



REGIONAL DISTRICT

Comox-Strathcona

**ROYSTON / UNION BAY
SEWAGE COLLECTION,
TREATMENT &
DISCHARGE STUDY**

SEPTEMBER 2005



COMOX VALLEY, BC



Payne Engineering Geology



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& ASSOCIATES
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September 26, 2005
0348-12

Regional District Comox-Strathcona
600 Comox Road
Courtenay, BC, V9N 3P6

Attention: Mr. Graeme Faris,
General Manager - Operational Services

Dear Sirs:

Re: Royston/Union Bay
Sewage Collection, Treatment and Discharge Study, Final Report

We are pleased to submit six copies of our draft report entitled "Royston/Union Bay Sewage Collection, Treatment and Disposal Study." The report has been updated to reflect the draft report comments and based on the response during the June public meetings.

The findings of the study are:

- Discharge to ground for soil based treatment is not considered feasible due to poor soil conditions, and a lack of readily available, large parcels of land.
- Discharge to ocean by a marine outfall into Baynes Sound (Option A) or the northeast side of Denman Island (Option B) is technically feasible, but is anticipated to meet strong resistance from the public and the aquaculture industries. This option is not recommended.
- Connection to the Comox Valley Water Pollution Control Centre has the lowest construction cost of any option. As you are aware however, this can not be achieved without Royston/Union Bay joining either the City of Courtenay or the Town of Comox, or by forming of a new municipality.
- Discharge to land or one of the several watercourses in the areas, including the Trent River, will require treatment to the Municipal Sewage Regulation Unrestricted Reclaimed Water Use standard.
- Even though treatment to the Unrestricted Reclaimed Water Use standard has a higher construction cost that ocean discharge, it appears to be the most suitable option as it is expected to meet public support and provide the greatest flexibility for discharge options including opportunity for the reuse of water within the community.



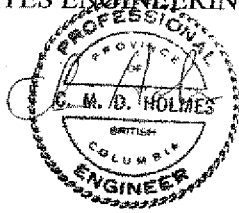
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Regional District of Comox-Strathcona
Mr. Graeme Faris

We have enjoyed working on this important study. We look forward to assisting the Regional District in furthering the development of this project in preparation of the February 2006 referendum.

Yours truly,

KOERS & ASSOCIATES ENGINEERING LTD.



Chris Holmes, P.Eng.
Project Engineer

Enclosure

EXECUTIVE SUMMARY

Over the past several years, the Regional District of Comox-Strathcona has been assisting the communities of Royston and Union Bay undertake a process to identify a sewage collection, treatment and discharge system. This report is the culmination of the activity to date.

The study reviewed three types of collection systems: a gravity system which requires eight (8) municipal pumping stations, a Septic Tank Effluent Pump (STEP) system, and a grinder pump system. Both the STEP and grinder systems require 5 municipal pumping stations. The gravity system has the highest construction cost, followed by the grinder pump system and the STEP system at \$22,340,000, \$18,510,000, and \$18,360,000, respectively. Annual operation and maintenance costs are estimated at \$177,000, \$286,000, and \$293,000, respectively.

The area to be served should be phased, with an initial area representing mainly lands already subdivided into small lots; typically between the E&N railway and the foreshore of Baynes Sound. The initial area encompasses 1,362 lots. The ultimate service area incorporates the Urban Containment Boundary in Royston, the higher developed areas within the Union Bay Local Area Plan Boundary and lands presently owned by Kensington Lands between Royston and Union Bay. The inclusion of the Kensington Lands does not imply that their development, which has been talked about on an ongoing basis for the past decade, would or should be approved, only that the area has the potential for development.

Three discharge sources were investigated; land, ocean, and freshwater.

Discharge to ground for soil based treatment is not considered feasible due to poor soil conditions and a lack of readily available, large parcels of land.

Discharge to the ocean is technically feasible to inside Baynes Sound (Option A) or the northeast side of Denman Island (Option B), but is anticipated to meet strong resistance from the public and the aquaculture industries.

Discharge to freshwater will require treatment to the Municipal Sewage Regulation Unrestricted Reclaimed Water Use standard. This can be achieved by a Sequencing Batch Reactor (SBR) or a Membrane Bioreactor (MBR), both requiring Ultraviolet treatment. They have an estimated construction cost of \$7,400,000 and \$8,200,000, respectively. Annual operation and maintenance costs are estimated at \$160,000 and \$230,000, respectively.

Treatment of effluent to the unrestricted reclaimed water use, though it carries the highest capital and O&M costs, is anticipated to be acceptable to the public because of the highest level of treatment and the availability for beneficial reuse of water in the community.

Two treatment sites were identified; a northern site near the boundaries of the Royston and Union Bay Improvement Districts, and a southern site near the mouth of Washer Creek. Regional District staff has identified the northern site as the preferred location.

The northern site has the potential for surface discharge to one or more of the adjacent drainage courses, with Argyle Creek being the closest and therefore the most probable.

It is recommended that a gravity collection system with a Membrane Bioreactor be advanced for registration under the Municipal Sewage Regulations.

Construction cost estimates quoted in this report are class 'C' estimates and are based on anticipated costs as of May 2005. Because of the recent and anticipated ongoing pressures for increasing construction costs, we recommend that one month prior to the proposed referendum, the total project cost estimate be reviewed and updated as necessary.

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SECTION 1 - INTRODUCTION

**ROYSTON / UNION BAY
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SECTION 1 - INTRODUCTION

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1 INTRODUCTION

1 AUTHORIZATION

The Regional District of Comox-Strathcona (RDC-S) in their letter dated April 26, 2004 accepted the consortium proposal from:

- Koers & Associates Engineering Ltd.,
- Anderson Civil Consultants Inc.,
- Komex International Ltd., and
- Payne Engineering Geology Ltd.

to carry out a sanitary sewer collection, treatment, and discharge study servicing the Royston and Union Bay areas. The work was to be carried out in accordance with the Koers' proposal of January 14, 2004.

2 TERMS OF REFERENCE

The RDC-S requested Koers & Associates Engineering Ltd. and Anderson Civil Consultants Inc. work together in undertaking a study to identify the most appropriate sewage collection, treatment, and discharge system to jointly service the communities of Royston and Union Bay. Koers & Anderson were invited by the RDC-S because of their previous work in the Liquid Waste Management Plans (LWMP) for both areas. They were instructed to assemble a team capable of capitalizing on the extensive work done to date in the Royston/Union Bay area.

The study was to replace the continuation of the Royston and Union Bay LWMP's that were being undertaken separately. A combined study for the area has been proposed on the underlying premise that a single servicing study would be more effective than proceeding with Stage 2 and 3 of the Royston LWMP and addressing the outstanding issues of the Ministry of Water, Land and Air Protection (MWLAP) for Stage 2 and 3 of the Union Bay LWMP.

It is recognized that the point of discharge and level of treatment required will be a key issue for the study. Discharge to land, freshwater and the ocean are to be considered, and the level of treatment required by the receiving environment addressed when identifying the treatment system options.

3 STUDY OBJECTIVE

Upon completion of the study, including public consultation meetings, and subject to public approval, a sewage collection, treatment and disposal system will be identified for registration under the Municipal Sewage Regulations.

4 BACKGROUND INFORMATION

4.1 Royston

Royston is located near the mouth of the Trent River and adjacent to Gartley Point in the southwest corner of Comox Harbour. It is a rural, semi-urban community made up of farmland, a small commercial strip along Highway 19A, and a growing residential area. The downtown area boasts an elementary school, a community hall, two gas stations, store, and restaurant. The population is estimated at approximately 2,200. The Royston Improvement District (RID) operates the local water system with the Village of Cumberland's Allen Lake as source. The RID supplies water to more than 820 households and businesses.

Sewage treatment and disposal is by on-site systems, the majority of which are septic tanks with gravity tile fields. Some newer systems include package treatment plants with pressurized disposal fields. Royston Elementary, with a capacity to handle 265 students, is serviced by a package treatment plant owned and operated by Hydroxyl Systems. The 64 room Kingfisher Oceanside Resort and Spa is serviced by a membrane treatment plant. However, in some areas the hydraulic capacity of the soils is being exceeded, resulting in the failure of the disposal fields. Partially treated sewage draining into ditches has been reported in parts of Royston.

It is estimated that 273,000 m³ of wastewater is generated and discharged annually in to the ground in Royston. An estimated 590 m³ of septage is pumped and hauled each year to the Comox Valley Water Pollution Control Centre for treatment and disposal.

Stage 1 of the Royston Liquid Waste Management Plan (LWMP) has been completed. The document indicated that the environmental impact on Baynes Sound for existing levels of development is severe as a result of poorly performing on-site sewage systems. The development of a collection, treatment, and disposal system for the denser urban area was identified as essential for environmental protection. On-site systems could continue in the lower density rural areas, beyond the Urban Containment Boundary.

4.2 Union Bay

The downtown core of Union Bay is located approximately 8 km south of Royston. Like Royston, Union Bay is an oceanside community containing farmland, residential, and a small section of commercial development along Highway 19A. The downtown core area includes an elementary school, community hall, local store, restaurant, pub, post office, and bank. The population is estimated at approximately 1,500 people. The Union Bay Improvement District operates the local water system with Langley Lake as the source.

Sewage treatment and disposal is by on-site systems. It is estimated that 186,000 m³ of wastewater is generated and discharged annually in to the ground in Union Bay. An estimated 400 m³ of septage is pumped and hauled each year to the Comox Valley Water Pollution Control Centre for treatment and disposal.

There is a history of failing septic systems in Union Bay area, where almost 40% of the systems are more than 30 years old, as recorded by the Comox Valley Citizens for

Action on Recycling and the Environment (CVCARE). The failing systems contaminate the intertidal areas along Baynes Sound.

Stages 1 and 2 of the Union Bay LWMP have been carried out. Stage 1 has been accepted by MWLAP, but not Stage 2. The LWMP process was begun in 1999 by the Union Bay Liquid Waste Management Committee. It concluded with the identification of a sewage collection, treatment, and disposal system based on a "waste to wealth" concept to service lands from the downtown area north to the Royston Improvement District boundary. It consisted of a gravity sewage collection system with septic tank effluent pumps (STEP) for waterfront properties as well as for properties on the low, south side of the road on the steep hill in the downtown area. The gravity mains would discharge to municipal pump stations which would convey effluent to the sewage treatment plant to be located on the northwest side of Hart (Washer) Creek and west of Highway 19A. The treatment system proposed was a Sequencing Batch Reactor (SBR) followed by a constructed wetland with disposal into the mouth of Hart Creek.

In November 2002, a referendum to approve the construction of the system was rejected by the residents for various reasons. Some indicated that they wanted a gravity and not a STEP service connection. Others indicated that the "waste to wealth" concept added too much cost. However, the general indication was that something still needed to be done to address the continuing failure of septic fields and to revitalize the downtown area of Union Bay.

In place of continuing with the formal Stages 2 and 3 of the LWMP process, the RDC-S proposes to join the Royston and Union Bay study processes. The rationale being that one joint study would be more cost effective than four separate studies, and the construction, and operation and maintenance of a single collection, treatment and disposal system would be more cost effective than two separate systems.

4.3 Baynes Sound

Baynes Sound produces approximately 50% of the province's cultured shellfish. In 2001, an estimated 3,360 tonnes of shellfish was harvested, and the areas five major shellfish processing plants processed approximately \$17.6 million of product. The shellfish industry employs 225 people on farm sites, with most working full-time.

Since 1994, all levels of government, the industry and the local community have been working to remediate water quality in Baynes Sound. Leakage from septic systems in Royston and Union Bay is reported to have caused eutrophication of the intertidal areas fronting concentrated development. It is estimated that the industry is operating at an estimated 60% capacity due to the closure of some of the shellfish leases.

Development of the collection, treatment, and disposal system must acknowledge the environmental sensitivity and economic benefit of Baynes Sound. It must also consider that Baynes Sound is the ultimate receiving environment from discharges to land or freshwater and that improving water quality and cleaning up the foreshore for public use and commercial benefit is a priority.

4.4 Effluent Discharge

Based on discussions with RDC-S staff, it is evident that the key issue of this study is the identification of the most appropriate point of discharge and the treatment level required by the receiving environment. It is acknowledged that the public may demand a higher level of treatment, based on the strong environmental sensitivity prevalent in the Comox Valley. For this reason, all three potential points of discharge; namely land, freshwater, and ocean will be reviewed.

5 WORK PLAN

The work plan adopted for this study, as outlined in our proposal of January 16, 2004, is as follows:

- Gather and Review Information
- Identify Study Areas
- Determine Design Flows
- Identify Collection Systems Options
- Carry out Site Visit
- Review Treatment System and Site Location Options
- Assess Effluent Disposal Options
 - i) *Land Discharge*
 - ii) *Freshwater Discharge*
 - iii) *Ocean Discharge*
- Prepare Base Plan Drawings
- Prepare and Submit Draft Report
- Prepare and Submit Final Report
- Assist with Public Consultation

6 ACKNOWLEDGEMENTS

Koers & Associates Engineering Ltd. on behalf of the project team acknowledges with thanks the assistance provided by the Regional District of Comox-Strathcona staff during the course of the data collection, analysis and preparation of the report.

In particular, we wish to thank Mr Graeme Faris, General Manager-Operational Services and Mr. Russ Hotsenpiller, Operations Planning Analyst for their assistance in coordinating and facilitating meetings, providing access to reports and drawings, and technical input/review throughout the study.

We thank Jim Argue, Roger Walker, Barry Bowen, Joe Lidster, and Brenda Fisher for their input during the course of the study. In addition, we thank Area A Director, Suzanne Murray, for her enthusiasm and service to the public throughout this project.