

CAPITAL REGIONAL DISTRICT
CORE AREA WASTEWATER MANAGEMENT PROGRAM
PROGRAM DEVELOPMENT PHASE – CONCEPTUAL PLANNING

ACTIVITY STATUS AS OF 30 JUNE 2009

BACKGROUND

The report entitled, *The Core Area Wastewater Management Program – Program Development Phase – Report to the Minister of Environment*, dated June 12, 2008 documented the progress that had been made in planning the Core Area Wastewater Management Program. The report also highlighted the proposed activities to complete the conceptual planning phase, based on an extended schedule. In his letter dated July 8, 2008, the Minister accepted the proposed schedule change, subject to the submission of a progress report on or before December 31, 2008 and a second progress report on or before June 30, 2009. The proposed Liquid Waste Management Plan (LMWP) amendment is to be submitted to the minister by December 31, 2009.

The conceptual planning is being carried out by the consultant team of Associated Engineering, CH2M Hill and Kerr Wood Leidal Associates. The first status report was submitted in December 2008, as part of the overall CRD Report. This second progress report provides the status of the conceptual planning to June 30, 2009, based on the originally proposed deliverables and milestones.

STATUS OF ACTIVITIES TO 30 JUNE 2009

The primary activity has been the development of a series of discussion papers. These discussion papers were intended to inform the CRD Core Area Liquid Waste Management Committee (CALWMC) on critical program issues, technical information and possible wastewater management strategies. The information developed has been used by the CALWMC to select the wastewater management strategy for the Core Area Wastewater Management Program.

The list of discussion papers is shown in Table 1. The series of discussion papers from Activity 030 to 035, inclusive, were intended to provide the background data for the major activity, 036, the development of distributed wastewater management strategy options. Activities 037 and 038 provide details on the proposed Biosolids Management Strategy and on the cost estimates, respectively. The summary report provides a concise discussion of the conceptual planning work and on the selected wastewater management strategy.

As part of the distributed wastewater management strategy, three option series were developed.

- Option 1 Series: Resource Recovery on a Regional Basis – the Fewest Plants
- Option 2 Series: Resource Recovery based on a Combined Regional – Local Basis
- Option 3 Series: Resource Recovery a Local Scale – the Largest Number of Plants

A sustainability assessment framework (SAF) approach was used by the consultant team, the CRD staff and the CALWMC to assess the three strategic directions from a triple bottom line perspective. Feedback from the public consultation process was used to set and weight the criteria.

The discussion papers and the summary report will be completed by June 30, 2009, as per the original schedule.

FINDINGS

Several key findings of the option evaluation are discussed below.

Wet Weather Flow Management

Goals and targets for wet weather flow management, including the elimination of combined sewer overflows (CSO) and the reduction of sanitary sewer overflows (SSO) have already been set in the LWMP. The analysis has concluded that the best approach to achieve these goals is a combination of sewer separation in the CSO areas, the continued management of the sanitary sewer system asset through replacement and remediation and the treatment of surplus wet weather flows at the end of the pipe, with discharge to the non-embayed marine environment. Wet weather flow treatment is proposed primarily at Clover Point, with some surplus wet weather flows treated at Saanich East, McLoughlin Point and South Colwood.

Secondary Wastewater Treatment Technologies

While it was not the intent to make final decisions on wastewater treatment technology, the option development has yielded some conclusions. The CRD should consider a blending of technologies that aim at providing an effluent quality that meets the final use. The opportunity for potential water reuse and the need for small plant footprints suggest that membrane bioreactor (MBR) technologies may be an appropriate choice for the dry weather treatment technology. This would be combined with high-rate primary treatment technologies that would be aimed at producing an effluent that meets the goals for wet weather discharges. By blending the effluent streams prior to marine discharge, the CRD can have the potential for water reuse and a cost effective dry weather / wet weather treatment strategy.

Biosolids / Organic Residuals Management

The analysis has concluded that the basic strategy for biosolids management should be anaerobic digestion and biomethane production with the fuel used in the community natural gas system. The dewatered and digested biosolids can best be managed through a multi-use zero waste strategy. A small portion of the biosolids could go to a willow-coppice demonstration project. This is an emerging biosolids management approach that has significant benefits in terms of greenhouse gas management and production of a value-added final product. The remaining biosolids could then be further dried for use as a green fuel. The initial target customer would be the cement manufacturing sector, where the current use of coal would be off-set by the use of the dried biosolids fuel. In order to not fully rely on third-party contracts, the thermal destruction of the dried biosolids, either alone or in conjunction with solid waste residuals management should also be pursued.

Water Reuse

Given the long term population growth and the potential impacts of climate change, water reuse may emerge as a key part of the overall watershed management strategy in the decades ahead. It is thus critical that the wastewater management strategy be planned so that this can be incorporated. All strategic directions under consideration provide this opportunity.

Heat Energy Recovery

The work has concluded that there are potential opportunities in the short term and even greater opportunities in the longer term for heat energy recovery from wastewater effluent. All strategies provide these opportunities. The differences are in the locations of the opportunities. As with water reuse, the major issue is economics and timing. As heat recovery from effluent is an “add-on” technology, the key is locating the plants in the right locations to take advantage of future opportunities. Examples of this are wastewater treatment plants that are located in areas of new community development, so that the source of the heat is located in close proximity to a future district heating system.

In developing the options, some common themes or conclusions emerged. These are:

1. A wastewater treatment plant is required at or near Macaulay Point / McLoughlin Point.

This is one of the two existing major wastewater discharge points. In order to develop a cost effective overall strategy, a facility at least handling the surplus wet weather flow is required at this location. As the Macaulay Point site is not available, the CRD is currently in discussions with Imperial Oil and the Department of National Defence on the use of the McLoughlin Point property.

2. A wet weather flow relief point is required at Clover Point.

This is the second of the two existing major wastewater discharge points. Given the significant wet weather flows at this point, it makes sense in all scenarios to develop this site as a wet weather flow relief point. It should be possible to site this facility almost entirely underground.

3. Wastewater treatment plants in the east and west area of the sewerage area are required.

In all scenarios, wastewater treatment plants in Saanich East and in the vicinity of the South Colwood area in the west are required. The major reason for this is their location within the sewerage area and their ability to contribute to the overall management of wastewater dry weather and wet weather flow. The capacity of the Saanich East plant is essentially governed by the build-out of the upstream sewerage area. This plant is situated to take advantage of the resource recovery partnering opportunities with the University of Victoria. There is some flexibility in the sizing of the South Colwood plant, as the flows can be split with other decentralized plants in the West Shore area. Again, this plant is well situated to take advantage of resource recovery opportunities through local community development.

THE SELECTED WASTEWATER MANAGEMENT DIRECTION

The SAF analysis concluded that Option 1 was the preferred direction. The Option 1 strategy would see the development of a distributed wastewater management system incorporating three wastewater treatment plants – Saanich East, McLoughlin Point and the West Shore – and a wet weather flow facility at Clover Point. Heat energy can be recovered from the effluent from the three secondary plants to provide supplement heat to local district energy systems. Local water reuse opportunities can also be developed, either now or in the future. The expected capital cost of the first stage project is about \$1.2 billion.

During the peer review process, the peer review team suggested that given the challenges and uncertainties in the development of the McLoughlin Point site, consideration be given to combining the functions of the McLoughlin Point plant and the South Colwood plant into a single, larger plant in South Colwood. Two variations on this theme were developed (Options 1B and 1C). The original Option 1 was renamed 1A for clarity.

At the 02 June 2009 meeting of the CALWMC, the following motion was passed:

- 1) *That the Capital Regional District (CRD) proceed with Option 1 with further investigation of variations on the strategy, including:*
 - a) *Continued analysis of Options 1a, 1b and 1c through the triple bottom line analysis, including an assessment of biosolids integration with solid waste activities and functions.*
 - b) *Investigation of a wastewater heat recovery system and delivery mechanism in James Bay.*
 - c) *Integration of inflow and infiltration management with appropriate phasing of the wet weather strategy at Clover Point.*
 - d) *Relocation of the solids processing from the liquid processing site to allow potential integration with solid waste activities and functions.*

- e) *Further development of the biosolids management plan to reduce operational risks associated with biosolids end uses.*
 - f) *Complete siting investigations in Saanich East/North Oak Bay.*
 - g) *Investigation of opportunities for heat recovery and water reuse with the University of Victoria.*
 - h) *Research the possibility of a single larger site in the event that the McLoughlin Point site is not selected.*
 - i) *Evaluation of the financial and rate impacts of the costs and revenues, including revenues and/or carbon tax benefits of resource recovery and use for each option; and*
- 2) *That the CRD look at options for sewage treatment in the West Shore by working in cooperation with the Administrators and Engineers of Colwood and Langford.*

The conceptual planning phase of the Project has been completed. The above activities will commence in July 2009 as part of the Pre-Implementation Phase.

Table 1
Discussion Papers

Activity	Discussion Paper Number	Title
Project Management	030-DP-1	Program Development and Implementation
Integrated Resource Management Strategy	031-DP-1	A Decision-Making Framework for the Wastewater Biosolids Management Program
	031-DP-2	Investigation of Examples of IRM in Sweden
	031-DP-3	Biosolids Management/Organic Residuals Energy and Resource Recovery
	031-DP-4	Flow Energy Management and Pressure Energy Recovery
	031-DP-5	Phosphorus Recovery
	031-DP-6	Heat Recovery
	031-DP-7	Water Reuse
	031-DP-8	Urine Separation
	031-DP-9	Biosolids / Organic Residuals Strategy Evaluation
Greenhouse Gas Management Strategy	032-DP-1	Methodology to Assess GHG Management Performance
Wastewater Flow Management Strategy	033-DP-1	Existing and Future Scenarios: Populations, ICI Equivalents, and Inflow & Infiltration
	033-DP-2	Design Flow Tables
	033-DP-3	Sanitary and Combined Overflow Locations
Macaulay Point / McLoughlin Point WWTP	034-DP-1	Liquid Process Alternatives Evaluation
	034-DP-2	Solids Processing Alternatives Evaluation

Activity	Discussion Paper Number	Title
Clover Point Wet Weather Flow Management Plant	035-DP-1	Wet Weather Management Strategies for Clover Point Wet Weather Plant
	035-DP-2	Conceptual Alternatives for Clover Point Wet Weather Plant
Distributed Wastewater Management	036-DP-1	Identification and Evaluation of Resource Recovery Opportunities
	036-DP-3	Sustainability Assessment Framework Analysis
Biosolids / Resource Management Facility	037-DP-1	Biosolids Management - Facility Planning and Implementation
Cost Estimates	038-DP-1	Capital and Annual Operating and Maintenance Costs
Summary Report		Summary Report - Core Area Wastewater Treatment Project