



Resource Recovery Market Sounding

Core Area and West Shore Wastewater Treatment

Background Document and Issues List

AUGUST 12, 2009

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Introduction

The purpose of this document is to collect input and feedback from technical experts and interested parties on resource recovery applications in the area of wastewater and sewage treatment.

The Capital Regional District (CRD), Partnerships BC, Ministry of Community and Rural Development, and Ernst & Young Orenda Corporate Finance Inc. (the “Sponsors”) wish to consider such input and feedback as it plans for procurement of new treatment facilities and services for the CRD’s Core and West Shore Areas (the “Project”) and is interested in receiving feedback relating to the following key areas:

1. Technologies that have been successfully used to recover energy or other resources,
2. Revenues and costs achieved by resource recovery projects, and
3. Integration issues that must be managed when using such technologies in wastewater and sewage treatment facilities.

The primary objectives of this market sounding are to assist in:

- shaping the Project to align it with relevant resale markets of energy/resources recovered,
- ensuring engineering facilities are designed to accommodate resource recovery technologies (both today and in future as technologies evolve),
- early identification of issues and risks that will affect the Project, and
- managing expectations of what the market can and cannot contribute to the Project.

This document includes a brief overview of the Project. Further information is available at the following websites:

www.WastewaterMadeClear.ca

Next Steps:

Please complete the qualifications summary information requested in Appendix A and return it to Alison Seto as described in Appendix A by **August 21 or sooner**. Such information will allow the Sponsors to obtain a better understanding of your project(s) and focus follow-up questions on your areas of expertise and interest.

Ernst & Young will then follow-up with each respondent with a short list of specific issues/questions relevant to the project and your specific area of experience (questions are categorized into (i) general issues, (ii) technologies, (iii) revenue opportunities and risks, and (iv) integration of technologies).

It is hoped this approach will respect and minimize the time of respondents required to participate in this survey while still providing the Sponsors with helpful and focused guidance on issues.

Background

The Core Area and West Shore of the CRD is a collaboration of seven local governments and two First Nation areas with a total land area of approximately 215 square kilometres that make up the majority of Greater Victoria. These communities include the Cities of Victoria, Langford and Colwood, the Districts of Oak Bay and Saanich, the Township of Esquimalt, and the Town of View Royal.

The CRD provides services that are regional in nature including the sewage system which serves a population equivalent of 320,000 in the Core Area. Over the next sixty years the Core Area and West Shore population is projected to grow to over 600,000 persons.

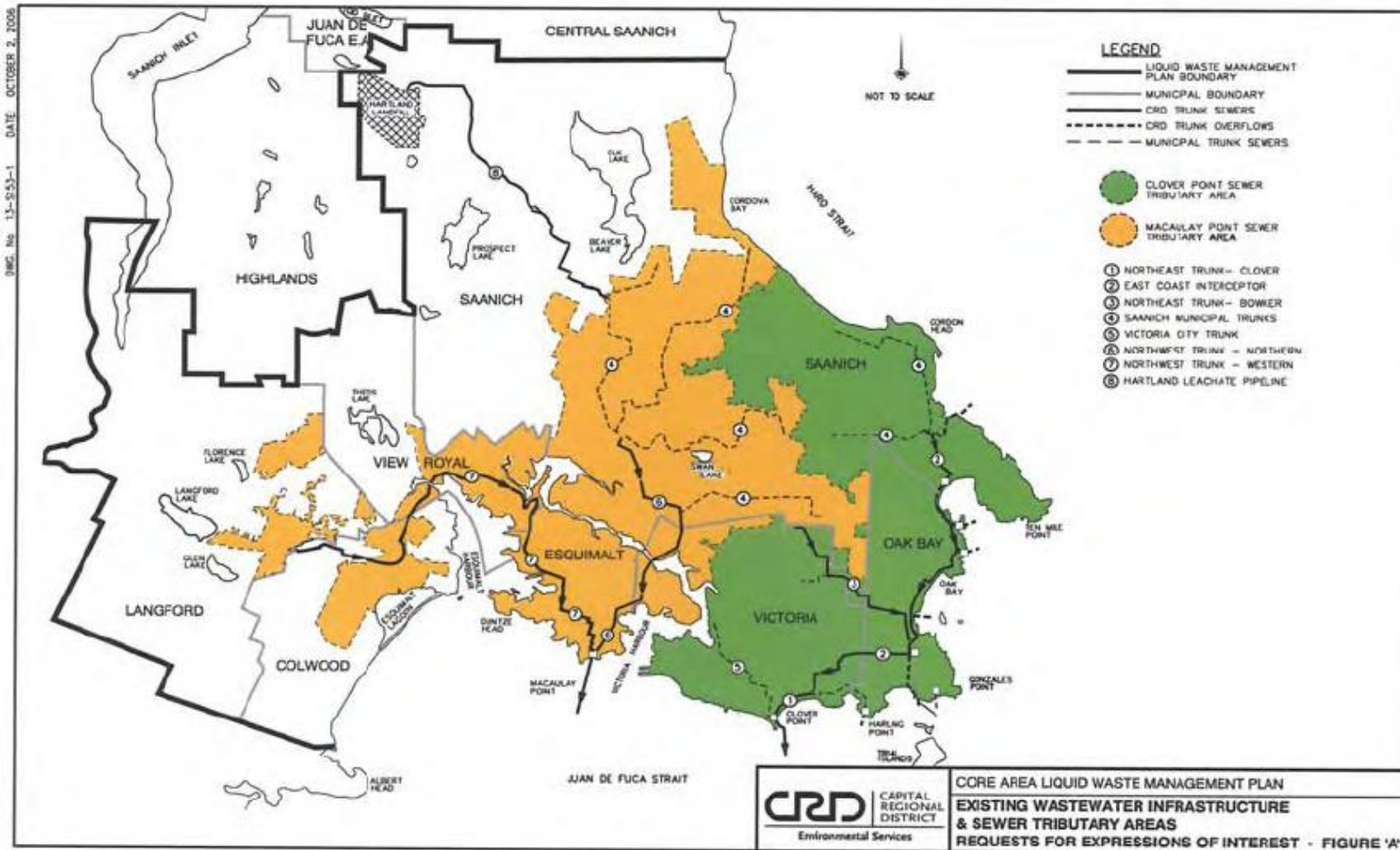
The Core Area sewerage system is primarily serviced by three separate regional trunk sewer collection systems:

- Northwest Trunk Sewer – Northern leg (NWT-N).
- Northwest Trunk Sewer – Western leg (NWT-W).
- Northeast Trunk / East Coast Interceptor (NET/ECI).

These trunk sewer systems have a total length of approximately 55 Km. Due to undulating topography and subsurface conditions, 12 pump stations (including Macaulay Point and Clover Point pump stations) provide service to the Macaulay and Clover Point service areas as shown on Figure 1. The other ten pump stations are Craigflower, Currie, Harling, Hood, Humber, Lang Cove, Marigold, Penrhyn, Rutland and Trent.

There are approximately 140 municipal pump stations located within the Core Area which are owned and operated by each respective municipality/district. Most of these municipally-owned pump stations are small.

Figure 1: Existing Wastewater Infrastructure and Sewer Tributary Areas



Liquid Waste Regional Source Control Programs

The CRD manages an extensive Regional Source Control Program (RSCP) to reduce the amount of contaminants that industries, businesses, institutions and households discharge into the region's sanitary sewer systems in order to protect sewage collection and treatment facilities, biosolids quality, public health and safety, and the receiving environment. The source control program is a key component of effective wastewater treatment and will form an integral part of the core area wastewater treatment strategy.

CRD's RSCP bylaw was approved in 1994 and implementation of a region-wide program began in 1995 with regulation of larger industries under a permit system, followed by adoption of the first regulatory codes of practice (COP) for commercial sectors in 1999. COP were developed, adopted and implemented by the end of 2005, to regulate discharges from approximately 2,200 businesses within 11 sectors.

The CRD has been tracking the performance of this legislation since 1990 and achievements include the following:

- Effluent trends for Clover and Macaulay Points over the period 1990 to 2008 include significant reducing trends in loads of metals, cyanide, organic compounds and oil and grease discharged to the environment at both outfalls.
- Studies also show continued reductions in priority metals loads (chromium, mercury, cadmium, lead, nickel, silver and zinc) ranging up to 26% decrease per year and significant reductions in loads of organic compounds, including 1,4-dichlorobenzene, tetrachloroethene (Perc), toluene and xylene ranging up to 18% decrease per year.
- Trends for metals levels in biosolids produced at the Saanich Peninsula wastewater treatment plant show significant decreases of such priority metals ranging up to 30% per year.
- Biosolids quality at Saanich Peninsula wastewater treatment plant continue to meet Class A criteria. Mercury concentrations in biosolids were maintained at a very low level, likely as a result of the continued implementation of the dental COP since 2001.

The "Medications Return Campaign", a new initiative under CRD's "Clean Water Begins at Home" residential outreach project, was launched in 2008 with goals of promoting awareness of the existing provincial medication return program and reducing the disposal of expired or unused pharmaceuticals into local sewers and solid waste streams. A follow-up survey showed that an estimated 745 kg of medications were collected and 57% of participating pharmacies registered an increase in the amount of medication returns.

Solid Waste Management in the CRD

The CRD became responsible for solid waste disposal in 1973 when the Province of BC directed all regional districts to take control of solid waste disposal within their borders. Hartland landfill was acquired by CRD in 1975 and CRD assumed operations of the site in 1985.

Solid waste management and disposal in the CRD is governed by the Solid Waste Management Plan¹ (SWMP). The original SWMP, which was approved in 1989, called for 10% waste diversion by 1993 and 15% by 1998. The SWMP was revised in 1995 to establish a 50% solid waste diversion goal. In 2006, the CRD Environment committee approved a draft Solid Waste Strategic Plan with the following waste diversion goals

- 60% of waste diverted from landfilling by 2012.
- 85% of waste diverted from landfilling by 2020.

Solid Waste Diversion and Resource Recovery Initiatives

All solid waste diversion programs are funded by tipping fees and the sale of recyclables (not municipal taxes). The CRD manages a number of diversion programs to reduce waste, including:

- Residential user pay garbage collection² (one bag per week allowable with additional bags requiring residents to purchase garbage tags).
- Landfill disposal charges. Tipping fees provide an incentive to reduce landfill disposal.
- Household hazardous waste collection. Hartland accepts HHW drop-offs including paints, pesticides, solvents and lubricating oil.
- Recycling programs. Curbside blue box/blue bag programs for more than 108,000 households and apartment buildings. Hartland is also experimenting with e-waste drop-off recycling initiatives and recycling of rigid plastic goods.
- Composting programs. The CRD adopted a landfill ban of yard and garden materials in June 2006. Source-separated yard and garden material is accepted for a fee at Hartland³.
- Wet organics (i.e. kitchen wastes). The CRD recently implemented a pilot program in Oak Bay and View Royal to collect wet organics at the curb. CRD is evaluating the cost effectiveness of this program along with type of collection vehicle, technical reliability, indoor/outdoor collection containers, waste diversion, ease of implementation, participation, public acceptance, optimal collection frequency and outreach needs.
- Product stewardship programs. The CRD partners with a number of industry groups and associations for management and control of specific target waste issues, including:
 - Product Care Association to provide the region with waste paint, solvents, flammable liquids, gasoline and pesticides at its Hartland landfill recycling depot.
 - BC Used Oil Management Association manages an oil product stewardship program that provides financial incentives for the collection and recycling of used oil, oil filters and oil containers.
 - Return-It Electronics stewardship program, at the Hartland recycling area where a pilot program was recently implemented to collect end-of-life computers, including desktop servers, CPUs, monitors, mice and keyboards; printers; fax machines; photo printers and TVs.
 - Refundable beverage containers.

¹ The SWMP is available on CRD's website at www.crd.bc.ca/waste/managementplan.htm

² Garbage collection is not operated by the CRD and is provided by municipalities or private collection companies in areas not served by municipal collection.

³ Yard and garden wastes are ground and used on-site at Hartland.

- Other product stewardship programs in the region include refundable beverage containers, pharmaceuticals, tires and lead acid batteries.
- Voluntary product stewardship programs for available for milk cartons, rechargeable batteries and cell phones.
- Landfill material bans/restrictions. Recyclable materials banned from disposal include drywall, corrugated cardboard, white goods, tires, directories, scrap metal, aggregate, concrete, asphalt, rubble, clean soil, paper fibres and yard and garden waste.

The CRD has won numerous awards for its management of the Hartland landfill, including community excellence awards from the Union of BC Municipalities and a landfill excellence award from the Solid Waste Association of North America for CRD's management of Hartland and the array of waste diversion programs implemented.

Sustainability and Environmental Regulations

The CRD is reviewing the integration of goals and objectives from the following climate change and sustainability legislation into the business case assessment of service delivery options:

- B.C.'s Climate Action Plan
- Living Water Smart Plan
- B.C. Energy Plan
- B.C. Bioenergy Strategy
- B.C. Air Action Plan

From a procurement planning perspective, it is important to note that such climate plans will likely evolve and change over the design horizon of the Program. If CRD enters into a long-term arrangement for operations and maintenance of facilities then agreements must be established to ensure flexibility to meet future climate goals.

Greenhouse Gas Emissions

CRD is developing a GHG management strategy and is committed to the principle of achieving carbon neutrality. CRD has signed the Local Communities Climate Action Charter which pledges communities to:

- Become carbon neutral.
- Measure and report on their community's greenhouse gas emissions profile.
- Work to create compact, more energy-efficient communities.

From a procurement and operations planning perspective, there may be room for CRD to view carbon emissions of the Program in context of the full carbon cycle when planning for carbon neutrality. This would require fossil-fuel generated carbon emissions to be monitored and tracked separately from biogenic carbon emissions (a distinction that will be important when determining CRD's baseline measures of carbon emissions). This approach appears to be in-line with the BC Bioenergy Strategy.

Source-Separated Wet Organics

Utilization of locally collected organics in the Core Area are under review for integration into interim digester capacity. The organics would predominantly be fats, oil and greases (FOG).

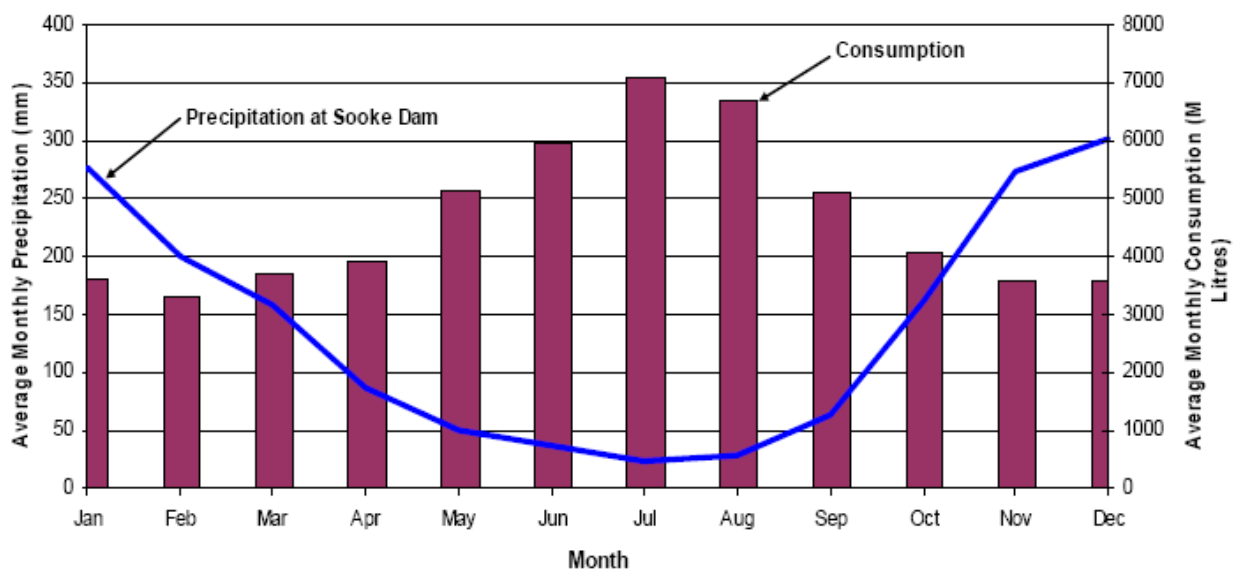
The CRD is also considering locating the digesters off-site from the liquid treatment in the industrial area and may include a transfer station and organics digester into the Program.

Garden and yard wastes are anticipated to continue to be composted at homes or at municipal or commercial facilities.

Potable Water Conservation Efforts & Demand Side Management

The water supply for the Greater Victoria area is comprised of Sooke Reservoir, the Goldstream Reservoirs (Butchart, Lubbe, and Goldstream) plus supporting reservoirs like Fulton. Sooke Reservoir contains 90% of the available total storage capacity and the other sources are for back-up and emergency purposes.

Average Monthly Precipitation and Consumption of Potable Water in CRD



Summer water consumption is a key challenge for CRD. There is a mismatch between water supply and consumption in the region during the summer and winter months with a winter surplus of 1226 mm and a summer deficit of 138 mm. In 2002 the CRD increased the level of the Sooke Reservoir by 6 metres which resulted in a 78% increase in storage capacity. This increase is forecast to meet regional demand beyond 2050 (per Water Use and Conservation Update 2008, CRD).

As noted in the CRD planning document Water Use and Conservation Update 2008 (section 6 – Integrated Resource Management): Treated wastewater effluent is a possible future water source for irrigation in Greater Victoria, potentially offsetting municipal water demand while reducing wastewater effluent discharges to the marine environment. The extent of wastewater effluent use depends upon several factors, including the proximity of wastewater treatment facilities to large landscape irrigation demands (e.g. playing fields, parks and golf courses), as well as sufficient indoor demands (e.g. toilet flushing and laundry) to make year-round use of the treatment facilities that are needed to produce reuse-quality effluent. Also, new developments that are designed to include treatment facilities and non-potable water distribution systems are more likely to be cost-effective applications of water reuse than retrofits of existing buildings and neighbourhoods.

CRD already offers a financial incentive to residents who replace an old toilet with a more efficient low-consumption toilet. CRD offers all residents, landlords, property managers and plumbers a \$75 rebate per bathroom for installing water efficient toilets (using 6 litres or flush or less). The rebate is available to households built before January 1, 2005. Old toilets must be recycled and residents are required to provide such recycling prior to applying for the rebate.

CRD also offers a \$100 rebate for residents who purchase a hi-efficiency clothes washing machine (CRD's "Smart Wash" program) and has been ongoing for several years in CRD. Old washing machines must also be recycled and the program is only available to residential properties (not commercial washing machines).

CRD has experienced recent success in commercial and industrial water conservation efforts by providing rebates and incentives for users to switch to air cooled systems rather than water cooled systems).

Basic Climate Facts

The CRD has a moderate climate which may make certain types of weather-dependent wastewater resource recovery challenging.

In Victoria, daily temperatures rarely rise above 30°C and rarely fall below -5°C (one or two days per year in summer and winter). During the winter, the average daily high and low temperatures are 8.2°C (47°F) and 3.6°C (38°F), respectively. The summer months are equally mild, with an average high temperature of 19.6°C (67°F) and low of 11.3°C (52°F).

Total annual precipitation averages 608 mm (24in) in Victoria, contrasted to nearby Seattle, (137 km/85 miles away to the southeast), with 970 mm (38in) of rainfall, or Vancouver, 100 km away, with 1,219 mm (48 in) of rainfall. Port Renfrew, 80 km from Victoria on the southwest coast of Vancouver Island receives 3,671 mm (145 in). Victoria Airport, 25 km north of the city, receives about 45 per cent more precipitation than the Victoria. Nearly two thirds of the annual precipitation falls during the four wettest months, November to February. Precipitation in December, the wettest month (109 mm/4 in) is nearly eight times as high as in July, the driest month (14 mm/0.5 in).

Local water supply is a gravity transmission system with an unfiltered supply. The area receives approximately 1,500mm of annual rainfall in the watershed.

Further details on the Victoria climate are available on the Environment Canada website located at <http://tinylink.com/?U48FuOFCUq>

CRD Project Objectives & Targets

For the purposes of this Market Sounding, the “Project” is defined as the overall solution for the provision of wastewater management in the Core Area and West Shore.

CRD High Level Project Objectives

- Maximize revenues from resource recovery.
- Use an integrated approach and philosophy for all CRD services – from wastewater treatment to solid waste management (possibly integrating wet organic kitchen waste, fats, oils, greases), source control programs, landfill management etc.
- Minimize energy use and production of greenhouse gases.
- Partner with firms able to provide resource recovery technologies and operations management (or able to mitigate CRD risks for such technologies).
- Provide wastewater treatment and transmission facilities that incorporate community needs, including good value for money over the life-cycle of the project, environmental sustainability, risk management, and other social issues.
- Comply with Ministry of Environment requirements.
- Involve the community in treatment and siting decisions.
- Develop solutions that minimize impacts on neighbours during both the construction and operational phases of the project.
- Develop accountability protocols to ensure that facility management is responsive to concerns of the public, and in particular, to neighbours of facilities.
- Ensure that facility designs provide a safe and healthy working environment for staff.
- Continuation of CRD’s successful source control programs.
- Manage and accommodate CRD’s wet weather flow challenges with inflow and infiltration of rainwater and groundwater.

Prior CRD Engineering & Analysis Work

The CRD has conducted extensive engineering research into various resource recovery initiatives and technologies and such research is available online at CRD's website:

www.wastewatremadeclear.ca/media/archived-documents

The following table summarizes the content of key resource recovery engineering studies:

Area of Interest	Discussion Paper
Energy from Organics	Biosolids Management / Organic Residuals Energy Resource Recovery - 031-DP-3 Biosolids / Organics Residuals Strategy Evaluation 031-DP-9
Wastewater Heat Energy	Heat Recovery - 031-DP-6
Water Reuse	Water Reclamation and Re-Use - 031-DP-7
Nutrient Recovery	Phosphorus Recovery - 031-DP-5 Urine Separation - 031-DP-8
Other Niche Applications	Flow Energy Management and Pressure Energy Recovery - 031-DP-4
Greenhouse Gas Issues	Methodology to Assess GHG Management Performance - 032-DP-1
Resource Recovery Strategy Assessment	Identification and Evaluation of Resource Recovery Opportunities - 036-DP-1

Engineering Peer Review Feedback

The CRD has also conducted a peer review of such engineering work which identified some issues/concerns as follows:

- The cost of supporting infrastructure for distribution of heat and other resources can be expensive and difficult to make end-users fund.
- Recovery of heat energy from wastewater may be challenging due to the moderate climate of the region (it may be more economic to recover heat using air-exchangers installed nearby end-users).
- Anaerobic digestion is an appropriate choice for sludge processing as it is an efficient way to produce energy from wet sludge, to reduce solids mass, and to provide pathogen destruction.
- Alternatives and back-up plans for biosolids disposal should be reviewed and included in plans.
- The market value of recovered resources is often less than the cost of recovery.
- Municipalities typically receive wholesale prices upon sale of recovered resources (not retail).
- The efficiency of commercially available heat pumps may be problematic for cost-effective heat recovery.
- Sales of reclaimed water are challenging and seasonal.
- Pricing of reclaimed water may not cover the cost of infrastructure required to deliver such water to end-users.
- An alternative approach to allow CRD to achieve GhG neutrality goals may include reduction of septic tank usage in the region (and should limit the expansion of septic tanks).

A Final Report by a Peer Review Team was submitted on May 6, 2009. This report included commentary on Resource Recovery options. The report can be found at:

www.wastewatermadeclear.ca/inthecrd/documents/FinalReportMay6v2.pdf

The CRD wishes to review the issues raised by its engineering team and peer review team through discussions with practitioners of resource recovery and those parties with direct first-hand experience implementing such plans.

The Preferred CRD Strategy for Implementation of its Wastewater Treatment Systems

On June 2, 2009 the CRD selected the following strategy for the provision of wastewater and sewage treatment facilities. Analysis of specific implementation options is ongoing and will include resource recovery plans.

Strategy 1: Resource Recovery on a Regional Basis

- a. Three treatment plants for up to two times average dry weather flows (ADWF) located at:
 1. Saanich East
 2. Macaulay Point/McLoughlin Point
 3. West Shore.
- b. Heat energy recovery opportunity from effluent of all three plants
- c. Wet weather flow plant for between 2xADWF and 4xADWF located at:
 1. Clover Point
 2. Macaulay/McLoughlin Point.
- d. Wastewater solids processing and possibly phosphorus recovery or other resource recovery initiatives at two plants:
 1. Macaulay/McLoughlin
 2. West Shore.
- e. Biosolids Management – anaerobic digestion with disposal/reuse plans still under review for location at wastewater plants or centralized elsewhere.
- f. Regional source control programs as described previously under section heading “Liquid Waste Regional Source Control Programs”.
- g. Inflow and infiltration (I/I) initiatives including extensive flow monitoring and sewer rehabilitation projects (ongoing implementation).
- h. Ongoing water conservation efforts continuing existing successful programs including educational programs and financial incentives to reduce consumption of drinking water.
- i. Plans to reduce septic tanks and unsewered households in Colwood and Langford (such plans led by the municipalities and supported by the CRD).
- j. Wet organics integration which could be encompassed within an integrated solid waste and liquid waste management plan including kitchen wastes, fats, oils and greases.
- k. Garden wastes are anticipated to be handled at Hartland landfill.

Market Sounding Process

The CRD is conducting this Market Sounding to gauge and confirm both public and private sector interest and to seek input and feedback on procurement issues and options.

Participation in this market sounding exercise is not mandatory in order to participate in the CRD's procurement process for the Project. Participation in the Market Sounding and information received will be used to develop a Procurement Strategy.

Confidentiality

The resultant Procurement Strategy Discussion Paper will reflect a consolidation of feedback received. To respect confidentiality, comments will not be attributed to specific respondents in the final report. However respondents should note that CRD is subject to the *Freedom of Information and Protection of Privacy Act*, which will likely mean that all responses may enter the public domain upon such a request.

Process and Schedule

Part 1: Initial Summary of Your areas of Expertise

This Market Sounding has been constructed in three parts. Interested Respondents are requested to provide their qualifications summary as described in Appendix A via email by midnight Pacific Daylight Time on **August 21, 2009 or sooner.**

Email responses are to be addressed to: Alison.Seto@ca.ey.com

A review of all responses received will be undertaken with the intent of determining which of the identified resource recovery projects and technologies should be followed up.

Parts 2 & 3: Follow-Up Questions

Respondents who express an interest in this market sounding will be sent a brief list of questions in their area of expertise. We will then schedule a +/-30-minute telephone conference call to obtain responses to the relevant part 2 and 3 questions with each respondent.

Respondents also have the option to provide written responses to issues identified during PART 2 and PART 3 on relevant projects.

Next Steps

Please complete the summary information contained in Appendix A and return it to Alison Seto. Any questions regarding this Market Sounding document are to be addressed to:

Alison Seto or Gary Morrison

Ernst & Young Orenda Corporate Finance Inc.

CRD Business Advisory Services Team

Tel: 604 891 8469 Email: Alison.Seto@ca.ey.com

Key Issues Summary

The following resource recovery areas of interest will be explored with parties who have experience in any of these areas:

1. Wastewater Heat Energy Recovery
2. Water Reuse
3. Biosolids Treatment and End Use
4. Other resource recovery (e.g. pressure energy)

For each type of resource recovery, the following areas will be investigated:

1. General issues
2. Technologies used
3. Revenue opportunities, risks and issues
4. Integration issues with other components of wastewater system

Parties should respond to this preliminary request by providing Ernst & Young with details as described in Appendix A. We will then follow-up with you and provide a short list of questions on the topic areas you identify. We anticipate a quick +/-30-minute follow-on phone call to review such questions. It is hoped this approach will respect and minimize the time of respondents required to participate in this survey while still providing the Sponsors with helpful and focused guidance on issues.

Appendix A: Qualifications Summary

Please briefly provide us with the following information in your response and we will arrange for a convenient follow-up call to review certain follow-on issues/questions which we can provide to you in advance. This information will allow the Sponsors to obtain a better understanding of your project(s) and focus follow-up questions on your areas of expertise and interest.

Email responses are to be addressed to: **Alison.Seto@ca.ey.com**

Respondent Identification:	
Name or Firm/Organization:	
Contact Person:	
Office Tel:	
Cell:	
Email:	

Respondent's Primary Activity	
Research & Development	
Facilities Design	
Facilities Construction	
Operation and Maintenance	
Manufacturer/Supplier	
Government/Agency	
Utility	
Academic	

1. Provide a list and brief synopsis of any relevant studies/evaluations/projects that you have undertaken to demonstrate that incorporation of resource recovery technology is viable.
2. Identify which of the following **Areas of Experience** we could briefly review with you to determine practical implementation issues (including technologies used, costs, revenues, risk management, integration issues, construction and operations):

Areas of Experience:

- Waste Heat Energy Generation (wastewater and/or treated effluent)
 - Wastewater Reuse
 - Energy from Organics, Biosolids Treatment & End-Uses
 - Other resource recovery solutions (e.g. water pressure energy)
3. Provide the following details on relevant projects incorporating resource recovery technology for which you have been involved:
 - Project Name
 - Owner and contact details
 - Type of resource recovery technology employed
 - Number of years the project and associated resource recovery technology has been in operation