The purpose of the program is to provide assurance that bivalve molluscan shellfish (e.g. mussels, oysters, and clams) meet food safety and quality standards for both domestic and international markets, thereby protecting the public from the health risks of consuming contaminated shellfish.
<i>DCC</i>	Development Cost Charges are funds collected to offset that portion of the costs related to services that are incurred as a direct result of this new development. DCCs are applied as one-time charges and are usually collected from developers at the time of subdivision approval or at the time of issuing a building permit.

<i>District Heating</i>	District heating captures thermal energy from wastewater effluent to provide hot water and space heating using heat recovery technology. District heating plants can provide higher efficiencies and better pollution control than localized boilers and provide an example of innovative resource recovery.
<i>DPA</i>	Development Permit Area provides a set of development guidelines pertaining to a specific area as specified by the Official Community Plan. If a property is located within a DPA, a development permit may be required before undertaking any construction or development.
<i>DPPCC</i>	Duke Point Pollution Control Centre, at 925 Jackson Road, Nanaimo, BC.
<i>DWWP</i>	Drinking Water & Watershed Protection service to protect water resources in the RDN.
<i>Effluent</i>	Liquid resulting from the treatment of wastewater.
<i>EMS</i>	An Environmental Management System is a tool used to evaluate and improve environmental performance. The RDN Wastewater Service's EMS is ISO 14001 certified.
<i>FCPCC</i>	French Creek Pollution Control Centre, at 957 Lee Road, Parksville, BC.
<i>GNPCC</i>	Greater Nanaimo Pollution Control Centre, at 4600 Hammond Bay Road, Nanaimo, BC.
<i>Grey water</i>	Wastewater from bathroom sinks, showers, and tubs.
<i>Groundwater</i>	Defined by the Municipal Wastewater Regulation as subsurface water at or below a water table in fully saturated geologic materials and formations.
<i>Growth Containment Boundary</i>	Areas defined by the Regional Growth Strategy where growth is intended to be directed. The Growth Containment Boundary is intended to control urban sprawl and to encourage the development of compact, complete communities within municipalities or within a Rural Village Area in electoral areas.
<i>I&I</i>	A collective term for inflow and infiltration.
<i>Infiltration</i>	Infiltration is groundwater that enters the wastewater system indirectly through the land. Infiltration can occur via pipeline cracks, leaky joints or deteriorated manholes.
<i>Inflow</i>	Inflow is water that enters the wastewater system from a direct stormwater connection (i.e. roof leaders, basement sump pumps or foundation drains). Older homes built before the 1970s can be major sources of inflow since building permits at the time allowed property drainage to connect to the wastewater system.
<i>Influent</i>	Wastewater entering the wastewater infrastructure.
<i>IRR</i>	Integrated Resource Recovery. An integrated approach to planning and managing infrastructure to maximize the recovery of value from waste resources (e.g. energy generation, water reuse, and nutrient recovery.) The RDN commits to managing our water resources in an integrated manner and will take an integrated resource recovery approach to liquid waste planning.
<i>Liquid Waste</i>	See wastewater.
<i>LWMP</i>	Liquid Waste Management Plan. BC's <i>Environmental Management Act</i> allows a regional district to develop a LWMP to establish affordable community-driven solutions for financing and upgrading infrastructure to meet the requirements under the Municipal Wastewater Regulation over a defined period. A LWMP lets a community develop local wastewater management solutions.
<i>MOE</i>	Ministry of Environment, Government of British Columbia. The MOE is the approving authority for the Liquid Waste Management Plan.

<i>MWR</i>	The <i>Environmental Management Act</i> Municipal Wastewater Regulation provides guidance on meeting the current standards and requirements for the treatment, reuse and disposal of sewage. It applies to all discharges of domestic wastewater except those regulated under the <i>Public Health Act</i> Sewerage System Regulation and discharges from single or multi-family dwellings. Also applies to any discharges of sewage to water bodies.
<i>NBPCC</i>	Nanoose Bay Pollution Control Centre, at 3260 Schooner Cove Drive, Nanoose Bay, BC.
<i>Operational Certificates</i>	Issued by the Ministry of Environment to specify authorized discharges and monitoring, reporting, and general requirements related to municipal wastewater discharge.
<i>OCP</i>	An Official Community Plan is defined by Section 875 of the <i>Local Government Act</i> . An official community plan is a statement of objectives and policies to guide decisions on planning and land use management, within the area covered by the plan, respecting the purposes of local government.
<i>OMRR</i>	<i>Environmental Management Act</i> and <i>Public Health Act</i> Organic Matter Recycling Regulation sets the standards for the beneficial re-use of composted organic matter including biosolids.
<i>Preliminary Treatment</i>	The first level of wastewater treatment. Involves screening and/or grinding.
<i>Primary Treatment</i>	Wastewater treatment (involves settling solids and skimming the scum) which consistently produces an effluent quality with a BOD ₅ and TSS not exceeding 130 mg/L, as defined by the MWR.
<i>Private Onsite Systems</i>	Defined under the Sewerage System Regulation as privately owned and maintained Type 1, Type 2, or Type 3 onsite wastewater treatment systems, holding tanks, and strata wastewater collection and treatment systems.
<i>Public Wastewater Systems</i>	Wastewater collection and treatment systems owned and operated by the RDN or a municipality. Public wastewater services are offered to established service areas associated with the Duke Point Pollution Control Centre, Greater Nanaimo Pollution Control Centre, Nanoose Bay Pollution Control Centre, and French Creek Pollution Control Centre. Public wastewater systems may also include systems with flows equal to, or greater than, 22,700 L/day that were privately constructed and transferred to the RDN. Public Wastewater Systems are referred to as community sewer service in an Official Community Plan or the Regional Growth Strategy.
<i>Rainwater Management</i>	Strategies designed to protect the health of watersheds and maintain pre-development water balance by managing rainwater and snow melt runoff.
<i>RDN</i>	The Regional District of Nanaimo; a federation of four municipalities and seven rural electoral areas including the: City of Nanaimo, City of Parksville, Town of Qualicum Beach, District of Lantzville, and electoral areas A, B, C, E, F, G, and H.
<i>Reclaimed Water</i>	Municipal wastewater that is treated and suitable for use in accordance with the MWR.
<i>Regional Growth Strategy</i>	Regional Growth Strategy, as defined by Section 849 of the <i>Local Government Act</i> . The purpose of a Regional Growth Strategy is to promote human settlement that is socially, economically and environmentally healthy and that makes efficient use of public facilities and services, land and other resources.
<i>Resource Recovery</i>	See Integrated Resource Recovery (IRR).
<i>RLWAC</i>	Regional Liquid Waste Advisory Committee. Established to update and monitor implementation of the Liquid Waste Management Plan.

<i>Secondary Treatment</i>	Wastewater treatment (usually biological or physical-chemical) to remove organics which consistently produces an effluent quality with a BOD ₅ and TSS not more than 45 mg/L, as defined by the MWR.
<i>Septic System</i>	A Type 1 private onsite wastewater treatment system. A conventional septic system includes a septic tank and soil filter called a drainfield.
<i>Sewage</i>	See wastewater.
<i>SSR</i>	The <i>Public Health Act</i> Sewerage System Regulation is the provincial regulation that applies to the construction and maintenance of holding tanks and sewerage systems or systems which process a wastewater flow of less than 22,700 L/day (i.e. systems for single family residences, duplexes and strata properties) and discharge to the ground.
<i>Sludge</i>	The organic and inorganic materials that settle in a primary clarifier (primary sludge) or secondary clarifier (secondary sludge).
<i>Stormwater Management</i>	See rainwater management.
<i>Sustainability</i>	Sustainability is about recognizing the inter-relationships between our environment, our society, and our economy. It is about recognizing that people are part of the ecosystem and that economic and social lives of people should be integrated into the environment in ways that maintain or enhance the environment, rather than degrade or destroy it.
<i>Sustainable Wastewater Management</i>	For the RDN, sustainable wastewater management is a long range commitment to build and maintain efficient infrastructure that enhances the environmental health of our region, meets the needs of our communities and represents the outcome of sound financial planning.
<i>Tertiary Treatment</i>	Wastewater treatment which produces phosphorus and nitrogen levels less than 1.0 mg/L, BOD and TSS levels less than 5 mg/L.
<i>TSS</i>	Total suspended solids are solids suspended in wastewater, reported in mg/L.
<i>Type 1 On-Site System</i>	Treatment by septic tank and drainfield only.
<i>Type 2 On-Site System</i>	Treatment that consistently produces an effluent quality with a BOD ₅ not exceeding 45 mg/L and TSS not exceeding 45 mg/L (equivalent to secondary treatment), that discharges to ground via buried perforated pipes or equivalent. Treatment by septic tank, treatment unit, and drainfield.
<i>Type 3 On-site System</i>	Treatment that consistently produces an effluent quality with a BOD ₅ not exceeding 10 mg/L, TSS not exceeding 10 mg/L and a median fecal coliform density of less than 400 colony forming units per 100 mL, that discharges to ground via buried perforated pipes or the equivalent. Treatment by septic, treatment unit, disinfection, and drainfield.
<i>VIHA</i>	Island Health, formerly Vancouver Island Health Authority.
<i>Wastewater</i>	Wastewater, liquid waste and sewage are terms for “used” water and the wastes that it carries. Basically, they are terms for what is flushed down the toilet or washed down the drain. Wastewater can also include rain water, groundwater, or snow melt (inflow and infiltration) that make their way into sanitary wastewater pipes.
<i>WSER</i>	Wastewater Systems Effluent Regulations. Regulations under the federal <i>Fisheries Act</i> designed to harmonize wastewater management in Canada. They include minimum effluent quality standards that can be achieved through secondary wastewater treatment.

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1.0 Introduction

Laws governing wastewater management in British Columbia require a standard level of wastewater treatment that can be achieved through secondary wastewater treatment or better. Those laws also recognize that it will take time for some treatment facilities, such as the Greater Nanaimo Pollution Control Centre (GNPCC) and the Nanoose Bay Pollution Control Centre (NBPCC), to provide secondary treatment. For that reason, BC's *Environmental Management Act* allows local governments to develop a Liquid Waste Management Plan (LWMP). The LWMP lets local governments establish a reasonable timeframe to develop affordable community-driven solutions for financing and upgrading infrastructure and to meet requirements under the provincial Municipal Wastewater Regulation (MWR). It also helps to define how local governments will recover resources from waste; reduce pollution, including the volume of flow, entering wastewater infrastructure; and manage stormwater.

An approved LWMP lets a local government borrow money without going to referendum. Since there is no mechanism to publicly appeal an approved LWMP, an LWMP is available for public and First Nations review and comment, and must be approved by the Regional District of Nanaimo Board (the Board), before it is submitted for approval to the Minister of Environment. For overall approval, the plan must align with:

- Community needs and expectations such as affordable solutions to sustainable wastewater management
- Regional initiatives (i.e. the Board Strategic Plan, Regional Growth Strategy, and Official Community Plans)
- Federal and provincial regulations and guidelines (including those listed in Table 1) which require the upgrade of wastewater treatment facilities to provide a minimum of secondary treatment.

However, the Minister of Environment may, at any time, with or without conditions, approve all or part of a liquid waste management plan or amendment.

Table 1. National, Provincial, and Regional Regulations and Guidelines for Wastewater Management

Regional Initiatives	Federal and Provincial Regulations & Guidelines
<p>Board Strategic Plan: Expresses a vision and priorities for the RDN and sets a course towards a sustainable future for the Region.</p> <p>Regional Growth Strategy: Directs land use and growth management in the RDN for the next 25 years. Aims to promote sustainable growth while meeting social, economic and environmental objectives. Recognizes the need to coordinate planning with First Nations.</p> <p>Official Community Plans: Guide decision making in the plan areas.</p> <p>Environmental Policy: Commits the Wastewater Services department to providing reliable, high-quality, and cost-effective wastewater services to the people and communities (in Appendix A).</p> <p>Drinking Water & Watershed Protection Program: Addresses regional water resource protection.</p> <p>Green Building Policy: Prescribes an integrated design process for new construction and major renovations in the RDN. This policy gives the RDN the flexibility to establish specific goals that achieve the highest level of environmental performance for each project.</p>	<p>Fisheries Act Wastewater Systems Effluent Regulations: Regulations to harmonize wastewater management in Canada. They include minimum effluent quality standards that can be achieved through secondary wastewater treatment. Upgrades to existing facilities must be completed by 2020, 2030 or 2040, based on volume, water quality criteria, and discharge location.</p> <p>Environmental Management Act:</p> <ul style="list-style-type: none">▪ Municipal Wastewater Regulation: Regulates the treatment, reuse, and disposal of municipal wastewater.▪ Code of Practice for the Use of Reclaimed Water: Guides the use of reclaimed water (Ministry of Environment, Lands and Parks 2001).▪ Organic Matter Recycling Regulation: Sets the standards for the beneficial re-use of composted organic matter including biosolids. <p>Public Health Act Sewerage System Regulation: Sets the construction and maintenance requirements for onsite sewage treatment systems.</p> <p>Interim Guidelines for Developing a Liquid Waste Management Plan: Describes the procedure for preparing and amending an LWMP (MOE 2011).</p> <p>Living Water Smart: British Columbia's plan to address the security and health of water resources (MOE 2008).</p> <p>Resources from Waste: A guide to recover resources from wastewater (Ministry of Community Development 2009).</p>

An LWMP approved by the Minister of Environment (formerly, Minister of Environment, Lands and Parks) authorizes liquid waste discharge according to provisions in the plan and the associated operational certificates or waste discharge permits. The Ministry of Environment (MOE) issues operational certificates and waste discharge permits to specify monitoring and reporting requirements and conditions for authorized discharges. Operational certificates will eventually replace waste discharge permits. An approved LWMP is more than a planning document; it is a legal document which gives the local government the authority and responsibility to implement the plan.

1.1 Scope of the LWMP

The MOE's primary objectives of an LWMP are to 1) protect public health and the environment and 2) properly consult the public. Additional objectives include water conservation; drinking water source protection; recovery of resources from waste; energy conservation; climate change adaptation and mitigation; and sustainable financing and asset management (MOE 2011). The MOE's long term goals with respect to LWMPs are for existing municipal wastewater facilities to meet the MWR within a reasonable timeframe, including the provision for secondary treatment as a minimum level of effluent treatment. Because public consultation and First Nations engagement are key components of the LWMP process, an LWMP lets a community be involved with the decision-making process and develop local wastewater management solutions.

1.2 Liquid Waste Management Planning in the RDN

The Regional District of Nanaimo (RDN) completed its original LWMP in 1997 and that plan was approved by the Minister of Environment, Lands and Parks in 1999. In 2008, the RDN initiated the LWMP amendment process. An amendment is necessary because:

- The MOE requires an LWMP review every five to ten years, or sooner if recommended by the advisory committee, to determine if an amendment or update is required.
- Most of the key regulations and guidelines summarized in Table 1 (previous page) have changed since original LWMP was approved.
- The RDN already met most of the original LWMP program commitments in the first ten years of implementation.
- The RDN is requesting an amendment to the timeline for secondary treatment upgrades at GNPCC and NBPCC.

Once approved by the Minister of Environment, this LWMP Amendment will replace the 1997 LWMP.

1.3 Structure of the Amended Plan

The structure of the LWMP amendment is as follows:

- Section 1: Introduction
- Section 2: Background Information
- Section 3: Milestone Achievements Since 1997
- Section 4: Plan Amendment Process
- Section 5: Updated Programs
- Section 6: Emerging Issues
- Section 7: Costs, Financing, and Implementation Schedule
- Section 8: Monitoring, Amendments, and Updates
- Section 9: Operational Certificates
- Section 10: References.

2.0 Background Information

2.1 Regional Profile

The RDN spans approximately 207,000 hectares on the central east coast of Vancouver Island, in the Georgia Strait-Puget Sound Basin of southeast British Columbia. The RDN is bordered by the Strait of Georgia to the east, the Comox Valley Regional District to the north, the Alberni-Clayoquot Regional District to the west, and the Cowichan Valley Regional District to the south.

The RDN respectfully recognizes that RDN boundaries overlap with many First Nation Traditional Territories and that First Nation governments have jurisdiction over planning on Indian Reserves. Still, services provided under the LWMP extend to First Nations.

Resident First Nations include:

- Qualicum First Nation
- Snaw-naw-as First Nation
- Snuneymuxw First Nation.

The RDN is made up of four municipalities and seven rural electoral areas, illustrated in Figure 1. The four municipalities include:

- City of Nanaimo
- City of Parksville
- Town of Qualicum Beach
- District of Lantzville.

The seven electoral areas include:

- A: Cedar, South Wellington, Cassidy
- B: Gabriola, Decourcy, Mudge Islands
- C: Extension, Nanaimo Lakes, East Wellington, Pleasant Valley
- E: Nanoose Bay
- F: Coombs, Hilliers, Errington
- G: French Creek, San Pareil, Little Qualicum
- H: Bowser, Qualicum Bay, Deep Bay.

Islands Trust has jurisdiction over planning for the Gulf Islands including Electoral Area B. Still, many services provided under the LWMP extend to residents of Electoral Area B.

The RDN is British Columbia's third most populous Regional District, and home to more than 140,000 people. Most of the communities, which are rural or suburban, exist at lower elevations near the Strait of Georgia coastline. In 2011, 146,574 people lived within RDN boundaries. Growth represents a 5.7% increase since 2006; slightly lower than the provincial average of 7.0% (Statistics Canada 2012a). The majority of residents (74%) live in the four municipalities, while the remaining 26% live in unincorporated electoral areas (BC Stats 2012). The RDN was projected to grow at an average rate of 2% per year, to a population of 231,000 in 2036 (Urban Futures 2007)¹. Despite the projections, the area has experienced slower than expected growth, largely due to reduced natural resource extraction and processing activity (BC Stats 2011). According to BC Stats (2012), the RDN population only increased by 0.7% between 2010 and 2011 and all municipalities within the region, except for the City of Nanaimo, decreased in population within this timeframe. Still, the Board Strategic Plan acknowledges that the RDN will implement best practices for managing growth and development.

There is a national trend towards an aging population. All jurisdictions in the RDN exceed the median age for the Province and some have among the eldest populations in BC (RDN 2010). The demographic trend may be a result of the preferable climate, landscape, and amenities in mid-Vancouver Island. This trend will likely continue and will have implications for land use, housing, services, and employment. The natural areas, amenities, and climate that draw retirees to the region are the same attributes which draw tourists and there is an increasing interest in tourism in the RDN. The City of Nanaimo is linked to the Lower Mainland by two BC Ferries routes and the RDN is favoured by tourists as both a stopover and final destination. The Nanaimo Cruise Ship Terminal opened in 2011 and also has the potential to offload thousands of tourists annually.

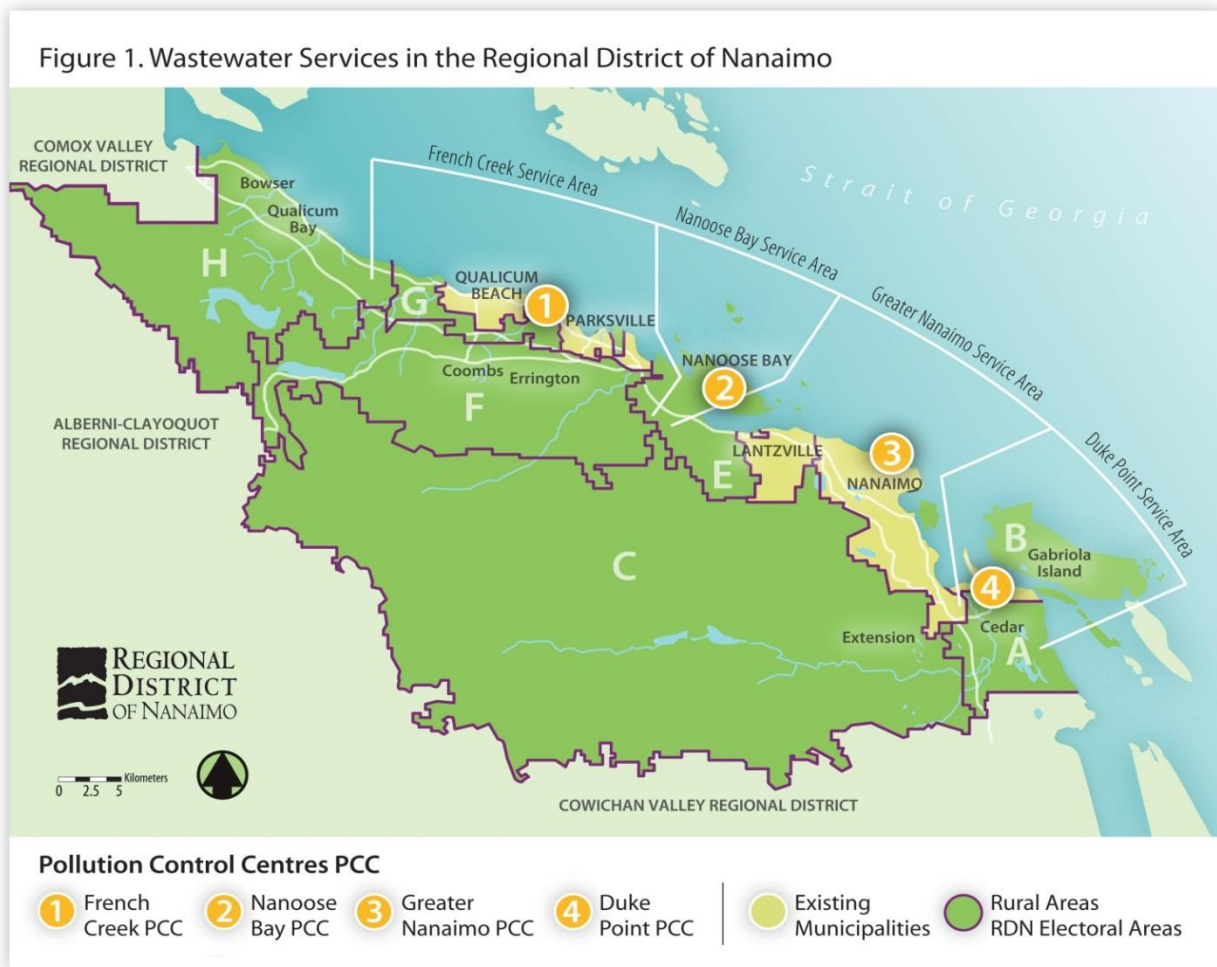
The mission of the Regional District of Nanaimo Board is to deliver services in a manner that enhances the environmental, social, and economic well-being of the residents and communities in the region. The RDN is

¹ Projections made by Urban Futures in 2007 are currently the most recent data available. However, expansion schedules based on actual population growth will be revised to reflect observed growth and revised growth projections.

recognized for its leadership among Canadian local governments in sustainable community development, improving services and quality of life for residents, while reducing the local environmental footprint and dependence on limited resources. Our vision is an environmentally, socially, and economically healthy region; resilient and adaptable to change. We will meet current residents' needs without compromising our ability to do the same for future residents. Our LWMP is an integral component of our strategy to achieve the vision and mission of the RDN.

The RDN provides regional governance and a variety of regional and local services to enhance the environmental, social, and economic well-being of residents. The RDN delivers regional services common to electoral areas and municipalities, such as wastewater treatment, recreation facilities, regional parks, watershed protection, solid waste disposal, and transit. The RDN provides additional local services to electoral areas, such as community planning, emergency planning, community recreation, community parks, and utilities. Member municipalities provide similar local services within their own jurisdictions.

Most of the RDN is resource land. The area has a strong history in coal mining and exportation; however, most of the resource land base is currently used for forestry and there are also pockets of agriculture throughout. Management of forestry and agricultural land fall under provincial jurisdiction.



2.1.1 Geography, Climate and Environmental Resources

During the last ice age, the regional landscape was covered in glaciers which created the rounded ridges of all but the highest mountains (Jungen and Lewis 1978). As a result of glaciation, soils are influenced by thick glacial deposits and exposed or shallow bedrock (Ronnseth et al. 1993). Upland areas are characterized by unconsolidated gravel, sands, and tills. Marine silts, clays, sands, and gravels are common in areas low enough to have been affected by sea level fluctuations (Jungen 1985).

Though some of Canada's wettest climates exist on the west coast of Vancouver Island (Meidinger and Pojar 2001), much of the RDN is in a rain shadow, giving the area a mild temperate coastal climate with moderately wet winters and dry summers. Mean annual precipitation is approximately 1,100 mm. Most of the precipitation falls as rain; snow at lower elevations traditionally melts within a week of falling (Environment Canada 2011).

The RDN extends across three distinct biogeoclimatic zones: Coastal Douglas-fir, Coastal Western Hemlock, and Mountain Hemlock. Each of these zones has characteristic vegetation with associated animals, soils, and climate; however regional forests are generally dominated by Douglas-fir (*Pseudotsuga menziesii* var. *menziesii*), western hemlock (*Tsuga heterophylla*), mountain hemlock (*T. mertensiana*), and western red cedar (*Thuja plicata*). Sitka spruce (*Picea sitchensis*), yellow cedar (*Callitropsis nootkatensis*), amabilis fir (*Abies amabilis*), and shore pine (*Pinus contorta* var. *contorta*) are also common in the region. Coastal Douglas-fir is the smallest of BC's 14 biogeoclimatic zones yet it has some of the highest diversity in the province and is home to some of the province's rarest vegetation. *Arbutus* (*Arbutus menziesii*) and Garry oak (*Quercus garryana*) grow in this zone. The Coastal Western Hemlock zone covers most of the lower elevations west of the Coast Mountains and is the wettest and most productive forest zone in BC. The Mountain Hemlock zone occupies subalpine elevations along the entire BC coastline and provides habitat for the Vancouver Island marmot (*Marmota vancouverensis*), an endangered species known only to Vancouver Island (Meidinger and Pojar 2001; MOF 1997; MOF 1999a; MOF 1999b).

Major watersheds in the RDN include Big Qualicum River, Little Qualicum River, Englishman River, Nanaimo River, Millstone River, and French Creek. There are also a number of smaller rural and urban watersheds. Major RDN rivers originate in managed forests in the eastern foothills of the Vancouver Island Ranges and flow into the Strait of Georgia. Because of the steep slopes, flow levels can rise and fall quickly in response to rain and snowmelt. Soils in steep areas are prone to erosion which causes stream sedimentation (Boom and Bryden 1994). The major watersheds are fairly well contained within the administrative boundaries of the RDN. Overlaps with other regional districts are in rural communities or unpopulated mountainous areas. Aquatic and riparian habitat, surface water flows, water quality, and groundwater sustainability are important topics in these watersheds as are wetland and estuary protection, aquifer integrity, and community recreation.

2.2 Wastewater Treatment

Wastewater, liquid waste, and sewage are terms for "used" water and the wastes that it carries. Basically, they are terms for what is flushed down the toilet or washed down the drain. Wastewater can also include rain water, groundwater or snow melt (inflow and infiltration²) that make their way into sanitary wastewater pipes. Wastewater treatment is essential to protect our water resources, the environment, and human health. Treated wastewater can also produce useable resources such as water, biosolids, heat, and electricity.

The majority of wastewater in the RDN is treated by Public Wastewater Systems (see Section 2.2.1) or privately-owned onsite systems (see Section 2.2.6). A small number of properties are authorized by the Island Health (VIHA) to use pump and haul services³. The RDN receives and treats holding tank waste from these properties as well as septage from pumped septic tanks. There are also a small number of wastewater treatment facilities (and discharges) in the region which are privately-owned and not operated by the RDN.

There are no combined sewers⁴ in the RDN wastewater system or within a collection systems owned by one of the member municipalities.

Stormwater sewers are owned by the municipalities or the Ministry of Transportation and Infrastructure. The RDN does not own any stormwater sewers.

² Inflow and infiltration are explained in more detail in Section 5.7

³ Typically, pump and haul services are used by properties with failing onsite systems or by those who cannot connect to public wastewater systems and are unable to obtain Ministry of Health approval for a conventional septic disposal system. Those using pump and haul services install a holding tank on their property which must be regularly pumped out by a septage hauler.

⁴ Combined sewers are rudimentary sewer systems designed to accommodate wastewater year round in addition to stormwater during wet weather conditions. Combined sewers are no longer an accepted system of wastewater conveyance and the provincial government has a mandate to eliminate all combined sewers.

2.2.1 Public Wastewater Systems

Public wastewater systems refer to wastewater collection and treatment systems owned by the RDN or a member municipality. The RDN's Wastewater Services department provides wastewater servicing for the Greater Nanaimo, French Creek, Nanoose Bay and Duke Point service areas which cover most of the urban population in the RDN. Figure 1 (previous page) illustrates the RDN service areas and associated treatment plants. In the municipalities, wastewater collection is generally a three-tiered system. Privately owned lateral sewer pipes from private properties (tier 1) connect to sanitary sewer collection systems owned and operated by the municipalities or RDN (tier 2). The collection systems then feed into the RDN's interceptor line (tier 3) which delivers the wastewater to a pollution control centre owned and operated by the RDN.

Wastewater systems in the RDN generally follow the natural slope of land allowing gravity to transport wastewater to one of four RDN wastewater treatment plants:

- Greater Nanaimo Pollution Control Centre (GNPCC)
- French Creek Pollution Control Centre (FCPCC)
- Nanoose Bay Pollution Control Centre (NBPCC)
- Duke Point Pollution Control Centre (DPPCC).

In areas lower than adjacent lands or treatment plants, wastewater must pass through a pumping station to a treatment facility. Through treatment at a wastewater facility, resources such as water, nutrients, and energy can be recovered from effluent (the liquid product of treatment), biosolids (the solid product of treatment), and other by-products (e.g. biogas). Details on the pollution control centres are provided below and in Appendix B, Discussion Paper 4 (Current Flows and Loads, Effluent Quality and Treatment Plant Capacities).

Generally, wastewater treatment at a Pollution Control Centre involves the following processes:

1. **Preliminary treatment** – Grit tanks reduce the velocity of influent wastewater and allow sand, gravel, and other heavy materials to settle out. Mechanical bar screens (ranging from 10 to 25 mm) further remove large objects. Material collected by grit tanks and bar screens is washed and sent to the sanitary landfill.
2. **Primary treatment** physically separates the solids and grease and lowers the biochemical oxygen demand (BOD₅) and total suspended solids (TSS) to produce an effluent with BOD₅ and TSS not exceeding 130 mg/L. During primary treatment, screened wastewater is held in a settling tank for several hours so solids can settle to the bottom of the tank and fats, oil, and grease can float to the surface. The settled material, known as primary sludge, is collected and pumped to digestion or holding tanks for further treatment into biosolids. The fats, oil, and grease are skimmed from the tanks, dewatered, and sent to the landfill.

Chemical enhancement takes primary treatment a step further to improve overall water quality. During this step, a coagulant (e.g. alum) and flocculants (e.g. anionic polymer) are added to the effluent to enhance the settling of solids, further reducing TSS and BOD₅ levels. Presently, GNPCC and NBPCC are chemically enhanced primary treatment facilities.

3. **Secondary treatment** uses a biological process to lower BOD₅ and TSS and produce an effluent quality with BOD₅ and TSS not exceeding 45 mg/L. In this stage, primary effluent is pumped to a trickling filter or sequencing batch reactor where microorganisms feed on organic matter in the wastewater to create secondary sludge. Secondary sludge is thickened and transported or pumped to digesters for solids processing. FCPCC and DPPCC are secondary treatment facilities.
4. **Ultraviolet disinfection** – At DPPCC, effluent from secondary treatment is disinfected with ultraviolet light.
5. **Tertiary treatment** is not currently used in the RDN. Tertiary treatment plants are needed whenever the phosphorus levels need to be significantly reduced or if there is a desire to reclaim effluent. Tertiary treatment can produce phosphorus levels less than 1.0 mg/L, BOD and TSS levels less than 5 mg/L, and low nitrogen levels (Associated Engineering 2008).
6. **Integrated resource recovery (IRR)** is an integrated approach to planning and managing infrastructure to maximize the value recovered from waste resources (MOE 2011). The Regional Growth Strategy supports resource recovery and the RDN considers resource recovery options at the planning and design phase for all

upgrades and expansions. Discussion Paper 8 (Integrated Resource Management Opportunities for the Regional District of Nanaimo) in Appendix B reviews potential IRR opportunities at the four wastewater treatment facilities. Additionally, the RDN is involved with benchmarking, an interactive process to compare our progress with other jurisdictions and learn how they are addressing IRR. Resources recovered in the RDN include:

- a. **Biogas** includes methane and carbon dioxide by-products of the digestion process. Biogas is a sustainable energy source used at GNPCC to fuel its boilers, heat on-site processes and buildings and to mix the digesters. Excess biogas may be flared (wasted) or used to create electricity (see cogeneration).
- b. **Biosolids** are humus-like products of wastewater treatment which contain nitrogen, phosphorous, and other nutrients that are vital to healthy and productive soil. The quality, production, distribution, storage, and land application of biosolids are regulated by the provincial *Environmental Management Act* and *Public Health Act* Organic Matter Recycling Regulation (OMRR).

Solids from FCPCC and NBPCC are processed at FCPCC using autothermal thermophilic aerobic digestion (ATAD) and centrifugal dewatering technology to produce Class A biosolids (as defined by OMRR).

Solids from GNPCC and DPPCC are processed at GNPCC using mesophilic anaerobic digestion to produce Class B biosolids (as defined by OMRR). Mesophilic anaerobic digestion processes sludge at lower temperatures over a shorter period than ATAD.

All RDN biosolids are beneficially used at the Vancouver Island University (VIU) woodlot in their Forest Fertilization Program.

- c. **Cogeneration** refers to the use of biogas to generate both electricity and heat. GNPCC is one of the first wastewater treatment plants of its size in Canada to implement cogeneration. All of the electrical power is sold to BC Hydro to supply enough power for up to 350 homes.
- d. **District heating systems** capture thermal energy from wastewater effluent to provide hot water and space heating using heat recovery technology. District heating plants can provide higher efficiencies and better pollution control than localized boilers. The RDN has an agreement-in-principle with School District 68 to provide Hammond Bay Elementary School with heat from the GNPCC outfall. This project will allow the school district to use the residual heat from the treated wastewater leaving the GNPCC as the primary heat source for the school. This unique system will reduce the school's overall carbon footprint by 78% and its operating cost by \$4,800 each year.
- e. **Reclaimed water** is effluent from a municipal wastewater facility that is suitable for use in accordance with the MWR. GNPCC and FCPCC use effluent during operation as process and wash water in place of potable water. During the summer months, FCPCC also sends up to 1,370 cubic metres per day (m³/d) of its final effluent to Morningstar Golf Course for irrigation. Beneficial effluent reuse lessens the demand on the potable water supply and reduces the volume discharged to the ocean.

2.2.2 Greater Nanaimo Pollution Control Centre

Wastewater from the Greater Nanaimo Service Area is received at the GNPCC, on 4600 Hammond Bay Road in Nanaimo. GNPCC serves an estimated population of 86,068 people (RDN 2012a) in the Greater Nanaimo Service Area, which covers the City of Nanaimo, District of Lantzville and Snuneymuxw First Nation lands (illustrated in Figure 1). Wastewater is conveyed to GNPCC from three pump stations, an interceptor, and a septage receiving facility at the Chase River Pump Station. It also provides service for BC Ferries' Departure Bay ferries to discharge from their wastewater tanks directly into the RDN's interceptor line. GNPCC provides chemically enhanced primary treatment to remove approximately 55% of BOD₅ and 76% of TSS (RDN 2012a). The RDN is authorized, under Environmental Management Permit No. PE-00338, to discharge treated effluent from GNPCC to the Strait of Georgia 2,030 m offshore at a depth of 70 m. GNPCC produces Class B biosolids that are beneficially used at the VIU woodlot. It also and uses effluent during operations in place of potable water to suspend the coagulant and flocculent in a solution.

There is potential for the Greater Nanaimo Service Area to include development in the City of Nanaimo, District of Lantzville, Snuneymuxw First Nation lands (IR 2, 3, and 4), new development in growth containment boundaries, and adjacent lands to address failing onsite systems that threaten environmental and human health. Though the

observed growth in the RDN from 2010 to 2011 was only 0.7% (BC Stats 2012), population estimates predict this service area will grow by 2% per year, reaching 130,720 people by 2036 (Urban Futures 2007).

2.2.3 French Creek Pollution Control Centre

Wastewater from the French Creek Service Area is received and treated at FCPCC, on 957 Lee Road in Parksville. FCPCC serves an estimated population of 26,047 people (RDN 2012b) in the City of Parksville, Town of Qualicum Beach, French Creek Sewer Service Area, Surfside Sewer Service Area, Barclay Crescent Sewer Service Area, and Pacific Shores Sewer Service Area (shown on Figure 1). FCPCC receives wastewater from seven pump stations, interceptor lines and forcemains, and has a septage receiving facility on site. FCPCC provides secondary treatment to remove up to 94% of the BOD₅ and TSS (RDN 2012b). The RDN has authorization under Environmental Management Permit No. PE-4200 to discharge treated effluent from FCPCC to the Strait of Georgia 2,440 m offshore at a depth of 61 m. FCPCC produces Class A biosolids which are beneficially used at the VIU woodlot. From May to September, up to 1,370 m³/d of reclaimed water is pumped to ponds at Morningstar Golf Course where it is stored for irrigation. Reclaimed water is also used at FCPCC during operations in place of potable water.

There is potential to expand the French Creek Service Area to include Village Centres or problem areas in Electoral Areas F, G and H to address failing onsite systems (e.g. Hawthorne Rise). Though the 2010-2011 observed growth in the RDN was only 0.7% (BC Stats 2012), population estimates predict the service area will grow at an estimated rate of 2% per year to a population of 40,770 by 2036 (Urban Futures 2007).

2.2.4 Nanoose Bay Pollution Control Centre

NBPCC is a small treatment facility built to serve the Fairwinds subdivision on the Nanoose Peninsula (its flows represent approximately 1% of the flows treated at GNPCC). Since the facility was commissioned, a few properties outside of Fairwinds, on Dolphin Drive and Department of National Defense lands, have been added to the service area. Wastewater from residential and commercial users in the Nanoose Bay Service Area is received at NBPCC, on 3260 Schooner Cove Drive in Nanoose Bay. The extent of the Nanoose Bay Service Area is illustrated in Figure 1. NBPCC receives wastewater from nine pump stations, interceptor lines, and forcemains and serves an estimated population of 1,350 people (RDN 2012c). NBPCC provides chemically enhanced primary treatment to remove approximately 61% of the BOD₅ and 82% of the TSS (RDN 2012c). The RDN has authorization under Environmental Management Permit No. PE-7214 to discharge treated effluent from NBPCC to the Strait of Georgia 450 m offshore at a depth of 39 m. Sludge from NBPCC is trucked to FCPCC and processed into biosolids.

This amendment focusses on the planned upgrade to secondary treatment at NBPCC. Future planning for expansion of the Nanoose Bay Service Area will support growth as envisioned in the Nanoose Bay Official Community Plan (OCP) and may include the Fairwinds Lakes District, Schooner Cove, Village Centres identified in the OCP, and problem areas with failing onsite systems. Though the observed growth in this service area was only 0.3% (AECOM 2010a) and the 2010-2011 observed growth in the RDN was only 0.7% (BC Stats 2012), population estimates predict the service area will grow at an estimated rate of 1.8% per year resulting in a population of 1,700 by 2025 (AECOM 2010b).

2.2.5 Duke Point Pollution Control Centre

DPPCC is located at 625 Jackson Road in Nanaimo. Duke Point Service Area, illustrated in Figure 1, includes 30 connections from the Duke Point industrial area and parts of Cedar Village. It also provides service for BC Ferries' to discharge their wastewater from Duke Point ferries into the City of Nanaimo's Duke Point collection system. Three pump stations and an interceptor convey wastewater to DPPCC, which provides secondary treatment to remove approximately 96% of the BOD₅ and 94% of TSS (RDN 2012d). Wastewater is treated with ultraviolet light to disinfect the effluent. Sludge from DPPCC is trucked to the Chase River Pump Station and processed into biosolids at GNPCC. The RDN has authorization under Operational Certificate ME-05989 to discharge effluent from DPPCC to the Northumberland Channel⁵ of the Strait of Georgia, 242 m off shore at a depth of 43 m. The service area may expand to include parts of Cedar, other Village Centres, and areas with failing onsite systems within Electoral Area A.

⁵ Marine outfall is shared with West Coast Reductions.

2.2.6 Private Onsite Systems

Most rural properties do not receive public wastewater services. Rural wastewater is typically treated with privately owned Type 1, 2, or 3 onsite systems (septic systems, private packaged treatment plants, and advanced package treatment plants; categorized based on the resulting water quality). A small number of rural properties are authorized by VIHA to use pump and haul services. Private onsite systems, if properly installed and maintained, are cost-effective options for sustainable wastewater treatment. There are an estimated 12,000 properties in the RDN with onsite sewage treatment, representing roughly one fifth of the RDN population.

Private onsite systems are currently regulated under the BC *Public Health Act* Sewerage System Regulation (SSR). The SSR shifted responsibility for the planning, design, construction, and maintenance of onsite systems installed or upgraded after May 30, 2005 from local health authorities such as VIHA, to professionals (e.g. professional engineers and geoscientists) and registered practitioners (e.g. registered onsite wastewater practitioners). However, the responsibility to arrange for maintenance and replacement of onsite systems in accordance with their maintenance plans is the responsibility of the system owner. Poorly maintained onsite systems can fail polluting the environment, and endangering public health. Refer to Appendix B, Discussion Paper 2 (On-site Treatment Issues) and Discussion Paper 3 (Policies Regarding New Communities and Developer Installed Package Treatment Plants) for more information on private onsite systems.

3.0 Milestone Achievements Since 1997

The original 1997 LWMP developed six programs:

- **Rural Areas Program:** to extend public wastewater services in growth containment boundaries, consistent with OCPs and the Regional Growth Strategy, and address areas with failing onsite systems
- **Source Control Program:** to prevent pollution
- **Stormwater Management Program:** to manage stormwater flows
- **Volume Reduction Program:** to reduce water consumption and inflow and infiltration (I&I)
- **Odour Control Program:** to mitigate odours generated by the pollution control centres
- **Service Areas Program:** to manage capital projects at the pollution control centres.

The 1997 LWMP made commitments for each program to manage wastewater and wastewater infrastructure sustainably in ways that protect public health and the environment. The RDN met most commitments during the first ten years of implementation (see Appendix C). Specific program milestones and challenges are presented below.

3.1 Rural Areas

The RDN fulfilled all of the original commitments regarding public wastewater systems (see Appendix C). The RDN works with property owners to establish sewer service in areas where failure of septic systems is identified. Since 2000, the RDN has undertaken sewer servicing feasibility studies in several communities, and undertaken a study identifying village centres with potential for investment in wastewater infrastructure. Sewer servicing studies were completed for:

- Electoral Area A – Cedar (Associated Engineering 2000; AECOM 2011a)
- Electoral Area B – Gabriola Island; (Associated Engineering 2003a)
- Electoral Area C – Extension (Associated Engineering 2002)
- Electoral Area E – Madrona, Dolphin Bay, and West Bay Estates / Red Gap (AECOM 2010a)
- Electoral Area H – Shaw Hill, Deep Bay, Qualicum Bay, Dunsmuir, and Bowser (Associated Engineering 2003b; Chatwin Engineering 2011).

The RDN extended wastewater services to Barclay Crescent in 2004 and parts of Cedar in 2010⁶. Given the cost per household associated with construction, operation and maintenance of public wastewater systems, the initiative to provide wastewater services in other areas was not successful and those areas are still serviced by onsite systems.

⁶ Municipalities may also expand sewer services within municipal boundaries. These sewer expansions are not noted here.

The RDN fulfilled many of the original commitments regarding private onsite systems (see Appendix C). The RDN reviewed its role with respect to new private onsite sewage systems permits processed under VIHA and for establishing minimum standards for private onsite systems. Conclusions of the review are provided in Appendix C. In 2001, the RDN and the VIHA collaborated in a study that identified 47 areas considered at risk for failing septic systems. In response, in 2009, the RDN introduced the first increase in septage tipping fees to support a public septic education program called SepticSmart. SepticSmart informs homeowners of onsite sewage disposal regulations; encourages homeowners to properly use, maintain, and service their system; and provides tools to enable homeowners to detect a failing system. The goal of the program is to reduce the number of failing systems and to prevent the future failure of ageing systems that could impact human health and the environment. The RDN has also drafted changes to the Regional District of Nanaimo Land Use and Subdivision Bylaw (No. 500) which, if adopted, would allow the RDN to acquire privately owned communal wastewater treatment systems if petitioned to do so. Eligible systems would be limited to wastewater treatment and disposal plants, pumping stations, forcemains and outfalls which serve a minimum of 60 or more dwellings.

3.2 Source Control Program

All of the commitments in the 1997 LWMP Source Control Program were met (see Appendix C and Discussion Paper 5, included in Appendix B). Such commitments included a cost-benefit study (completed in 1998), creation of the Sewer Use Regulatory Bylaw (No. 1225), and an education program, based on the cost-benefit study, to support the bylaw. Source control outreach programs focussed on:

- The dental sector and promoting amalgam separators to address high mercury levels (2001). This program resulted in a 71% reduction of mercury in biosolids and a 96% reduction of mercury in effluent
- The restaurant and food services sector to address oil and grease (2005)
- Garburator use to address BOD₅ (2007).

The RDN also promotes the Province's pharmaceutical return program and the RDN's Team WaterSmart program delivers free workshops educating the public on chemical free gardening and green cleaning techniques. As well, the City of Nanaimo and Town of Qualicum Beach banned the cosmetic use of pesticides.

3.3 Stormwater Management Program

All of the original stormwater management commitments were met (see Appendix C). In 2008, the RDN implemented the Drinking Water and Watershed Protection (DWWP) service. This serves as the foundation of our rainwater management commitments under the LWMP. The DWWP program focuses on learning more about our water resources to better manage and protect them, ultimately with an integrated watershed management approach. Effective partnerships with community members, government agencies, academia, and business are key to the success of initiatives under this plan.

Specific accomplishments of our DWWP and rainwater management activities include:

- **Team WaterSmart awareness and education initiatives:** Participation at community events; Water Conservation workshops (including WellSmart; Xeriscaping, Rainwater Harvesting; Efficient Irrigation and Gardening; Stream Protection; Home Greywater Systems); guidebooks including Rainwater Harvesting Best Practices.
- **Incentive rebate programs including:** Low Flow Toilets; Rainwater Harvesting Systems; Well Protection Upgrades; Sustainable Development.
- **Community Watershed Monitoring Network:** Partnership including the RDN, Community groups and Ministry of Environment collect valuable water quality data from 14 watersheds across the RDN, identifying priorities for action.
- **WaterMap:** An online interactive tool that provides public access to water resource mapping.
- Expansion of the provincial observation well network in partnership with Geological Survey of Canada and the province.

- Development of a region wide **Water “Budget” Model**, quantifying water availability and demand in order to gain an improved understanding of how population growth, land use, and climate change will impact water resources.
- Approval of a regional **“Water Conservation Plan”**.

The RDN’s role in stormwater management in the past decade has also included:

- A partnership with provincial and federal governments to produce the Stormwater Planning: A Guidebook for British Columbia (BC MWLAP 2002)
- A partnership with the Ministry of Water, Land and Air Protection and the Georgia Basin Ecosystem Initiative to develop a draft Stormwater Management Plan for the region in 2002. The 2002 draft Storm Water Management plan was not adopted by the RDN Board but a more comprehensive DWWP program was adopted in 2008. Each municipality and Electoral Area now participate in the DWWP service
- Cooperation with the City of Nanaimo on the Wexford Creek Integrated Stormwater Management Plan
- The Yellow Point Aquifer Protection Development Permit Area to protect water levels of the aquifer
- A pilot Rainwater Harvesting Incentive Program (2011-2013), offered a rebate to residential property owners installing or updating a rainwater harvesting system
- A Rainwater Harvesting Best Practices Guide informing residents of safe and effective rainwater harvesting systems
- A Sustainable Development Checklist for residential, commercial and industrial developments
- A Pilot Green Building Incentive Program promoting best management practices for rainwater management, greywater reuse, and rainwater harvesting
- Workshops and open houses offered by Energy and Sustainability Services and Water Services’ Team WaterSmart highlighted rainwater harvesting and grey water reuse options.

Many OCPs have also created a number of development permit areas (DPAs) which provide protection for the natural environment, its ecosystems and biodiversity, and support the Regional Growth Strategy goal of environmental protection. DPAs exist to protect water features, aquifers, and Sensitive Ecosystems. They also promote a reduction of impervious surfaces and the maintenance of natural hydrologic function.

Such RDN DPAs which protect watersheds and aquifers include:

- Environmentally Sensitive Features DPA (in Area A, G and H OCPs)
- Fish Habitat Protection DPA (in Area A, C, F, G and H OCPs)
- Watercourse Protection DPA (in Area C, E and F OCPs)
- Nanaimo River Floodplain DPA (in Area A OCP)
- Cedar Main Street, Cassidy, and Cedar DPAs (in Area A OCP)
- Yellow Point DPA (in Area A OCP).

Islands Trust also has an OCP for the Protection of the Natural Environment on the Gulf Islands in the trust area.

Through formation of the Wastewater and Water Collaborative (W3C) Meeting, the RDN also meets biannually with municipalities to share information related to advances in rainwater management.

In recognition of the efforts of our member municipalities:

- The City of Nanaimo:
 - Attends biannual W3C meetings
 - Requires stormwater planning in their Engineering Standards and Specifications
 - Has integrated stormwater management plans for Walley Creek and Wexford Creek watersheds
 - Works to disconnect roof leaders from the sanitary sewer
 - Uses policy to encourage homeowners not to infill ditches
 - Monitors rainfall and storm flow using rain gauges and flow meters
 - Requires that developers ensure that storm drainage flows and frequencies after development match predevelopment discharges
 - Has DPA guidelines for watercourses and environmentally sensitive areas in their OCPs
 - Has DPA guidelines for steep slopes which address stormwater management and erosion control

- Considers developing a policy for the design of developer-installed bioswales.
- The District of Lantzville:
 - Attends biannual W3C meetings
 - Discourages infilling open ditches
 - Requires new developments to provide and put in place a rainwater management system
 - Requires small residential developments to provide an enhanced stormwater system to detain water on site
 - Promotes engineered wetlands
 - Upgrades stormwater infrastructure while ensuring an ecological benefit from the upgrade.
- The City of Parksville:
 - Attends biannual W3C meetings
 - Restores and/or realigns creeks and streams to improve drainage
 - Provides a checklist with building permits highlighting sustainable rainwater management practices
 - Develops ditches into bioswales and installs flush curb mounts
 - Pursues capital projects to upgrade underground infrastructure
 - Continues to proactively implement innovative strategies to manage rainwater.
- The Town of Qualicum Beach:
 - Attends biannual W3C meetings
 - Supports the installation of rain gardens and rain barrels on public and residential lands
 - Encourages open ditches and prescribes an engineering standard for ditch infilling
 - Does not charge stormwater DCCs if 100% infiltration occurs onsite
 - Restores and/or realigns creeks and streams to improve drainage
 - Has Erosion and Sediment Control Bylaw No. 617
 - Implements proactive and innovative strategies to manage rainwater.

3.4 Volume Control Program

The 1997 Volume Reduction Program addressed the need to manage I&I and reduce potable water consumption and all of the commitments towards this program were met (see Appendix C). Water consumption was reduced by:

- Educating the public through the RDN's Team WaterSmart program, the City of Parksville's AquaStar program and the District of Lantzville's online water conservation tips and low impact development techniques
- Promoting water conservation through water metering and use of an inverted block rate structure for metered water conservation (used by the RDN and member municipalities)
- Providing rebates to encourage toilet replacements with low-flow alternatives. Rebates were offered by the RDN, City of Nanaimo, District of Lantzville, City of Parksville, and Town of Qualicum Beach
- Offering free workshops, home visits, and information on efficient irrigation.

Average water consumption in the RDN has gone down from 331 L/day in 2009 to 281 L/day in 2013.

The RDN and member municipalities also worked to reduce volume at the treatment facility through I&I control. In 2001, 2004 and 2006, the RDN completed a three-phased strategy to manage wet weather flow (Associated Engineering 2001, 2004, 2006). The RDN also uses flow meters to measure flows entering the treatment facilities and inspects the interceptors with closed circuit television (CCTV) and smoke tests on a five year rotation cycle. Progress towards I&I reduction is shared at semi-annual meetings with the municipalities. I&I issues and reduction in the RDN are discussed further in Discussion Paper 10 (Appendix B). Some monitoring and mitigation techniques used by the municipalities are listed below.

- The City of Nanaimo:
 - Continues to establish capital plans to address I&I at critical locations within Municipal boundaries
 - Relines portions of the collection system to improve capacity
 - Uses ten sewer and five rain flow monitoring stations to track flows through the collection system and identify problem areas
 - Plans to replace old service connection wyes at property lines, particularly in the community of Harewood
 - Inspects and seals manholes
 - Develops annual operations and maintenance plans with an I&I component

- Continues with annual CCTV inspections to identify potential problem areas
- Shares rainfall and flow monitoring data with the RDN.
- The District of Lantzville:
 - Annually smoke tests existing lines to eliminate storm drainage cross-connections
 - Monitors manholes and sewer lift stations for infiltration of ground water
 - Monitors and identifies repairs in the collection system such as, but not limited to, cracked pipe, manhole sealant degradation and manhole lid degradation
 - Monitors the outgoing flow for increased flows during the rainy season.
- The City of Parksville:
 - Targets older neighbourhoods for comprehensive repair through an established capital program
 - Installs flow and rainfall gauges at key locations within the city
 - Meets I&I standards established for the city based on the Metro Vancouver standard of 11,200 litres per hectare per day (L/ha/d) for a 5 year storm event and the Capital Regional District (CRD) design standard of 12,500 L/ha/d for new sewers
 - Repairs manholes and pipes as identified or through sanitary sewer condition assessments
 - Monitors collection system for I&I.
- The Town of Qualicum Beach:
 - Uses CCTV to inspect the collection system and potential problem areas
 - Fills manhole gaps with a foam injection system
 - Inspects the entire collection system with dye and smoke tests to identify and remedy problem areas.

3.5 Odour Control Program

All of the commitments in the 1997 LWMP Odour Control Program were met (see Appendix C). Since 1997, the RDN has implemented extensive odour control measures at wastewater treatment facilities. For example, the RDN established a hydrogen sulphide monitoring program and established “odour procedures” in the Environmental Management System (EMS)⁷ to ensure that staff eliminate or reduce odours during routine duties and respond within 24 hours to odour complaints. To further control odour at FCPCC, the RDN installed chemical scrubbers and added ferrous chloride and biological scrubbers to neutralize hydrogen sulphide and installed ion generators and enclosed odour-generating areas at Bay Avenue, Lee Road, and Hall Road Pump Stations. As a result, the number of complaints received for odours at FCPCC dropped from 227 in 1999 to none in 2011. Similarly, an odour control system was installed at the Wellington Pump Station and GNPCC received only four odour complaints in 2011.

3.6 Service Areas

Greater Nanaimo Pollution Control Centre

Most of the commitments in the 1997 Service Areas Program for the GNPCC were met (see Appendix C) and only the GNPCC secondary treatment upgrade is outstanding. The 1997 LWMP projected that GNPCC would be upgraded to provide secondary treatment by 2015. Expansion and upgrade of GNPCC were topics of much discussion during the LWMP amendment process and were addressed in Discussion Papers 1, 4, 6, 7, and 8, all provided in Appendix B. Over the last decade, the RDN has initiated the upgrade process through a number of planning, engineering and capital projects. Projects completed in the past decade include:

- Introduction of chemically enhanced primary treatment to improve effluent quality (2002)
- Purchase of property to establish a buffer to Neck Point Park and to facilitate expansion and upgrades (2002)
- Relocation and enhancement of Walley Creek to facilitate secondary upgrade and expansion (2006)
- Completion of the GNPCC upgrade process selection (2011)
- Construction of a third digester (2013)
- Construction of the fourth primary sedimentation tank (2013).

⁷ An Environmental Management System is a tool used to evaluate and improve environmental performance. RDN Wastewater Services' EMS is ISO 14001 certified.

The RDN seeks an amendment to the timeline for completion of secondary treatment upgrades at GNPCC.

French Creek Pollution Control Centre

Since 1997, most of the original LWMP commitments regarding the FCPCCC were met (see Appendix C), including expansion and upgrades to the Lee Road and Bay Avenue pump stations. As well, the dewatering facility was upgraded to facilitate the economic transportation of biosolids. The only commitment from the original LWMP not yet met is the expansion of the facility and outfall by 2015. Since growth in the area was slower than projected, expansion is not yet required and the projects are now scheduled for 2018-2025. As well, projects completed between 2006 and 2011, have increased plant capacity and these capacity improvements are enhanced by the volume reduction program. FCPCCC expansion is addressed in Discussion Papers 1, 4 and 8, all provided in Appendix B.

Nanoose Bay Pollution Control Centre

Since 1997, all of the original LWMP commitments regarding the NBPCCC were met (see Appendix C) with the exception of the projected upgrade to provide secondary treatment by 2010 (based on an expected service population of 6,000). Throughout the amendment process, the RDN explored a number of alternative timelines and expansion levels for completion of secondary treatment at NBPCCC. Discussion Paper 1, in 2008, considered the potential to upgrade NBPCCC to secondary treatment in 2013. The Draft LWMP Amendment documents since February 2012 have explored a number of potential upgrade completion dates between 2020 and 2030. Discussion Paper 7, in 2008, discussed the potential to upgrade to secondary treatment for a service population of 6,000 (all discussion papers are provided in Appendix B). The 2010 "Nanoose Bay Pollution Control Centre Upgrade Study" (Appendix D), considered the costs of upgrades to secondary for service population levels of 1,500, 3,000 and 6,000.

NBPCCC currently provides serves a population of approximately 1,350 (discharging an average 273 m³/day). Without the population base to fund secondary treatment, the project cannot proceed as planned in 1997. Through this amendment, the RDN seeks alternative timeline for secondary treatment upgrades at NBPCCC, based on the rationale below.

NBPCCC was built to provide primary treatment for an estimated 1,500 people, with minor improvements required to serve approximately 3,000 people. When the 1997 LWMP was prepared, NBPCCC served an estimated 580 people and, once the service area population reached 3,000, the RDN planned to upgrade to secondary treatment and expand to provide treatment for a population of 6,000.

Growth in the sewer service area was predicted to come from development of the Fairwinds subdivision and potential trunk expansions to Madrona / Wall Beach, Delanice Way, Beachcomber, Red Gap, and Garry Oaks (Dayton & Knight Ltd. Consulting Engineers 1997). With respect to sewer trunk expansion, the 1997 LWMP noted that the "final decision regarding the options will be made as part of the OCP" review process (3.6.3 page 16). The OCP supported evaluating service area expansion. The RDN completed sewer servicing studies in 2002, 2008, and 2009 for Dolphin Beach, West Bay Estates / Red Gap, and Madrona / Wall Beach, respectively. On the basis of these engineering feasibility studies, the RDN concluded that expansion of the NBPCCC service area was not feasible at that time. Growth in Fairwinds has been much slower than expected and connection rates to the facility remain low.

The RDN funds services based on a user pay principle by establishing service area bylaws. This means that the entire cost of upgrading the NBPCCC must be borne by residents living in the service area. Secondary treatment was not in place at NBPCCC by 2010 since projected growth and service area expansion did not occur.

Duke Point Pollution Control Centre

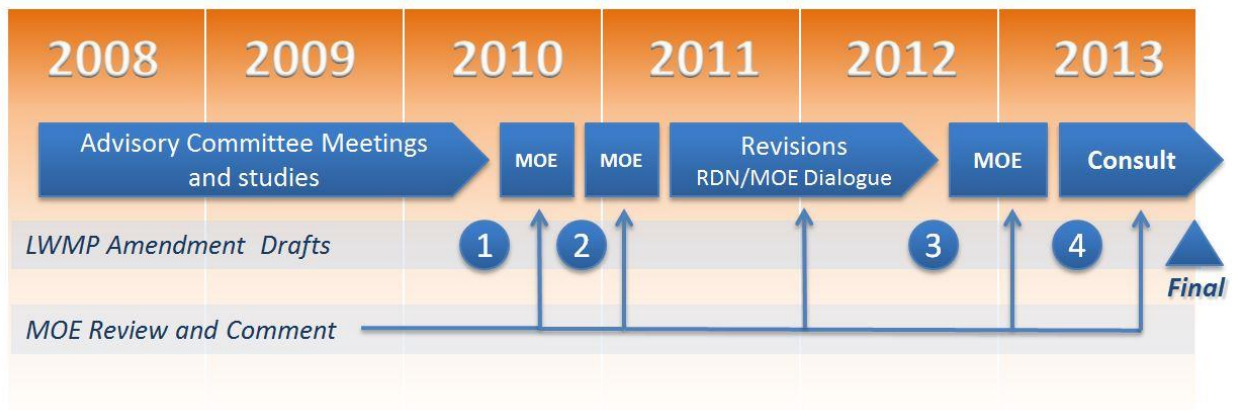
All of the commitments in the 1997 Service Areas Program for the DPPCC were met (see Appendix C). The RDN commissioned the sequencing batch reactor treatment system at DPPCC in 1998. Since then, DPPCC has provided domestic wastewater treatment for the Duke Point Industrial Park. In 2009, sewer service was extended to Cedar Village. The necessity to expand or upgrade the Duke Point Pollution Control Centre was evaluated during the LWMP update process and was addressed in Discussion Paper 1, 4, and 8, all provided in Appendix B.

4.0 Plan Amendment Process

The LWMP amendment is a result of six years of study and input from the public, technical specialists, MOE staff, First Nations and elected representatives of regional and municipal jurisdictions (refer to Figure 2 for a detail of amendment milestones). During that time, there were 19 Regional Liquid Waste Advisory Committee (RLWAC) meetings (see Section 4.3.1) and RDN staff submitted four draft amendments to MOE staff for review.

The RLWAC meetings were critical to the input process as they provided a regular venue for committee members to review progress on the update and provide feedback on plan development. The update process also includes a program for public review and consultation and First Nations engagement, explained in Section 4.3 and Section 4.4. The amended plan is consistent with the intent of the original LWMP and current Regional Growth Strategy; documents already adopted by the RDN and its member municipalities. It is also consistent with new and updated federal and provincial regulations.

Figure 2. LWMP Amendment Milestones



4.1 Guiding Principles

The 1997 LWMP established a set of principles intended to guide the decision-making process towards meeting these goals. The current guiding principles evolved from those listed in the 1997 LWMP to respect that the LWMP is a collaborative plan and to reflect the need for sustainable and affordable services. While the core values of the original principles remain, the new guiding principles provide a closer link to the fundamental objectives and scope of the plan. The guiding principles which guide the RDN's approach to wastewater management moving forward are:

Flexibility: Flexibility is necessary for the LWMP to meet future demands, new environmental criteria and evolving technologies. Infrastructure must also adapt to varying loads, flows, environmental conditions, new regulatory requirements, and new technologies.

Sustainability: The RDN must choose affordable solutions for wastewater management that respect and protect the environment and public health. Decisions to replace and upgrade infrastructure will consider potential energy generation, water conservation and reuse, nutrient recovery, greenhouse gas and odour emissions, and operational efficiency. Operational efficiency considers lifecycle costs, resource consumption, ease of operation, adaptability, and worker safety.

Collaboration: The RDN will collaborate with other levels of government including First Nations, government agencies, municipalities, businesses, the public, and other stakeholders when developing wastewater management strategies. Inter-departmental collaboration within the RDN is also essential since the success of many programs require joint services by various departments. RDN Wastewater Services will assume a coordinating role when collaboration will benefit the success of LWMP implementation.

The updated plan proposes no new discharge points; rather it provides a revised schedule for infrastructure upgrades which will improve effluent quality, meet new regulatory requirements, and provide services to a growing population.

Program actions identified in Section 5.0 also support the RDN's commitment to sustainable wastewater management.

The original LWMP followed the MOE's three stage process (MOE 1992). This LWMP amendment is a revision of the Stage 3 report. While there is no guideline specifically for an LWMP amendment, this document was prepared in accordance with the Ministry's updated guidelines for developing an LWMP (MOE 2011).

4.2 Regional Priorities

The LWMP will address the needs of community by focussing on:

- Protecting human health and the environment
- Required secondary level treatment upgrades at GNPCC and NBPCC
- Preparing for growth, specifically at GNPCC and FCPC
- Taking an integrated resource management approach to liquid waste planning
- Efficient delivery of services and management of assets
- Meaningful First Nations engagement and public consultation.

The RDN recognizes the importance of all LWMP programs and will methodically develop the programs, monitor feedback, and refine program delivery in partnership with the plan monitoring committee (discussed in Section 8.1). Emerging issues (discussed in Section 6) will be monitored and addressed as new technologies, standard practices, and grant funding become available.

4.2.1 Protect Human Health and the Environment

We will manage our liquid waste and rainwater resources in a manner that protects human health and the environment, and future generations' access to those resources.

4.2.2 Secondary Upgrades

Federal and provincial laws governing wastewater management require us to achieve a standard level of wastewater treatment that can be achieved through secondary wastewater treatment. Currently, GNPCC and NBPCC provide chemically-enhanced primary treatment and must be upgraded in the upcoming years⁸.

Through the LWMP Amendment, the RDN is requesting an extension to the timeline for secondary treatment upgrades at GNPCC and NBPCC.

4.2.3 Preparing for Growth

GNPCC and FCPC are reaching their capacity and must be expanded to accommodate growth in the service areas. Preparing for growth, both through DCC collection and capital projects, is a priority for RDN LWMP.

4.2.4 Integrated Resource Management

We will take an integrated resource recovery approach to liquid waste planning. Our decisions will consider potential energy generation, water conservation and reuse, nutrient recovery, greenhouse gas and odour emissions.

We recognize that water is a shared and interconnected resource, and our waste management decisions affect our neighbours and the water resources we all rely upon. The RDN commits to managing our water resources in an integrated manner.

⁸ According to the federal Wastewater Systems Effluent Regulations (WSER), existing wastewater treatment facilities must be upgraded to provide secondary treatment by 2020, 2030, or 2040 based on criteria defined in Schedule 2 of that regulation. According to the WSER, secondary treatment at GNPCC must be provided by 2030 and secondary treatment at NBPCC must be provided by 2040.

4.2.5 Efficient Services and Asset Management

Statistics Canada stated that wastewater treatment facilities were among the oldest category of infrastructure in Canada and were past 63% of their useful life in 2007 (Gagnon et al. 2008). As such, many Canadian municipalities are challenged with the need to invest in wastewater infrastructure while maintaining affordable rates.

The RDN is committed to delivering affordable and efficient services to its residents and responsibly managing wastewater infrastructure. We will perform preventative and corrective maintenance, and replace infrastructure when necessary to optimize life expectancy and system performance. To maximize efficiency, the RDN will consider lifecycle costs, resource consumption, ease of operation, adaptability, and worker safety. Capital assets will be designed and managed for the long term.

4.2.6 Meaningful Engagement and Consultation

Under the Community Charter and *Local Government Act*, a local government must seek electoral approval (i.e. hold a referendum) to borrow for capital works. However, an LWMP gives the public an opportunity to provide input with respect to the development of the LWMP and financing of the proposed projects. Therefore, the *Environmental Management Act* considers the need for electoral approval to be fulfilled if a local government can demonstrate that the public was adequately consulted during the LWMP development stage. There is no mechanism to appeal an LWMP once approved by the Minister of Environment. For those reasons, meaningful public consultation during plan development is essential.

4.3 Public Consultation

The Board approved the RDN's LWMP Review Public Consultation Plan in March 2008 and an updated Consultation Plan in July 2013. The plans were available on the RDN website throughout the update process. The following sections summarize the RDN's involvement with the community and First Nations during development of the LWMP.

4.3.1 Regional Liquid Waste Advisory Committee

The LWMP was updated in consultation with the RLWAC, a committee that fulfills the roles of the technical, local advisory and monitoring committees as described by the MOE guidelines. The Terms of Reference for the RLWAC are provided in Appendix E.

The RLWAC played a key role in public consultation since community, environmental, and business stakeholders and First Nations were invited to sit on the committee and have direct input into the LWMP decision-making process. RLWAC meetings were also open to the public and meeting minutes were available on the RDN website and upon request. The RLWAC includes individuals representing the following:

- RDN Board (elected officials representing the municipalities and electoral areas)
- Municipal utility managers
- RDN residents
- Local businesses
- Resident First Nations
- Environmental organizations (Georgia Strait Alliance)
- Ministry of Environment
- Island Health (formerly Vancouver Island Health Authority)
- Environment Canada.

Fisheries and Oceans Canada declined the invitation to join the committee.

A list of RLWAC members is included in Appendix E. The RLWAC met on 19 occasions between February 2008 and January 2014 to evaluate options and issues related to the updated LWMP and wastewater management in the RDN. Information presented to the RLWAC included a background of Wastewater Treatment Basics and ten discussion papers, attached in Appendix B. Discussion Papers included:

- Discussion Paper 1: Review of Existing Conditions
- Discussion Paper 2: On-site Treatment Issues

- Discussion Paper 3: Policies Regarding New Communities and Developer Installed Treatment Plants
- Discussion Paper 4: Current Flows and Loads, Effluent Quality and Treatment Plant Capacities
- Discussion Paper 5: Source Control Program
- Discussion Paper 6: Options for Secondary Treatment Processes
- Discussion Paper 7: Cost Estimates of Upgrading/Expanding Treatment Capacity
- Discussion Paper 8: Integrated Resource Management Opportunities for the Regional District of Nanaimo
- Discussion Paper 9: Servicing Rural Areas
- Discussion Paper 10: Volume Reduction in Sanitary Sewers.

The RLWAC commented on discussion papers, reports, draft LWMP chapters and other issues as they emerged through the review process. Input from the RLWAC was recorded in the minutes and incorporated into the LWMP update. Meeting minutes are attached in Appendix E.

4.3.2 Public Consultation

Public Consultation provided an opportunity for all members of the RDN community to learn about and provide input towards the LWMP amendment. The RDN followed the updated Consultation Plan and created a comprehensive framework to provide a range of opportunities for the RDN public to participate directly in the LWMP amendment process. Through the widespread advertising and information campaign, the RDN was able to reach every household within regional boundaries at least once to inform residents of the LWMP amendment. Pathways for information distribution and feedback included:

- Engagement through an Advisory Committee
- LWMP Website
- LWMP public consultation mail-out (delivered to every RDN household)
- LWMP factsheets
- Distribution of the Draft LWMP Amendment
- Public meetings
- Survey
- Mail-out to Nanoose Bay Service Area residents
- Feature article in the Electoral Area Updates
- Meetings with other levels of government
- Advertising.

The public was invited to respond in person during public meetings, via phone, and through the survey, email, and standard mail. Through the widespread advertising and information campaign, the RDN was able to reach every household within regional boundaries at least once to inform residents of the LWMP amendment. To date, 1,036 people participated in LWMP events. Feedback trends are summarized below and incorporated into Section 5 of the plan. Detailed comments from residents and stakeholders are documented in a separate Consultation Summary Report.

Public Wastewater Systems Program

Program feedback included:

- In areas without sewer, sewer is generally desired where the lots are small. Sewer is not deemed necessary or feasible on large acre properties.
- Costs to connect to sewer, should it become available, should be comparable to replacing a septic system (\$20,000-\$30,000)
- The cost to connect to sewer is too expensive for some residents
- Some residents feel they should not have to connect to sewer if their septic system is working.

Based on public feedback, this program was updated to improve public awareness of areas which may connect to RDN sewer systems for health and environmental reasons (failing onsite system) and create a guide which walks homeowners through the sewer connection application process.

Private Onsite Systems Program

Program feedback included:

- Among residents with onsite systems, there is some concern of neighbours with failing onsite systems and the effects on the environment and groundwater
- There is limited desire for the RDN to adopt regulatory role regarding onsite systems
- There was some desire for the RDN to regulate and limit properties on pump and haul
- There is a broad perception that VIHA does not respond to complaints made regarding failing onsite systems.

The program as proposed for consultation meets public expectations.

Source Control Program

Program feedback included:

- There was a long list of suggestions for partners and pollution prevention targets
- Many residents are interested in receiving more education related to source control. Suggested ways to deliver the information included columns in the Regional Perspectives, regular newspaper ads, financial incentives, and mailed information.
- A source control program will require bylaw enforcement to be most effective.

Based on public input, the RDN will continue as planned to review the Source Control Bylaw and consider mechanisms for bylaw enforcement. The RDN will also develop public education material to support initiatives under this program.

Rainwater Management / Drinking Water & Watershed Protection Program

Program feedback included:

- There was a strong interest in this topic among public meeting participants, particularly around rainwater harvesting, developing building specifications, and erosion control (particularly for steep areas)
- Many residents are concerned about the effect of upstream land use and development and the potential effects on their groundwater and the quality and quantity of water in nearby watercourses.

Based on public input, the RDN will continue to implement water education and incentive programs and programs under the Drinking Water and Watershed Protection Program. The RDN will implement a new Water Conservation Plan and refine the Water Budget Study to assist in land use and development decisions.

Odour Control Program

Program feedback included:

- Greater Nanaimo Pollution Control Centre and Duke Point Pollution Control Centre generally do not emit nuisance odours
- Odours from Nanoose Bay Pollution Control Centre are noticeable, but not a nuisance yet
- Odours from French Creek Pollution Control Centre are a significant nuisance to neighboring residents
- When asked to share ideas about tolerable levels of odours, many residents replied that no amount of odours is acceptable in residential areas. Others recognized that there is a significant cost associated with odour control and there must be a balance between investing in odour-controlling infrastructure and dealing with a moderate amount of odours.

The program as proposed meets public expectations. This program already considers odour control upgrades during capital projects.

Volume Reduction Program

Program feedback included:

- There was support for RDN workshops and educational information
- There was a strong interest in, and support for, greywater reuse as a way to conserve water.

Based on public input, this program was updated to commit the RDN to working with provincial regulators to provide the RDN public with information around opportunities for greywater reuse, as supported by the BC Building Code and provincial regulations.

Inflow and Infiltration Program

Program feedback included:

- Most people were unaware of what inflow and infiltration are and the problems they cause
- Most people expressed a willingness to reduce private property inflow and infiltration if they were provided enabling tools such as increased education and financial incentives.

Based on public input, this program was updated to develop public education material to increase awareness around inflow and infiltration. The RDN will also consider providing tools (guidebook and incentives) to enable residents to reduce private property inflow and infiltration.

Pollution Control Centres Program

Program feedback regarding the secondary treatment upgrades at Greater Nanaimo Pollution Control Centre and Nanoose Bay Pollution Control Centre varied widely. Feedback trends included:

Secondary Treatment

- Residents appreciate the value of protecting a “shared environment”
- Many residents support an earlier upgrade timeline because:
 - They felt that costs go up the longer you wait due to inflation and the rising costs of construction
 - It is better for the environment
- Many residents support a later upgrade timeline because:
 - It allows more time to secure provincial and federal grant funding
 - It represents the lowest tax increase
- Regardless of the date proposed, many residents felt that the project should be completed as soon as provincial and federal grant funding were secured but that support for early upgrade was contingent upon securing grant funding.

Greater Nanaimo Pollution Control Centre

When the RDN population was asked for their preference for timing options for secondary treatment at GNPCC (based on 103 responses),

- 32% preferred Option 1: 2016
- 30% preferred Option 2: 2018
- 38% preferred Option 3: 2019.

Considering the response of only residents who would pay for the project (GNPCC service area) (based on 33 responses),

- 21% preferred Option 1: 2016
- 30% preferred Option 2: 2018
- 49% preferred Option 3: 2019.

On average, there was greatest support during public consultation for completion of secondary treatment at GNPCC by 2018. The proposed secondary treatment date for GNPCC reflects public input and average preferences.

Nanoose Bay Pollution Control Centre

When the RDN population was asked for their preference for timing options for secondary treatment at NBPCC (based on 101 responses),

- 40% preferred Option 1: 2020
- 30% preferred Option 2: 2025
- 30% preferred Option 3: 2030.

Considering the response of only residents who would pay for the project (NBPCC service area) (based on 35 responses),

- 60% preferred Option 1: 2020
- 11% preferred Option 2: 2025
- 29% preferred Option 3: 2030.

On average, there was greatest support during public consultation for completion of secondary treatment at NBPCC by 2023. The proposed secondary treatment date for NBPCC reflects public input and average preferences. As well, the Nanoose Bay Service Area mail-out was done in response to feedback from the public meeting.

French Creek Pollution Control Centre

When discussing the expansion plans for French Creek Pollution Control Centre, there was a general concern from French Creek residents that expansion would increase odour problems.

Resource Recovery Program

Program feedback included:

- Most people strongly supported economically viable resource recovery programs in the RDN
- There was support for the potential Hammond Bay Elementary district heating project and others like it.

As supported by public feedback, the RDN commits to completing a Resource Recovery Opportunities Study.

Biosolids Program

Program feedback included:

- Biosolids reuse is a great idea, so long as storage and application areas were kept away from them due to the concern about potential effects on groundwater quality
- Residents were curious about the possibility to generate revenue from the sale of biosolids.

Based on public feedback, the RDN will develop material to increase awareness of precautions taken to prevent impacts to groundwater from the storage and application of biosolids.

4.3.3 First Nations Engagement

The LWMP amendment represents an important milestone in an ongoing process of engagement with First Nations related to liquid waste management. We will continue to engage First Nations to provide ongoing opportunities to identify adverse impacts as planning and implementation moves forward in the coming months and years.

The province of British Columbia has a duty to consult with First Nations whenever it considers a decision that has the potential to affect aboriginal interests or treaty rights. For the LWMP amendment, the province has delegated procedural aspects of First Nations consultation to the RDN. To engage First Nations in a respectful and meaningful way, the RDN have provided a range of opportunities for First Nations to meet, engage, and participate directly with the RDN and others in the liquid waste management planning process. Where feasible, input was incorporated into the planning and decision-making process.

In 2010, the Province updated their First Nations consultation policy (Province of British Columbia 2010) and developed the Consultative Areas Database (CAD) Public Map Service to help proponents such as the RDN determine First Nations groups with potential aboriginal interests within the project boundaries. Accordingly, the RDN referenced the Province's updated procedures and performed a CAD query which identified the following groups (Province of British Columbia 2011):

- Cowichan Tribes
- Ditidaht First Nation
- Halalt First Nation
- Hul'qumi'num Treaty Group
- Hupacasath First Nation
- K'omoks First Nation
- Laich-kwil-tach Treaty Society
- Lake Cowichan First Nation
- Lyackson First Nation
- Nanwakolas First Nations Referrals Office
- Penelakut Tribe
- Qualicum First Nation
- Semiahmoo First Nation
- Sliammon First Nation

- Snaw-naw-as First Nation
- Snuneymuxw First Nation
- Stz'uminus First Nation
- Te'Mexw Treaty Association
- Tseshah First Nation
- Wei Wai Kum First Nation
- We Wai Kai Nation
- Xwemalhwu (Homalco) First Nation.

First Nations engagement included:

- Involvement in the RLWAC
- Introductory letters and information package delivered directly to the First Nations listed above
- Follow up letters and/or conversations, as required
- Minimum 60 day information package review period
- Meeting with First Nations, upon request, to share information and consider accommodation
- Access to information and feedback through the public consultation process listed in Section 4.3.2.

The RDN invited feedback from First Nations at RLWAC meetings, through mail, phone, e-mail, and from conversations during information meetings. To date, First Nations have not identified specific LWMP-related impacts. Therefore, specific accommodation was not discussed during engagement activities. Snuneymuxw First Nation and the RDN intend to engage in further dialogue related to the Treaty of 1854 and marine resources. Progress towards First Nations engagement is detailed in a separate First Nations Engagement Progress Report and incorporated into Section 5 of the plan.

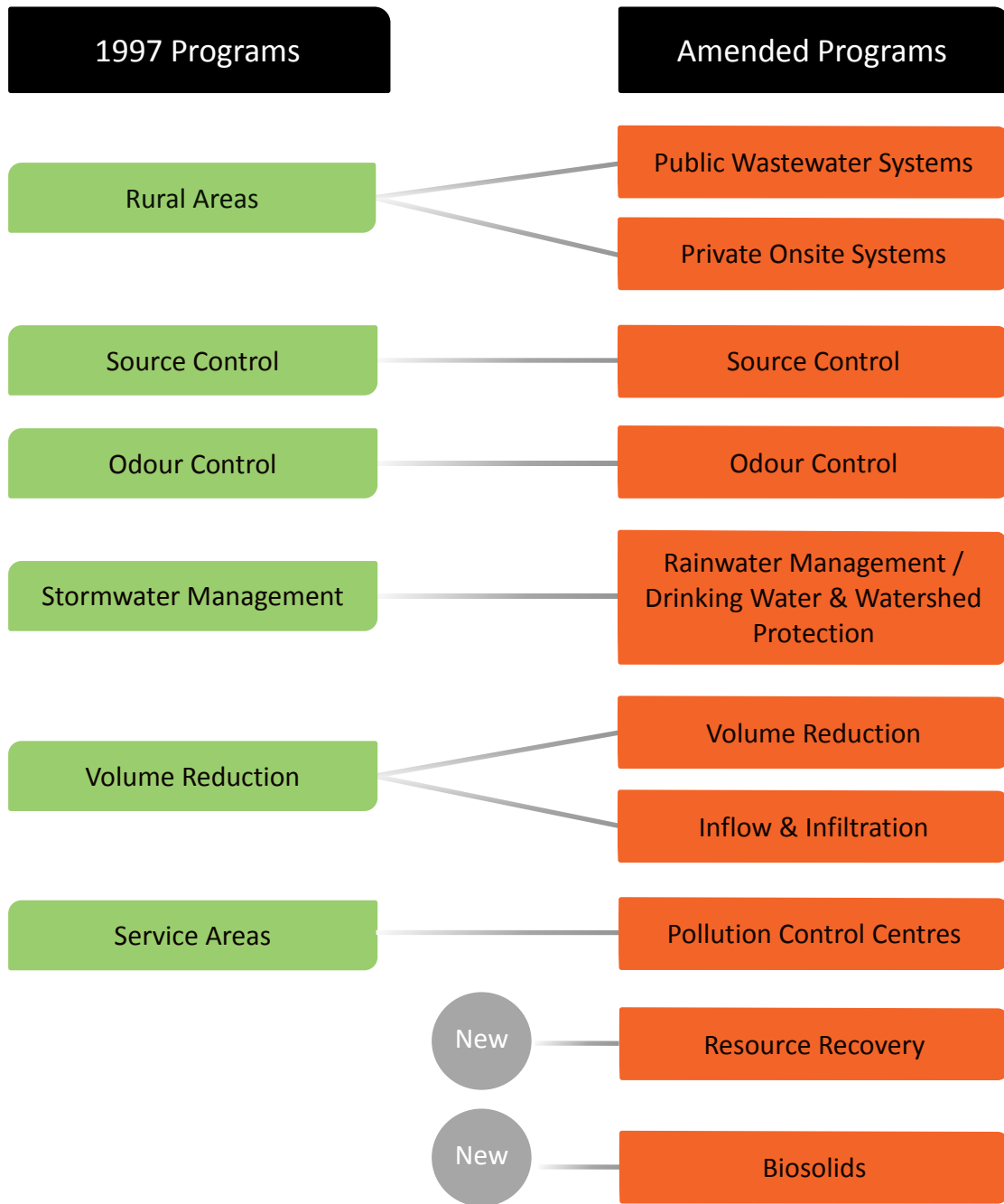
5.0 Updated Programs

During the amendment process, the original six programs were expanded, as shown in Figure 3. As well, the Biosolids Program and Integrated Resource Recovery Program were added to guide the beneficial reuse of waste resources. Biosolids management and resource recovery are not new to the RDN; however, there was no LWMP program for biosolids or resource recovery in the past. MOE guidelines recommend inclusion of these management components (MOE 2011); therefore, they were added to the amended LWMP.

The program format models the RDN's Environmental Management System with the use of objectives, targets, and actions. Objectives are the long range goals (20 years) for a program designed to meet the intent of the MWR and align with the initiatives defined in Table 1. Targets are ten-year commitments that measure progress towards the objectives. Actions are incremental strategies designed to achieve the target.

Actions will be reviewed annually and refined as necessary under the guidance of a plan monitoring committee (described further in Section 8.0) to achieve objectives of the program. Annual review and refinement will provide the flexibility to sustainably manage wastewater and respond to changes such as the pace of development, technical issues, study results, regulatory changes, and availability of funding and grants. Anticipated dates for delivery of program commitments are provided in Section 7.

Figure 3. LWMP Amendment Program Topics



5.1 Public Wastewater Systems Program

During the LWMP amendment process, the RLWAC decided the RDN should continue pursuing opportunities to establish public wastewater systems for properties in growth containment boundaries and for properties adjacent to growth containment boundaries with failing private onsite systems, as consistent with OCPs and the Regional Growth Strategy. Community wastewater systems may be provided if the full cost of service provision is paid by property owners. Public Wastewater Systems Program objectives, targets, and actions are summarized in Table 2.

Table 2. Public Wastewater Systems Program Commitments

OBJECTIVES

1. Address OCP goals of providing wastewater services in growth containment areas
2. Reduce the threat to human and environmental health from failing onsite systems

TARGETS

The RDN will:

1. Establish a strategy to provide wastewater servicing in growth containment areas
2. Establish a strategy to accept new connections to existing public wastewater infrastructure for properties adjacent to growth containment areas with failing private onsite systems

ACTIONS

1. Establish a strategy to achieve wastewater servicing in growth containment areas:
 - i. A study to identify Village Centres with the development potential to warrant an investment in wastewater infrastructure (completed 2013)
 - ii. Complete sewer servicing engineering studies for Bowser and Cedar villages
 - iii. Coordinate with Development Services through the OCP review process to identify property owners in growth containment boundaries who are interested in establishing public wastewater services
2. Establish a strategy to achieve wastewater servicing for properties with failing private onsite systems:
 - i. Draft a bylaw to allow properties with failing onsite systems to connect to sewer services, where available
 - ii. Improve public awareness of areas which may connect to RDN sewer systems for health and environmental reasons (failing onsite system) and create a guide which walks homeowners through the sewer connection application process
 - iii. Work with property owners, as needed, in locations where there are known onsite system failures to establish connections to public wastewater infrastructure
 - iv. Develop a webpage to inform the public of historic sewer servicing studies and of the criteria for the provision of future sewer services.

5.2 Private Onsite Systems Program

The Private Onsite Systems Program addresses the need to improve the condition of failing privately owned onsite systems. The Private Onsite Systems Program applies to systems covered under the Sewerage System Regulation (SSR) including privately owned and maintained Type 1, Type 2 and Type 3 onsite wastewater treatment systems. It may also apply to privately-owned holding tanks (using pump and haul services).

The Sewerage System Practice Manual recommends that Type 1 septic tanks be monitored every two years and pumped out regularly (generally three to five years) depending on household occupancy and tank volume. The manual also recommends that Type 2 and 3 systems be monitored annually or semi-annually and maintained by an authorized person according to the maintenance plan (British Columbia Onsite Sewage Association 2007). However, the SSR currently does not have a process in place to actively inform residents of the minimum maintenance requirements or to incent adherence to those recommendations. For those reasons, the RDN initiated a study in 2011 (using a Ministry of Community Services Infrastructure Planning Grant) to examine the feasibility of establishing a mandatory maintenance program for onsite systems. Results of that study will contribute to development of the Private Onsite Systems Program. The Private Onsite Systems Program objective, targets and actions are summarized in Table 3.

Table 3. Private Onsite Systems Program Commitments

OBJECTIVE
Protect the environment and human health from failing private onsite systems
TARGETS
The RDN will:
1. Enhance the SepticSmart education program content to encourage regular onsite system maintenance with the intent of prolonging the life of functioning systems and reducing the number of failing systems
2. At the request of the owner, allow RDN acquisition of privately owned onsite systems which serve a minimum of 60 parcels
3. Limit holding tanks in the RDN
ACTIONS
1. Enhance SepticSmart education program content:
i. Annually review the SepticSmart education program; update where necessary
ii. Enhance the source control component of the SepticSmart program (complete 2013)
iii. Work with VIHA and Water Services to develop area-specific communications or newsletters for areas at high risk for groundwater contamination
iv. Host at least four SepticSmart education workshops annually
v. Evaluate the potential for a mandatory onsite system maintenance program in the RDN (complete 2013)
2. Work with Development Services to adopt draft changes to Land Use and Subdivision Bylaw (No. 500) which would enable the RDN to acquire privately-owned onsite systems serving at least 60 parcels, if petitioned
3. Limit holding tanks in the RDN:
i. Review and revise the Pump & Haul Local Service Establishment Bylaw (No. 975) and the Sewage Disposal Regulation Bylaw (No. 1224) so only grandfathered properties and properties with failed onsite systems qualify for the septage receiving rate reduction
ii. Work with VIHA and Building Inspection Services to limit holding tanks on new developments.

5.3 Source Control Program

Source control is an economical and effective way to limit what pollutants get put down the drain. Such limits improve the quality of wastewater entering the system and subsequently improve the quality of effluent and biosolids produced after treatment. It can also protect the health and safety of the environment, the public, and RDN employees. Discussion Paper 5 (included in Appendix B) evaluated three options for the updated LWMP: 1) abandon the program, 2) maintain status quo or 3) improve the program.

The discussion paper concluded that the RDN should continue the program with minor improvements such as:

- Partnerships with other RDN departments and organizations to promote source control in the RDN
- Partnerships with the municipalities and other jurisdictions to establish a streamlined approach to source control.

The RDN will build on past successes and continue updating and delivering the source control program, which is delivered mainly through the Sewer Use Regulatory Bylaw (No. 1225) and public education programs. The Source Control Program objective, targets and actions are summarized in Table 4.

Table 4. Source Control Program Commitments

OBJECTIVE

Reduce contaminants at the source to improve the quality of influent, effluent and biosolids

TARGETS

The RDN will:

1. Enhance regional source control through a single unified bylaw similar to the Sewer Use Regulatory Bylaw (No. 1225) or through consistent municipal bylaws
2. Enhance the education and outreach strategy, as required
3. Monitor wastewater influent

ACTIONS

1. Enhance regional source control:
 - i. Work with the municipalities to develop similar source control bylaws or adopt a single bylaw
 - ii. Amend the Trucked Liquid Waste Disposal Bylaw (No. 988) to allow marinas to apply for reduced holding tank waste disposal rates if they provide free pump-out services to discourage marine dumping
 - iii. Work with municipalities, marinas, and/or harbour authorities to accept wastewater from marine vessels as opportunities arise
2. Enhance the public education and outreach strategy:
 - i. Collaborate with other RDN departments to promote pollution prevention strategies
 - ii. Liaise with other local governments to share source control strategies
 - iii. Promote source control through the SepticSmart program
 - iv. Encourage green boating practices
 - v. Target the outreach program on RDN residents, medical clinics, the hospital, and businesses to address pharmaceuticals, personal care products, organics, fat, oil, grease, and I&I
 - vi. Partner with RDN community members with an interest in promoting source control (e.g. non-governmental organizations; local stewardship groups)
 - vii. Consider publishing regular articles (e.g. newspaper or Regional Perspectives) promoting source control
 - viii. Update the RDN website information on source control
3. Monitor wastewater influent:
 - i. Monitor influent and biosolids quality and review discharge permits to assess potential contaminant sources
 - ii. Work with RDN Bylaw Services to provide enforcement as needed.

5.4 Odour Control Program

Odours refer to nuisance odours emitted by wastewater treatment facilities and associated interceptors, pump stations, outfalls, and other RDN wastewater collection and treatment infrastructure. Odour is managed at all wastewater facilities. The RDN will consider additional chemical and technological tools as they are required and will incorporate odour control infrastructure into the design phase of future capital works projects. The Odour Control Program objective, targets and actions are summarized in Table 5.

Table 5. Odour Control Program Commitments

OBJECTIVE

Reduce nuisance odours from RDN wastewater infrastructure

TARGETS

The RDN will:

1. Maintain and upgrade equipment so fewer than ten nuisance odour complaints are made per facility per year
2. Investigate, document, and respond to odour complaints within 24 hours

ACTIONS

1. Maintain and upgrade equipment:
 - i. Continue using current odour control measures and consider new control technologies as required
 - ii. Address odour at Bay Ave Pump Station (Completed 2011)
 - iii. Replace biofilter media at GNPCC and FCPCC (completed 2011 & 2012)
 - iv. Reverse the air flow through the trickling filter at FCPCC (completed 2012)
 - v. Install ion generators at Hall Road and Chase River Pump Stations (completed 2011 & 2012)
 - vi. Review the odour management system at GNPCC to identify potential improvements (completed 2013)
 - vii. Complete improvements to the odour management system at the NBPCC outfall manhole
 - viii. Incorporate odour controls into the design phase of future capital works projects including upgrade of GNPCC, NBPCC and expansion of FCPCC
 - ix. Seek resident input before upgrading or expanding facilities
2. Investigate, document, and respond to odour complaints within 24 hours.

5.5 Rainwater Management / Drinking Water & Watershed Protection Program

Rainwater management, often referred to in the past as stormwater management, refers to the management of precipitation and associated strategies to protect the health of watersheds and maintain a pre-development water balance. The RDN utilizes a wide range of management tools for rainwater, through strategic planning, Regional Growth Strategy, Official Community Plans, infrastructure engineering standards and the LWMP. Our commitments provide a methodology to move through planning, development and implementation of an effective integrated rainwater management program.

In 2008, the RDN implemented the Drinking Water and Watershed Protection (DWWP) service. This program is the foundation of our rainwater management commitments under the LWMP. The DWWP Action Plan may be found in Appendix F.

Sewer service areas in the RDN do not have combined sanitary-and-storm sewer systems. Storm sewers are owned and maintained by member municipalities. The City of Nanaimo, District of Lantzville, City of Parksville, and Town of Qualicum Beach are responsible for stormwater management within municipal boundaries and the Ministry of Transportation and Infrastructure is responsible for stormwater management on highways. Still, the RDN permits land development and therefore has a responsibility to manage rainwater. The Rainwater Management Program will focus on execution of the DWWP Action Plan, and on rainwater education and coordination throughout the region and rainwater planning in the electoral areas. Program objective, targets, and actions are summarized in Table 6.

Table 6. Rainwater Management / Drinking Water & Watershed Protection Program Commitments

OBJECTIVES

1. Use of rain as a resource
2. Promote the maintenance of hydrologic function
3. Protect the quality of water

TARGETS

The RDN will:

1. Develop a regional strategy on rainwater management in coordination with member municipalities
2. Implement rainwater management initiatives as detailed in the Drinking Water & Watershed Protection Action Plan

ACTIONS

1. Develop a regional strategy on rainwater management
 - i. Collaborate with Development Services, Water Services, Energy & Sustainability Services, and member municipalities to create a Rainwater Management Plan
 - ii. Liaise with other local governments to share rainwater management strategies
 - iii. When developing the plan, consider subdivision development standards (i.e. low impact development principles, green infrastructure policies, erosion and control standards, onsite rainwater management, watercourse protection, and wetland protection) and non-point source control (i.e. runoff pollution)
 - iv. Support Building Code changes that remove barriers to rainwater harvesting
 - v. Subject to Board approval of the Rainwater Management Plan, Wastewater Services and Water Services will coordinate the plan, administer the budget, and oversee collaboration with other departments and jurisdictions
 - vi. Establish watershed performance targets and standards to mitigate the impacts of land development

2. Implement rainwater management initiatives under the Drinking Water & Watershed Protection Action Plan:
 - i. Develop a regional Water Budget to increase our understanding of ground and surface water resources
 - ii. Monitor water quality in selected streams to study the impact of land use on watershed health (e.g. Community Watershed Monitoring)
 - iii. Monitor the impacts of climate change on hydrology in the RDN to identify flood risks
 - iv. Continue to implement the seven programs detailed in the DWWP Action Plan including integrated watershed management planning
 - v. Implement the Water Conservation Plan
 - vi. Refine the Water Budget Study to assist in land use and development decisions
 - vii. Continue to provide water education, incentive programs and watershed monitoring partnerships.

5.6 Volume Reduction Program

The MWR requires that dischargers must not overflow⁹ during storm or snowmelt events with a less than 5-year return period. To date, the RDN has never overflowed under such situations. Still, the RDN will undertake a review of the potential for overflows and develop an appropriate strategy to eliminate them. Further measures to reduce the potential to overflow include capital upgrades (e.g. pump station upgrades, increasing outfall capacity), measures

⁹ A municipal wastewater collection system overflow is defined by the MWR as a discharge from a municipal wastewater collection system to a location other than a wastewater facility, commonly referred to as a sanitary sewer overflow

taken manage flows through the Environmental Management System, and commitments within the LWMP Volume Reduction Program (this section) and the LWMP Inflow and Infiltration Program (next section).

The Volume Reduction Program promotes potable water conservation. Reducing potable water consumption i) is supported by the Regional Growth Strategy, ii) results in less water entering public wastewater systems and iii) lowers the cost to treat wastewater. The RDN will continue to address volume reduction through public education and incentives. The Volume Reduction Program objective, targets, and actions are summarized in Table 7.

Table 7. Volume Reduction Program Commitments

OBJECTIVE

To reduce wastewater production by promoting water conservation measures

TARGETS

The RDN will:

1. Promote a reduction in per capita water consumption
2. Reduce water consumption in RDN buildings and wastewater
3. Eliminate sanitary sewer overflows

ACTIONS

1. Reduce per capita water consumption:
 - i. Promote water conservation incentives like low-flow toilet rebates (complete 2009-2013)
 - ii. Work with provincial regulators to provide public with information around opportunities for greywater reuse, as supported by the BC Building code and provincial regulations
 - iii. Educate the public through free workshops and online information
 - iv. Hold semi-annual meetings with the City of Nanaimo, District of Lantzville, City of Parksville, and Town of Qualicum Beach to develop a regional volume reduction strategy
 - v. Continue to develop and implement water conservation measures through the DWWP service, with a target of reducing per capita water consumption by 25% between 2009 and 2030
2. Reduce water consumption used in RDN buildings and wastewater treatment operations
 - i. Install low-flow or dual flush toilets and other water-saving devices in RDN buildings
 - ii. Consider water efficient technology when designing infrastructure upgrades and expansion
 - iii. Promote the use of reclaimed water when practicable
3. Identify potential sources of sanitary sewer overflows and develop a strategy to eliminate.

5.7 Inflow & Infiltration Program

Inflow refers to rainwater or snowmelt that enters the sanitary sewer system from a direct stormwater connection (e.g. roof leaders, basement sump pumps, or foundation drains). Homes built before the 1970s can be major sources of inflow since building permits at the time allowed property drainage to connect to the sewer system. Infiltration refers to groundwater (marine or freshwater) that enters the sewer system. Infiltration can occur via pipeline cracks, leaky joints or deteriorated manholes. I&I is a term to collectively describe inflow and infiltration. I&I are regulated under the MWR and are measured in reference to the average dry weather flow (ADWF), the daily municipal flow to a wastewater facility after an extended period of dry weather such that I&I is minimized to the greatest extent practicable.

Inflow and infiltration are problems because they:

- Reduce capacity at the treatment plant, interceptors, forcemains, and pump stations and accelerate the need to replace and upsize infrastructure
- Have the potential to lower groundwater levels
- Can transport soil into the sewers and cause structural damage
- Can accelerate corrosion if marine waters enter the pipes
- Disrupt the treatment process by causing dramatic changes in influent volume, concentration or salinity
- Can lead to sewer overflows
- Result in increased operational and capital costs.

The RDN's wastewater infrastructure has the capacity to accommodate peak wet weather flows in excess of five times the ADWF. Historically, even under severe storm events, the RDN's infrastructure has functioned well without significant backups, flooding or overflows (Associated Engineering (B.C.) Ltd. 2001). However, the MWR requires that LWMPs address I&I reduction and the RDN has committed to work with the municipalities to develop a regional strategy to lower I&I rates to the treatment facilities in addition to reducing I&I in RDN-owned infrastructure.

Inflow and infiltration can be difficult for local governments to manage since as much as 70% or more of the inflow and infiltration volume can come from private building connections (National Guide to Sustainable Infrastructure 2003). Notably, most of the regional public collection system is owned by the City of Nanaimo, City of Parksville, District of Lantzville, or Town of Qualicum Beach. While it is not economically feasible or necessary to eliminate all inflow and infiltration into a sewer system, I&I can be managed with a cost benefit approach so dollars spent bring the best value to the community. Vapour tests (also called smoke tests) and dye tests are two simple and cost effective ways of identifying inflow. CCTV inspections and manhole inspections are two more ways of identifying I&I. Objectives, targets, and actions for the Inflow & Infiltration Program are summarized in Table 8.

Table 8. Inflow & Infiltration Program Commitments

OBJECTIVES

1. Reduce inflow and infiltration entering the wastewater collection and treatment system
2. Meet MWR standards for I&I

TARGETS

The RDN will:

1. Monitor I&I entering RDN infrastructure
2. Reduce I&I directly entering RDN owned infrastructure
3. Provide secondary treatment for flows up to 2 times ADWF and at least primary treatment for flows beyond 2 times ADWF during storm or snowmelt events with less than a 5-year return period
4. Develop a regional strategy on I&I management
5. Encourage I&I reduction on private land through public education

ACTIONS

1. Monitor I&I entering RDN infrastructure:
 - i. Set up an I&I monitoring function for GNPCC and FCPCC in FlowWorks (flow monitoring system)
 - ii. Evaluate flow data to understand system reaction to rainfall and high flow events
 - iii. Use CCTV to inspect GNPCC and FCPCC interceptors on a 5-year cycle
 - iv. Maintain and install flow meters and rainfall gauges as needed

2. Reduce I&I into RDN owned infrastructure:
 - i. Repair manholes as needed; perform regular maintenance of interceptors
 - ii. Investigate grant funding opportunities (e.g. Gas Tax Fund) for infrastructure rehabilitation
3. Design upgrades to RDN infrastructure so flows up to 2 times ADWF will receive secondary treatment and all flows in excess of this amount will receive primary treatment
4. Develop a regional strategy on I&I management:
 - i. Hold semi-annual meetings with the municipalities to develop regional monitoring and reduction targets for inflow and infiltration
 - ii. Share flow and rainfall data with municipalities
 - iii. Consider requiring replacement or disconnection of private laterals when granting demolition permits
 - iv. Consider providing municipal or regional staff to witness or perform service connections
 - v. Work with the member municipalities to continue to reduce flows due to I&I and to eliminate sewer overflows
5. Help landowners manage private property I&I:
 - i. Enhance the source control program to encourage landowners to check gutters and outside drains for connection to the sewer system, avoid planting trees and shrubs over sewer laterals, ensure basement drains and sump pumps are not connected to the sanitary sewer, and replace broken or leaky pipes located on private property
 - ii. Consider providing incentives to enable residents to reduce private property I&I.

5.8 Pollution Control Centres Program

Greater Nanaimo Pollution Control Centre

Asset management (outfall replacement) and secondary treatment upgrades are both priorities for GNPCC.

Between 2009 and 2012, the GNPCC outfall that discharges to the Strait of Georgia experienced 11 breaks in the marine and intertidal sections even though the outfall was designed to last until 2040. The RDN repaired all but the three deepest breaks, which are difficult and expensive to repair. Replacement, though not planned in the 1997 LWMP, must be addressed as it contravenes our discharge permit. Since 2010, the RDN has been investigating options for rehabilitation and replacement of the outfall (AECOM 2010c; AECOM 2011b). The RDN has recently committed \$18 million to replace the GNPCC effluent outfall by 2015. For more information, refer to Section 7.3.1.

The 1997 LWMP projected that GNPCC would be upgraded to provide secondary treatment by 2015. Secondary treatment at GNPCC is estimated to cost those in the Greater Nanaimo Sewer Service Area \$61.8 million (2012 dollars). Over the last decade, the RDN has prepared the facility for major expansion and upgrades (refer to Section 3.6). However, with the additional need to also replace the outfall the RDN is proposing to amend the date for completion of secondary treatment to reflect the increased cost and complexity and manage the resulting tax burden.

For that reason, the RDN consulted the public on three secondary upgrade timeline options: 2016, 2018, and 2019. Feedback generated through consultation is summarized in the separate Public Consultation Summary Report.

Based on an evaluation of technical, environmental, social and economic considerations (see Appendix G) and results of public consultation, the RDN is requesting to amend the LWMP to provide secondary treatment at GNPCC by 2018.

This date was recommended because it:

- Was supported by public feedback
- Provides reasonable time to address technical, environmental, social and economic considerations
- Meets provincial and federal requirements within a reasonable timeframe
- Aligns well with completion of the outfall project
- Provides time to collect funds to complete the project

- Provides time to apply for grant opportunities
- Aligns with the timing for major treatment upgrades by Metro Vancouver and the Capital Regional District.

French Creek Pollution Control Centre

Capital projects planned for FCPCC include the replacement of existing works as well as the expansion of the plant to accommodate population growth.

Nanoose Bay Pollution Control Centre

It is a priority of the RDN to provide secondary treatment at NBPCC in a manner that considers the capacity of residents to fund the proposed upgrades as well as the environmental impacts of the primary plant in comparison to other municipal wastewater treatment facilities. Secondary treatment at NBPCC, without solids handling, is estimated to cost those in the Nanoose Bay Sewer Service Area an estimated \$4.1 million (2012 dollars).

The RDN funds services based on a user pay principle by establishing service area bylaws. This means that the entire cost of upgrading the NBPCC must be borne by residents living in the service area. The approved 1997 LWMP contemplated an upgrade from primary to secondary treatment by 2010. This timeline was not met since projected growth and service area expansion to a NBPCC population of 6000 did not occur. Instead, NBPCC currently serves a population of approximately 1,350, resulting in too few residents in the service area to support the additional tax.

For those reasons, the RDN consulted the public on three secondary upgrade timeline options: 2020, 2025 and 2030 for NBPCC. Feedback generated through consultation is summarized in the separate Public Consultation Summary Report. Based on an evaluation of technical, environmental, social and economic considerations (see Appendix G) and results of public consultation, the RDN is requesting to amend the LWMP to provide secondary treatment at NBPCC by 2023.

This date was recommended because it:

- Was supported by public feedback
- Provides reasonable time to address technical, environmental, social, and economic considerations
- Meets provincial and federal requirements within a reasonable timeframe
- Aligns well with completion of GNPCC secondary treatment
- Aligns with growth projections
- Provides time to collect funds to complete the project
- Provides time to apply for grant opportunities.

Duke Point Pollution Control Centre

No major changes are proposed for the DPPCC for the next 20 years.

The Pollution Control Centres Program manages capital upgrade and expansion projects associated with the four RDN-operated pollution control centres. Program objective, targets, and actions are summarized in Table 9.

Table 9. Pollution Control Centres Program Commitments

OBJECTIVE

Meet MWR standards and sustainably manage wastewater treatment

TARGETS

The RDN will:

1. Comply with permit or operational certificate
2. Manage assets to maintain the quality and integrity of existing infrastructure
3. Expand and provide secondary treatment at GNPCC by 2018
4. Provide secondary treatment at NBPCC by 2023
5. Expand capacity in wastewater infrastructure to respond to demands created by an increasing population
6. Develop a sewer servicing strategy for the Nanoose Bay Peninsula
7. Develop a DCC bylaw to allow new connections to use existing capacity at DPPCC
8. Review DCC plan every year and revise bylaws where necessary to fund anticipated projects

ACTIONS

1. Comply with permit or operational certificate:
 - i. Manage wastewater collection and treatment using the RDN's EMS to meet permit requirements
 - ii. Work with MOE staff to establish reasonable timelines and scope of any required receiving environment monitoring programs
2. Maintain existing infrastructure:
 - i. Update and evaluate asset management and preventative maintenance plans
 - ii. Systematically inspect, detect, and correct incipient failures
 - iii. Replace the GNPCC effluent outfall line by 2015
 - iv. Prepare an Environmental Impact Study for the GNPCC outfall
 - v. Monitor the condition of the Departure Bay forcemain
 - vi. Improve the odour management system at the NBPCC outfall manhole
3. Expand and provide secondary treatment at GNPCC:
 - i. Commission a third digester (complete 2013)
 - ii. Construct a fourth primary sedimentation tank (complete 2013)
 - iii. Upgrade the facility to provide secondary treatment by 2018
 - vii. Explore federal and provincial grant options to fund secondary treatment
4. Provide secondary treatment at NBPCC:
 - i. Upgrade the facility to provide secondary treatment by 2023
 - ii. Explore federal and provincial grant options to fund secondary treatment
5. Expand capacity at FCPCC:
 - i. Expand the treatment plant capacity

6. Work with Development Services to complete a sewer servicing strategy for Nanoose Bay:
 - i. Coordinate with Development Services through the OCP review process to identify property owners in growth containment boundaries who are interested in establishing public wastewater services
 - ii. Consider resource recovery, visual, and olfactory buffers and the number of pump stations required
 - iii. Review and update the Fairwinds sewer servicing agreement and DCC bylaw for the Nanoose Bay area
7. DCC Bylaws:
 - i. Develop a DCC bylaw to allow properties in the growth containment area to purchase capacity at DPPCC
8. Review DCC plan every year and revise bylaws when necessary to adequately fund growth-related projects
 - i. Revise DCC bylaws at GNPCC, NBPCC, and FCPCC.

5.9 Resource Recovery Program

We recognize that water is a shared and interconnected resource, and our waste management decisions affect our neighbours and the water resources we all rely upon. The RDN commits to managing our water resources in an integrated manner and will take an integrated resource recovery approach to liquid waste planning. Our decisions will consider potential energy generation, water conservation and reuse, nutrient recovery, greenhouse gas and odour emissions. Program objective, targets, and actions are summarized in Table 10.

Table 10. Resource Recovery Program Commitments

OBJECTIVE

To economically recover and utilize resources in wastewater

TARGETS

The RDN will:

1. Reduce resource consumption at wastewater treatment facilities
2. Recover resources from wastewater

ACTIONS

1. Reduce resource consumption at wastewater treatment facilities:
 - i. Complete a study to review resource recovery opportunities at RDN wastewater facilities
 - ii. Evaluate wastewater treatment operations which require energy, water, chemicals or fuel and identify activities that can be run more efficiently, if any
2. Recover resources from wastewater:
 - i. Commission a cogeneration facility for biogas recovery and energy generation at GNPCC (complete)
 - ii. Continue to beneficially use biosolids according to the Biosolids Program
 - iii. Reclaim water for use onsite in compliance with MOE guidelines (MOELP 2001)
 - iv. Discuss future opportunities for reclaimed water use with Morningstar Golf Course
 - v. Consider potential resource recovery options for new projects, particularly through process selection
 - vi. Examine opportunities for a district heating project at Hammond Bay Elementary using the GNPCC outfall
 - vii. Examine opportunities for using reclaimed water for the Fairwinds Golf Course.

5.10 Biosolids Program

Biosolids management was not a component of the 1997 LWMP; however, biosolids management is not new to the RDN. Since 1999, RDN biosolids have been beneficially used in agriculture, landfill closures, mine reclamation, and forestry. Currently, about 4,500 bulk tonnes of biosolids are produced annually by the RDN (RDN 2012a, 2012b).

In partnership with VIU and SYLVIS Environmental, RDN biosolids are applied and managed on VIU woodlot as part of the Forest Fertilization Project. Land application of biosolids is beneficial. Not only does it provide an economical alternative to disposal at the RDN landfill (in an emergency, or if biosolids do not meet OMRR requirements, biosolids can still be sent to the RDN landfill), but VIU researchers have reported a 50 to 400% increase in tree growth at the woodlot site since the application of biosolids began (Wickman 2010). As well, the RDN and partners VIU and SYLVIS Environmental won the Excellence in Management of Biosolids Award in 2013.

Safe application of biosolids is a priority for the RDN. The RDN produces, stores and applies biosolids with strict adherence to provincial regulations. Some safeguards include:

- Only sites without steep slopes are chosen for application
- A 30 m buffer between water courses is maintained
- An additional 30 m buffer is implemented around areas to which biosolids were applied in the previous year to ensure no overlap of application areas
- Stockpile sites have been carefully chosen to ensure regulatory compliance, and are a minimum of 15 m from any permanent watercourse
- Clear signage and communication with local user groups.

The VIU woodlot is a popular area for outdoor recreation, particularly mountain biking. Each year, biosolids are applied to approximately 50 hectares of the woodlot's total 1,073 hectares. Before biosolids applications, the RDN, SYLVIS and VIU provide maps to the Nanaimo Mountain Bike Club, indicating where biosolids will be applied. Signs are also posted at application sites to notify the public where biosolids have been applied. The signs are designed according to criteria set out in the OMRR.

The Biosolids Program objective, targets and actions, are summarized in Table 11.

Table 11. Biosolids Program Commitments

OBJECTIVE

Continue producing and beneficially using biosolids

TARGETS

The RDN will:

1. Produce, at minimum, Class B biosolids
2. Enhance the biosolids-based education and outreach program

ACTIONS

1. Produce, at minimum, Class B biosolids:
 - i. Develop a Biosolids Management Plan to assess options for the beneficial use of RDN biosolids, including land application, energy generation, and other possible resource recovery strategies (completed in 2011)
 - ii. Improve the quality of biosolids through upgrades to wastewater treatment infrastructure and innovative technologies and techniques (i.e. decrease volatile solids content and pathogen concentrations)
 - iii. Monitor and report biosolids quality according to operational certificate/discharge permit and OMRR
 - iv. Establish a contingency plan for temporary storage or application of biosolids if the VIU site is not useable

2. Expand biosolids-based education and outreach activities targeted at RDN residents:
 - i. Develop and distribute information on source control in order to improve biosolids quality
 - ii. Develop material to increase awareness of precautions taken to ensure the storage and application of biosolids do not negatively impact groundwater
 - iii. Continue working with local user groups to communicate plans for biosolids application areas
 - iv. Provide educational material and outreach at open houses and other events.

6.0 Emerging Issues

The RDN recognizes that new issues may emerge from innovations in water quality monitoring and from an evolving regulatory environment. Regarding the emerging issues listed below, the RDN will keep informed of current research and continue implementing strategic initiatives to improve effluent quality and the health of the receiving environment.

6.1 Shellfish Harvesting Areas

The Canadian Shellfish Sanitation Program (CSSP) is a federal food safety program, jointly administered by the Canadian Food Inspection Agency, Environment Canada, and Fisheries and Oceans Canada (DFO). The purpose of the program is to provide assurance that bivalve molluscan shellfish (e.g. mussels, oysters, and clams) meet food safety and quality standards for both domestic and international markets, thereby protecting the public from the health risks of consuming contaminated shellfish. The program is also in line with Regional Growth Strategy Policy 7.15 to work collaboratively with the provincial and federal government to protect the shellfish aquaculture leases from wastewater or industrial runoff contamination.

Under the CSSP, Conditional Management Plans may be developed to allow shellfish harvesting in areas that may be periodically at risk for poor water quality. These plans clearly identify what events will trigger a temporary closure of the area and what response protocol would follow if a trigger event was to occur. The RDN has a Conditional Management Plan for shellfish harvesting areas near two pump stations that have uncontrolled bypasses. The bypasses are designed to allow untreated wastewater to discharge to the marine environment if the volume of wastewater entering the interceptor exceeds the capacity of the pump station. Bypasses prevent damage to infrastructure and reduce the risk of flooding private residences. These bypasses have been in place since the system was built in the 1970's and during this time there has been no reported need to bypass the flow. Furthermore, pump redundancy, back-up power, and a Supervisory Control and Data Acquisition System make it unlikely that an overflow would occur at these locations. RDN's Conditional Management Plan clearly outlines the roles and responsibilities of each partner, as well as immediate actions to be taken to close these conditionally classified areas should a discharge of untreated wastewater occur from the pump station bypasses. The agreement would be signed by the RDN, Canadian Food Inspection Agency, Environment Canada, DFO and BC MOE.

6.2 Contaminants of Emerging Concern

Contaminants of emerging concern, sometime called emerging contaminants, refer to an array of pharmaceuticals, personal care products, and industrial contaminants (CCME 2009). Once standards are established by higher levels of government for the identification, testing, and measurement of contaminants, the RDN will develop a strategy to mitigate their impact on the wastewater stream. Recognizing that most of the contaminants entering the wastewater stream originate from private residences and businesses, the RDN will continue to work to improve the quality of effluent through the Source Control Program, the Sewer Use Regulatory Bylaw (No. 1225), and through strategic investments in critical infrastructure. In the future, the RDN may wish to establish codes of practice to address contaminants of concern.

6.3 Heritage Resources

The Province protects heritage sites through the *Heritage Conservation Act*. This protection applies to both private and Crown land and a provincial heritage permit is required before altering or developing a heritage site. Projects near known or suspected heritage sites will obtain a Heritage Permit before ground disturbing construction begins and ground disturbing activities will be monitored by a qualified archaeologist. If potential artifacts are discovered, construction activities will be stopped or modified according to the advice of the archeologist.

6.4 Climate Change

Since the late 1800s, global sea level has risen more than 20 cm, primarily as a result of glacial melting and the expansion of water as it warms. The annual rate of sea level rise increased from about 1 mm per year in the early part of this period to more than 3 mm per year over the past decade. Expected changes in sea level for the BC coast by 2100 are not uniform and differ from the global projections. The most probable sea level rise around Nanaimo is estimated at 11 cm while an extreme global rise rate could raise the sea level 80 cm for this area (Bornhold 2008). In addition to sea level rise, winter precipitation is expected to increase in the Nanaimo area by 10 to 20% by 2050 relative to mean values from the period 1961-1990 (Thomson et al. 2008). Changes to the frequency and magnitude of precipitation events may also cause changes to peak flows in rivers and creeks. Weston et al. (2003) predict that, in 2080, peak annual flows on the Englishman River will be 17% greater than present, with more frequent flood events. Weston et al. (2003) also modeled that, by 2080, the magnitude of the 10-year flood will be equal to today's 20-year flood based on a predicted decrease in snowfall and increase in rainfall in the watershed.

Coastal erosion, storm surge, and flooding are among the risks of a rise in sea level. Addressing climate change and its growing impact on our environment and quality of life is an increasingly important topic. The RDN and its member municipalities have voluntarily agreed to develop climate change and energy plans for their respective operations and community. RDN initiatives implemented to address climate change include:

- Reducing the demand on wastewater treatment infrastructure from privately owned buildings through:
 - Increased water conservation awareness via the Team WaterSmart program
 - Discouraging garburators in new development
 - Reducing potable water consumption
 - Lawn-watering restrictions (reduce I&I and demand on wastewater treatment infrastructure)
 - A rebate program on ultra-low-flow toilets.
- Promoting efficient upgrades during renovation and development of corporate infrastructure through:
 - Installing low-flow toilets, dual flush toilets, and other water-saving devices in corporate buildings
 - Investigating the optimization of wastewater treatment motors and pumps
 - Designing all new construction and renovation projects (including the upgrade of GNPCC) with energy efficient technology, according to the RDN's Green Building Policy B1.16.

Preparing for climate change is Goal #1 of the Regional Growth Strategy and the Regional Growth Strategy supports adaptation and emergency planning measures to mitigate the potential impacts of climate change such as sea level rise and flooding. Much of the wastewater infrastructure is near tidally influenced land to take advantage of the low elevation and allow for gravity transport. Therefore, the RDN will pursue grant funding to complete a Vulnerability Analysis to estimate the effect of sea level rise and inundation on infrastructure. As well, future engineering decisions will consider the potential to handle an increase in storm frequency and intensity and a possible sea level rise.

6.5 Non-point Sources of Pollution

Non-point sources of pollution come from sources other than an outfall pipe. Some examples of non-point pollution include agricultural and stormwater runoff, onsite sewage systems, and discharges from vessels. The LWMP Private Onsite Systems Program begins to address pollution from onsite sewage systems.

Management of marine pump out facilities is cross-jurisdictional and vessel pump out facilities are located within municipalities, marinas, and harbour authorities. The RDN regulates wastewater from marine sewage reception facilities through the Trucked Liquid Waste Disposal Bylaw (No. 988). In 2008, the RDN, through Bylaw No. 988, provided the Nanaimo Port Authority with reduced holding tank waste disposal rates so their Eco-Barge can provide free services to discourage marine dumping. As mentioned in Section 5.3, the RDN will amend this bylaw to allow reduced rates for similar requests and the RDN will work with municipalities, marinas, and/or harbour authorities to accept wastewater from marine vessels as opportunities arise.

The RDN also has agreements with BC Ferries to establish a pump ashore program to accommodate the wastewater produced on BC Ferries vessels at GNPCC and DPPCC. Further management of non-point sources of pollution will be considered in future amendments.

7.0 Costs, Financing, and Implementation Schedule

In accordance with the *Municipal Act*, RDN services are funded based on the user pay principle. That is, only those benefitting from the service are required to pay for it. Tax revenue from one service area must stay in that service area; funds cannot be transferred to pay for services out of that area.

All cost estimates in this section, unless otherwise stated, are Class C (2013 dollars) taken from the Wastewater Services Ten Year Capital Plan (Appendix H). Refined cost estimates (Class A or Class B) become available as project design reaches completion.

7.1 Program Funding

The LWMP and the programs within are funded by a variety of sources. Overall administration of the plan is funded through the Liquid Waste Management Planning Service Establishment Bylaw (No. 1543) which establishes a long range budget for the planning and implementation of the updated LWMP. Annual revenue from this bylaw is relatively constant and is generated through property taxes at a rate of \$0.0063 per one thousand dollars of net taxable value of land (approximately \$2/household) for a total of \$152,625 per year. Funds generated from Bylaw No. 1543 pay for one full-time staff member to administer the plan. They also pay for some of the non-capital program costs including the public education programs, consulting fees for studies, and plan amendments.

In 2008, the RDN implemented an increase in septage receiving fees from \$0.16/gallon to \$0.18/gallon to create and deliver the septic education program, SepticSmart, to inform homeowners of onsite sewage disposal regulations and to encourage regular care and maintenance of their systems. The annual revenue generated from septage receiving fees, and therefore for this service, is variable but estimated at \$30,000. The SepticSmart program falls under the Private Onsite Systems Program.

The RDN Water Services department and their Team WaterSmart run programs to protect water quality and promote efficient water use and the use of rainwater as a resource. These programs fall under the scope of DWWP Action Plan and are funded by the Action for Water program. This revenue source funds many projects outside the scope of the LWMP but also supports initiatives within the scope of the LWMP (under the Source Control, Rainwater Management and Volume Reduction Programs) and should be noted.

Operation and maintenance of the wastewater collection and treatment infrastructure (including odour control, I&I management, and biosolids management) are financed with tax requisitions for wastewater services. Revenue from resource recovery offsets the costs of wastewater treatment.

Capital projects, such as upgrades to and expansion of the pollution control centres are funded through a combination of capital charges and DCCs (for expansion), property taxes, tax reserves, long term debt, and/or grant funding.

The RDN pursues grant funding when grant programs are available. For example, the RDN received \$10,000 Infrastructure Planning Grants from the Ministry of Community Services to complete the Biosolids Management Plan and the Mandatory Maintenance Feasibility Study. The RDN also received \$350,000 in federal grant funds from the Federation of Canadian Municipalities and \$2.3 million from the Union of British Columbia Municipalities under the Gas Tax Program to construct a cogeneration facility at GNPCC. An additional \$2 million in Gas Tax funds is allocated to the future GNPCC outfall replacement project.

7.2 LWMP Program Deliverables

Cost estimates and proposed timelines for key LWMP program deliverables are provided in Table 12.

Table 12. Cost Estimates and Timelines for Key LWMP Program Deliverables

Program	Report or Deliverable	Cost Estimate	Target Date
Public Wastewater Systems	Village Centre Review	\$10,000	complete
	Review and update DCC bylaws where necessary	\$8,000	2014
Private Onsite Systems	Mandatory Maintenance Feasibility Study	\$15,000	complete
	Revise Pump & Haul Bylaw (No. 975)	\$2,000	2014
Source Control	Enhanced Public Education Program	\$10,000	2013-2015
Odour Control	Review the odour management system at GNPCC	\$15,000	complete
Rainwater Management	Revised Rainwater Management Plan	\$15,000	2014-2016
Volume Reduction	Study of overflow potential and elimination strategies	\$10,000	2016
Inflow and Infiltration	CCTV monitoring of the GNPCC Interceptor	\$15,000	annual
	CCTV monitoring of the FCPCC Interceptor	\$23,000	every 5 years (next in 2015)
	Set up an I&I monitoring function for FCPCC	\$5,000	2014
	I&I Study	\$15,000	2014-15
Biosolids	Biosolids Management Plan	\$15,000	complete
Resource Recovery	Resource Recovery Options Study	\$25,000	2014-15
Emerging Issues	Climate Change Vulnerability Study	\$15,000	2015-16
LWMP	5-year Audit	\$5,000	2019 (every 5 years)

7.3 Major Capital Projects

The RDN builds and maintains infrastructure to meet the needs of RDN communities and enhance the health of people and our environment. To date, the RDN has invested millions of dollars in the construction, operation, maintenance, and upgrade of wastewater infrastructure. Further investments are necessary to protect the value of these assets, support the RDN's growing population and meet increasingly stringent federal and provincial requirements for secondary treatment. Major wastewater projects are captured in the Wastewater Services Ten Year Capital Plan (Appendix H) and Table 13. The Ten Year Capital Plan is integrated into the RDN's current five year financial plan which is prepared in accordance with the *Local Government Act*. While the *Local Government Act* only requires the RDN to report five years, the RDN considers a ten year timeframe when developing budget forecasts. The financial plan is reviewed annually at which time greater precision regarding current costs are incorporated into the projections. When planning major capital projects, the RDN considers the costs of design and construction, operating and maintenance, and future replacement, as well as the potential social and environmental benefits.

Table 13. Cost Estimates and Timelines for Major Wastewater Capital Projects

Service Area	Major Capital Projects	Cost Estimate	Target Date
Greater Nanaimo	Biofilter media replacement for odour control	\$15,000	complete
	Third Digester	\$10,000,000	complete
	Sedimentation tank expansion (completion)	\$2,700,000	2014
	Outfall replacement	\$18,000,000	2015
	Secondary Treatment (total \$61,800,000; 2012 dollars)		
	Engineering – Predesign and Detailed Design	\$4,200,000	2018
	Construction	\$42,600,000	
	Contingencies	\$15,000,000	
Departure Bay Forcemain Replacement and Expansion	\$18,000,000 ^a	monitor	
Departure Bay Pump Station Upgrade	\$3,052,600 ^b	2016	
French Creek	Biofilter media replacement for odour control	\$15,000	complete
	Reversal of the air flow through the trickling filter	\$600,000	complete
	Seacrest Place forcemain repairs	\$660,000	complete
	Lee Road Pump Station Expansion and Upgrade	\$659,000	complete
	Grit Channel Expansion	\$677,000	complete
	Outfall repairs	\$600,000	complete
	Hall Road Pump station upgrade	\$900,000	complete
	Increasing effluent pumping capacity	\$350,000	2018-2025
	Commission 5 th digester cell	\$200,000	2018-2025
	Chemically Enhanced Primary Treatment works	\$930,000	2018-2025
	Interceptor / pump station expansion	\$5,000,000	2025
	Treatment plant capacity expansion, outfall replacement	\$32,000,000	2018-2025
Nanoose Bay	Odour management improvements at NBPCC outfall manhole	\$10,000	complete
	Secondary Treatment for 2,000 residents	\$4,100,000 ^{a,c,d}	2023
Duke Point	No major changes planned for the next 20 years	–	–

NOTE: a. Not included in the 2013-2022 Ten Year Capital Plan due to its preliminary planning stage; b. Project not required if Departure Bay Forcemain is replaced and expanded; c. Cost estimates provided by AECOM (2012); d. 2012 dollars.

The estimated average annual household levies for major wastewater capital projects, operations, and maintenance are discussed in sections below. Actual levies are based on net taxable value of land and the examples provided describe approximate levies for an average house in the RDN with an assessed value of \$350,000. The cost of operation and maintenance, which increases with upgrades to secondary treatment, is incorporated into the average household levies. Given the importance of secondary treatment, the RDN will explore provincial and federal government funding partnerships to reduce the amount financed through the Municipal Finance Authority's Long Term Debt Financing Program.

7.3.1 Greater Nanaimo Pollution Control Centre

The RDN has recently committed \$18 million to replace the GNPCC effluent outfall by 2015. As well, the RDN will provide secondary treatment at GNPCC, at a cost of \$61.8 million dollars (2012 dollars)¹⁰. The outfall replacement and secondary upgrade and expansion will benefit existing and future users, therefore RDN plans to finance both project with DCC funds, reserves, tax requisitions, and debt (amortized over 20 years). Through prudent asset management practices, the RDN has established significant reserve and DCC funds to support capital projects. Still, those reserves will be largely depleted with the completion of the outfall replacement project and borrowing will be necessary. Where there is a DCC shortfall, the remainder of the costs will be funded by general reserves and long term debt. However, the RDN will continue to collect DCCs which may be used to cover a portion of the debt.

Grant Funding

The RDN has secured \$2 million in Gas Tax funds for the future GNPCC outfall replacement project. The RDN will continue to pursue federal and provincial grant options to fund secondary treatment at GNPCC.

DCCs Collected

The RDN started collecting DCCs in the Greater Nanaimo Service Area in 1997 to help fund expansion projects including the secondary treatment upgrade. DCC revenue was lower than projected in the DCC collection plan due to the low observed growth rate. In July 2013, the GNPCC DCC reserve balance was approximately \$4.2 million.

Reserves Collected

The 1997 LWMP approved an average tax increase of \$100 (in 1997 dollars) for users in this service area. This service area observed only a minor tax increase since 1997. Still, approximately \$22 million was collected over the past 16 years. Of this, approximately \$3.5 million was used to purchase property required for secondary upgrades. Another \$1.5 million was spent on projects required at GNPCC to maintain facility integrity. The balance in the GNPCC general reserve fund was approximately \$16.8 million in July 2013.

Future Property Taxes

The average annual sewer tax for wastewater capital projects, operations, and maintenance at GNPCC is currently about \$104. To fund the major capital projects at GNPCC, property taxes must increase over the next nine years. The average household will see an average annual tax increase of \$6-18/year, as shown in Table 14. The RDN will explore provincial and federal funding opportunities to reduce the amount required from local taxpayers.

Table 14. Potential Average Annual Sewer Tax Increase for Residents in the Greater Nanaimo Service Area, Based on Three Timing Options and Three Cost Sharing Scenarios

Cost sharing scenario	2013 Tax (average)	Potential tax increase phased in from 2014-2022					
		Option 1. 2016		Option 2. 2018		Option 3. 2019	
		Average Annual Increase	Tax in 2022	Average Annual Increase	Tax in 2022	Average Annual Increase	Tax in 2022
No Grant	\$104	\$18	\$268	\$15	\$238	\$13	\$224
1/3 Grant		\$12	\$213	\$10	\$194	\$9	\$185
2/3 Grant		\$8	\$179	\$7	\$167	\$6	\$161

Note, tax increase is phased in incrementally from 2014-2022. Amounts are based on an average house in Nanaimo, with an assessed value of \$350,000. Cost-sharing (grants) apply only to construction costs and do not cover the costs of operation.

¹⁰ The cost estimate rose from \$35 million in 1997 to \$61.8 million in 2012. The discrepancy is a result of inflation in the past 15 years due to the rising costs of skilled labour and materials, and the strong market for residential and non-residential building construction (Statistics Canada 1999-2011, 2012b). As a result, the cost estimate has risen greatly even though the project scope is the same.

7.3.2 French Creek Pollution Control Centre

Capital projects planned for FCPCC include the replacement of existing works as well as the expansion of the plant to accommodate population growth. These projects will cost an estimated \$32 million and are scheduled for 2018-2025. Based on current population estimates, 85% of the expansion will accommodate new population growth and 15% will benefit existing users. In a similar manner to the GNPCC projects, FCPCC expansion and upgrades will be financed by a combination of DCCs, accumulated capital reserves, long term debt, and property taxes. Due to low growth in the past four years, DCC collection was considerably lower than expected. As well, \$2 million in DCC have been applied to projects at FCPCC since 2008. As a result a DCC shortfall is expected and the remainder of the costs will be funded by general reserves and long term debt. DCCs will continue to be collected after borrowing and may be used to cover a portion of the debt. Additionally, DCC rates are reviewed approximately every five years to ensure they reflect the most recent project estimates as well as changes in growth projections.

DCCs Collected

As mentioned above, DCC collection in recent years was considerably lower than expected. As well, \$2 million in DCC have been applied to projects at FCPCC since 2008. The balance in the FCPCC DCC reserves was \$4.1 million in July 2013.

Reserves Collected

For users in this service area, the 1997 LWMP did not propose an increase in taxes over the 1997 levels. The balance in the FCPCC general reserves was \$3.2 million in July 2013.

Future Property Taxes

The average annual sewer tax for wastewater capital projects, operations, and maintenance at FCPCC is currently about \$246. To fund the major capital projects at FCPCC, property taxes must increase over the next nine years, by \$11 to 14 per year, starting in 2014, for a total of \$99 to 126 over nine years, shown in Table 15. Currently, provincial and federal grant funding is not applicable to expansion projects.

Table 15. Average Annual Sewer Tax Increase for Residents in the French Creek Service Area

Grant Funding	2013 Tax (average)	Potential tax increase phased in from 2014-2022		
		Average Annual Increase	Total 9-year Increase	Tax in 2022
Not applicable	\$246	\$11-14	\$99-126	\$245-372

Note, rates listed are approximations based on an average City of Parksville and Town of Qualicum Beach average household rates and an average assessed value of \$350,000. Estimates assume debt is amortized over 20 years.

7.3.3 Nanoose Bay Pollution Control Centre

NBPCC serves a very small population, estimated at 1,350 people. The flow produced by this population is approximately 1% of that produced by the population contributing to GNPCC. Current growth projections estimate that this service area may grow at a rate of 1.8% per year even if no trunk extensions are completed (AECOM 2010b). If growth occurs at the predicted rate, the population will reach 1,700 by 2025 and 2,000 by 2034. However, the observed growth rate in this service area remains quite low at 0.3% (AECOM 2010a); therefore it is likely that it will take longer to achieve the predicted population growth. Accounting for the population estimates and observed growth, and given that secondary treatment upgrades are required at NBPCC, it is reasonable to upgrade the treatment facility to provide secondary treatment for 2,000 people.

The provision of secondary treatment at NBPCC, without solids handling, will cost those in the Nanoose Bay Sewer Service Area an estimated \$4.1 million (2012 dollars). Revenue from resource recovery will offset the costs of wastewater treatment wherever feasible and the RDN will explore provincial and federal infrastructure funding opportunities to reduce the amount that must be borrowed.

DCCs Collected

The NBPCC DCC reserve balance was approximately \$249,000 in July 2013. Currently, all of the DCCs for NBPCC are collected from outside of the Fairwinds subdivision. Under the existing sewer servicing agreement, properties within the Fairwinds subdivision do not pay DCCs for the primary treatment facility (unless expansion or upgrades are required) since Fairwinds constructed the collection, treatment, and marine outfall facilities at its own expense before transferring ownership to the RDN.

Reserves Collected

The 1997 LWMP intended for users in the Nanoose Bay Service Area to see an average tax increase¹¹ of \$240 (above their 1997 taxes; in 1997 dollars), phased in from 1999 to 2004, to pay for secondary treatment. Between 1997 and 2012, there has been an average per household tax increase of \$304 to cover increasing operational and maintenance costs and to repair ageing infrastructure such as the forcemain. The NBPCC general reserve balance was approximately \$358,000 as of July 2013.

Future Property Taxes

The average annual sewer tax for wastewater capital projects, operations and maintenance at NBPCC is currently about \$622. To fund the secondary treatment upgrade at NBPCC, property taxes must increase over the next 18 years. The average household will see an average annual tax increase of \$12-27/year, as shown in Table 16. The RDN will explore provincial and federal funding opportunities to reduce the amount required from local taxpayers.

Table 16. Potential Average Annual Sewer Tax Increase for Residents in the Nanoose Bay Service Area, Based on Three Timing Options and Three Cost Sharing Scenarios

Cost sharing scenario	2013 Tax (average)	Potential tax increase phased in from 2014-2031					
		Option 1. 2020		Option 2. 2025		Option 3. 2030	
		Average Annual Increase	Tax in 2031	Average Annual Increase	Tax in 2031	Average Annual Increase	Tax in 2031
No Grant	\$622	\$27	\$1,115	\$20	\$983	\$19	\$966
1/3 Grant		\$20	\$982	\$16	\$916	\$15	\$885
2/3 Grant		\$14	\$863	\$13	\$852	\$12	\$833

Note, tax increase is phased in incrementally from 2014-2031. Cost-sharing (grants) apply only to construction costs and do not cover the costs of operation.

7.3.4 Duke Point Pollution Control Centre

No major capital projects are planned for DPPCC at this time.

8.0 Monitoring, Amendments, and Updates

8.1 Monitoring

Upon approval of the LWMP amendment, the RDN will establish a new committee to oversee and evaluate plan implementation and fulfills the role of the plan monitoring committee, as outlined in the Interim Guidelines (MOE 2011). RDN staff will meet with the plan monitoring committee to complete an annual review of LWMP progress. During the review, the committee will evaluate progress towards each program objective. When necessary, the committee will recommend refinements to the actions to keep implementation on track with the overall objectives and targets. Refinements may also reflect lessons learned from other jurisdictions through communication and benchmarking exercises. Refinements are not considered an amendment or update. Rather, annual review and

¹¹ The 1997 taxation model assumed borrowing would be necessary and that not all the required funds would be available in reserves.

refinement will provide the flexibility to sustainably manage wastewater and respond to changes such as the pace of development, technical issues, study results, regulatory changes, requests from the public and Board, and availability of funding and grants.

RDN staff will prepare an annual report which will be available to the MOE and public and will:

- Document implementation of the LWMP programs
- Track progress towards program actions, targets, and objectives
- Revise expansion schedules to reflect actual growth rates
- Explain deviations and adjustments to actions and targets, if any.

There will be an independent audit of the plan every five years.

8.2 Amendments and Updates

The RDN will initiate periodic amendments or updates to the LWMP as required.

- The MOE requires that local governments review their LWMPs every five to ten years to determine if an amendment or update is required
- The RDN will issue an amendment or update if significant changes are made to the cost or timeline of facility expansion or upgrade, or if there are new discharges, or major changes to a program objective or targets
- The RDN LWMP monitoring committee may wish to initiate the plan amendment process at more frequent intervals over the life of the plan, based on regional needs and initiatives.

At the beginning of an amendment or update, a scope of work will be completed and submitted to MOE staff. The scope will guide the completion of the report for that update. This will be followed by a public and First Nation review and comment period.

9.0 Operational Certificates

Operational certificates are issued by the MOE to replace waste discharge permits. They specify the requirements and conditions for authorized discharges, the monitoring and reporting requirements, and other conditions. Draft operational certificates for all four facilities were submitted to the Ministry of Environment, Lands and Parks in 2001. Currently, DPPCC operates under an approved operational certificate while GNPCC, FCPCC, and NBPCC operate under waste discharge permits. Draft operational certificates for the three remaining facilities are contained in Appendix I. Draft operational certificates will be revised in cooperation with the MOE.

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