Comox Valley REGIONAL DISTRICT

Report to Committee

DATE: March 7, 2019

FILE: 5340-01

TO: Chair and Members
Comox Valley Sewage Commission

Supported by Russell Dyson
Chief Administrative Officer

R. Dyson

FROM: Russell Dyson
Chief Administrative Officer

RE: **Comox Valley Sewerage Service Liquid Waste Management Plan Long List Options**

Purpose

The purpose of this report is to present to the Comox Valley Sewage Commission (CVSC) the long lists of options of conveyance, treatment and resource recovery components for the Comox Valley Sewerage Service Liquid Waste Management Plan (LWMP).

Recommendation from the Chief Administrative Officer

THAT the Comox Valley Sewage Commission approve the Comox Valley Sewerage Service Liquid Waste Management Plan conveyance, treatment and resource recovery long list of options as presented in the report dated February 22, 2019, for conceptual study and subsequent evaluation to select a shortlist.

Executive Summary

At their February 25, 2019, meeting the Sewage Commission approved a set of LWMP goals and an evaluation system to be used in shortlisting options. The next LWMP task is to develop a long list of conceptual options for the three LWMP components of conveyance, treatment and resource recovery.

- The technical consultants (WSP), working with Comox Valley Regional District (CVRD) staff, developed an initial set of options for each component.
- These options are purely conceptual, representing different ideas and different approaches to the same problem.
- The options were presented to the joint Technical Advisory Committee and Public Advisory Committee (TACPAC) and subsequently to the general public and K'ómoks First Nation (KFN) for review and feedback.
- General themes of feedback from the public were:
    - Conveyance: protection of the foreshore, aspirations for high treatment standards, affordability and opposition to Comox No. 2 Pump Station;
    - Treatment: a desire for high quality treatment, regardless of lesser regulatory requirements;
    - Resource recovery: to pursue possibilities, particularly reclaimed water and biogas.
- General themes of feedback from KFN were:
    - Strong support for the installation of ultra-violet (UV) treatment for the benefit of shellfish resources in the area;
    - KFN can demonstrate significant historical cultural history in terms of midden's and burial sites along much of the estuary between Courtenay pump station and the treatment plant. For this reason they do not support estuary routing of the forcemain.

  - Feedback related to the timing of consultation with first nations.
- The options were screened by the TACPAC using the mandatory screening criteria described as part of the goals and evaluation system.
- In terms of recommending long list options, the members of the TACPAC reached consensus to:
  - Remove one of the conveyance long list options due to technical non-feasibility and recommend the remaining five options for conceptual study;
  - Recommend all four of the treatment options for conceptual study;
  - Remove one of the resource recovery options due to economic non-feasibility and recommend the remaining five options for conceptual study.
- The wide range of options developed, particularly for conveyance, represents the results of "clean sheet" thinking, and the TACPAC is pleased to recommend these long lists to the CVSC for approval for conceptual study.

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LWMP Options Development and Evaluation Process

The LWMP process is centred on developing a broad range of options for the issues at hand, and then progressively studying and narrowing them down from a long list to a short list, and eventually selecting a preferred option.

For this LWMP there are the three principal components of conveyance, treatment and resource recovery, and each of these components will go through the same process of option development:

1. *Develop* conceptual options.
2. *Screen out* the non-viable options to derive the official long list for conceptual study. This evaluation is focused on eliminating options that are obviously technically or economically non-feasible.
3. *Conceptual Study*. Includes technical descriptions of construction and operations, conceptual layout and Class D cost estimates for comparison purposes.
4. *Evaluate* to select short list options for detailed study. This evaluation is focused on selecting the most promising options.
5. *Detailed study*. Refinements of the technical descriptions, preliminary layouts, construction and operation strategies and quantity estimating. Preparation of Class C capital cost estimates, operating cost estimates to get the life cycle cost and financial modelling of subsequent residential tax burdens.
6. *Evaluate* to select preferred option(s). This evaluation is about selecting the best option. For conveyance and treatment, there will be one preferred option. For resource recovery, the decision is primarily about economic viability, which may lead to no option being selected, multiple options being selected or simply recommendations for further or future study.

Stage three of a LWMP is the detailed implementation and financial planning for the preferred option.

Conceptual Options Development and Review Process

After the goal setting exercise in TACPAC meetings two and three, WSP and CVRD staff began work on developing conceptual options for the three LWMP components. This began with a brainstorming meeting of WSP to identify the widest range of options for the three LWMP components, with some input from CVRD staff. One of the goals of this exercise was to challenge conventional thinking and identify some options, particularly for conveyance, that had not been studied before. The guiding philosophy at this stage is that there are no bad ideas. Any idea that, in principle, can achieve the mandatory outcomes makes it onto the initial list, regardless of cost or technical challenges.

The initial ideas were reviewed by CVRD staff, further screened and refined, then written up by WSP to create the initial long list for each component.

The process was then to:

1. Present the initial list to the TACPAC for discussion at meeting four, on January 24, 2019.
2. Take the list to a public information session and online review for feedback.
3. Bring the feedback to the TACPAC at meeting five, on February 8, 2019, for further discussion and screening to select the official long lists.
4. Recommend the long lists to the CVSC for approval for conceptual study.

It is intended that the conceptual studies will be completed by late March, for evaluation and selection of the short list.

Conveyance Long List Options

Of the three LWMP components, conveyance is that one that has the most previous studies, urgency and stakeholders' interest.

Finding a good conveyance option is the main reason the LWMP process was initiated, so a high level of importance is placed on the conveyance component by the technical team. In developing the conveyance options, the broadest possible approach was taken to develop as many ideas as possible. As is always the case in such idea development efforts, it is recognized that many ideas will be non-starters, but they can sometimes lead to new directions, or parts of the non-starter ideas are useful and get incorporated into other options. There is potentially great value in developing new ideas off a blank sheet, and this is the approach that was taken.

The initial approach recognized four different possible pathways for the sewage to be conveyed from Courtenay and Jane Place Pump Stations to the Comox Valley Water Pollution Control Centre (CVWPCC), without using the Willemar Bluffs pipeline:

- *Along the water* – an estuary/foreshore alignment that would transition to overland alignment somewhere between Comox and the Lazo Road height of land.
- *Over the land* – a conventional forcemain along various routes.
- *Through the land* – a use of tunneling to avoid high surface elevations.
- *Under the water* – a subsea pipe in the deepest part of the estuary, out into the Salish Sea and no onshore component until arriving at the CVWPCC.

An additional concept that was included is the decentralized treatment concept, which is an effectively combined treatment and conveyance concept. This resolves the issue of pumping raw sewage to the treatment plant by pumping treated effluent to the outfall. The concept of second treatment plant has arisen in numerous public forums and so was included on the initial list.

After discussion and refinement, the final list of initial options was developed. This is detailed in Appendix A - Conveyance Options, and summarized below in Table No. 1.

Table No. 1: Long List of Conveyance Options

Option Series	Variant	Description	Comments	TAC/PAC Decision
1 Estuary		A new forcemain within or along the Comox Harbour foreshore, and transition to an overland pipe between Comox and the Lazo Road height of land.	The existing pipe would be replaced as part of all Option 1 variants.	Recommend for Conceptual Study
	A	Come onshore near Lazo hill and tunnel through Lazo hill to the CVWPCC.	Intention is to minimize/avoid pressure head driven upgrades at the existing pump stations.	
	B	Come onshore at or after Comox and a forcemain over Lazo hill, upgrade Courtenay Pump Station and build a new Comox Pump Station for high pressure.	Intention is to avoid building a third pump station in series.	
	C	Come onshore after Comox and build a third pump station, then overland to CVWPCC.	Essentially the Comox No.2 project. Intention is to minimize/avoid pressure upgrades at existing pump stations	
2 Overland		A new forcemain from Courtenay over the Comox Road and Lazo Road hills to the CVWPCC. This is a "high pressure" option due to the land elevations.	Intention is to eliminate the pipe from the estuary and reduce capital cost of micro-tunneling	Recommend for Conceptual Study
	A	A new Comox high pressure pump station would pump into the new forcemain coming from the Courtenay Pump Station.	Intention is to avoid having pump stations in series	
	B	Both Courtenay and Jane Place Pump Stations would pump into a new high pressure pump station.	Intention is to minimize changes to Jane Place Pump Station.	
3 Tunneling		Use micro tunneling techniques to go through the hills, lowering pumping elevations.	Bonus is minimizing surface disruption in construction.	Recommend for Conceptual Study
	A	Forcemain tunnel starting at Comox Road hill, conventional forcemain through Comox and a second tunnel through Lazo hill to CVWPCC.	Intention is to minimize/avoid pressure upgrades at existing stations.	
	B	Conventional overland forcemain from Courtenay through Comox with one tunnel through Lazo hill, new Comox Pump Station to pump directly into forcemain. Requires pressure upgrades.	Intention is to eliminate one tunnel, and still avoid having pump stations in series.	
	C	A gravity flow tunnel starting in Comox or ideally at Comox Road hill, and constant gradient all the way to the CVWPCC. Jane Place connects directly into the tunnel through a new forcemain.	Intention is to avoid pressure upgrades at existing stations. Also, may allow for upper part of Comox/Jane Place catchment to connect directly to tunnel and avoid pumping entirely.	

4 North Side Overland		A dedicated forcemain from Courtenay to the CVWPCC along the north side of Comox, and a second forcemain from a new high pressure Comox Pump Station to the CVWPCC.	Intention is to achieve completely independent conveyance and operation of Courtenay and Comox Pump Stations.	Recommend for Conceptual Study
	A	A new overland forcemain direct form Courtenay to the CVWPCC.	Alignment to be determined.	
	B	A new forcemain to follow the Hudson and/or Greenwood and Knight Road trunk mains, to reach the CVWPCC via a major upgrade to the CFB Comox Pump Station.	A TACPAC suggestion to enable a shorter forcemain, and utilize the recently upgraded infrastructure.	
5 Decentralized Treatment		A new treatment plant to be constructed in Courtenay and convey treated effluent to the Cape Lazo outfall. Options for the alignment of the effluent line are the same as for the forcemain.	Intention is to avoid pumping raw sewage through the estuary and defer or avoid expansions required at the CVWPCC. It is assumed that discharge of effluent to Comox Harbour is not allowed.	Recommend for Conceptual Study
6 Deep Marine		Place the forcemain from Courtenay in the deepest part of the estuary, connect Jane Place via a branch, out into the open ocean and back onshore directly at the CVWPCC.	Intention was to avoid any pump station upgrades and minimize community construction disturbance. However, this option was removed by the TACPAC due to obvious technical difficulties associated with crossing the Comox Bar.	***Remove from Long List***

At TACPAC meeting 5 on February 8, 2019, the conveyance options and the public feedback were reviewed. There was extensive discussion about all the options.

A motion was made to exclude the series one options from the long list, based on the estuary pipeline being undesirable for environmental and archeological reasons. In discussion on the motion, it was noted that the philosophy for screening out options at this stage is to eliminate ones that are not feasible primarily for reasons beyond the control of the community and the TACPAC. Even though this option is not liked by some, it is still feasible and affordable, and should be carried forward to the extensive evaluation system that has been developed. The motion was defeated in a vote.

There was a suggestion from the TACPAC about a variation of option four, which was to have a forcemain from the Courtenay Pump Station going to the catchment of the recently constructed Greenwood and/or Hudson trunk mains. This represents a distinct variant, as this flow would then go through the CFB Comox Pump Station, which would then require upgrading. It was agreed that this variant would be considered as part of the option four study.

Subsequent discussion on option five centered on the high cost of this option, because of a second treatment plant, but also the apparent public support. While WSP recommend ruling out this option based on high cost, it was decided to leave it on the long list with similar reasoning as to the motion to exclude option one – that option five be studied enough to allow it to be evaluated, and definitively answer the question as to its viability.

Option six is ruled out by WSP on technical viability basis. It became apparent that installing a forcemain across the shallow Comox Bar between Goose Spit and Denman Island would expose the forcemain to potential damage from boats and other marine activities.

Thus, the final long list recommended by the TACPAC is for the five options, excluding the deep marine option, to be carried forward for conceptual study and subsequent evaluation.

It is noted that even though the variants make for a total of eleven possibilities, the variants within an option category are similar enough that there is not a lot of extra work to study them at the conceptual level.

Treatment

The development and study of treatment options is normally the main component of a LWMP. In this LWMP it does not have the urgency of the conveyance component, but is of equal importance to it.

WSP developed four conceptual treatment options based on the quality of treatment for the dry and wet weather flows. The Municipal Wastewater Regulation requires secondary treatment and disinfection for flows up to two times the average dry weather flow (ADWF), and does allow for primary treatment for wet weather flows greater than two times ADWF, provided the flow is recombined before disinfection and discharge. In wet weather conditions, the CVWPCC receives flow up to three times ADWF, and this happens up to about ten days per year.

It is interesting to note that the ADWF, at 12,000 m^3/day, has not substantially changed in two decades, while peak wet weather flows have been increasing. This is suspected to be a combination of aging municipal sewer collection pipes, including old asbestos cement pipes, and increasing winter rainfall intensity.

Regardless of the reasons for the high wet weather flows, the CVWPCC must deal with inflow and infiltration flows. This has led to the development of four conceptual treatment options, based on the level of treatment and wet weather flow handling. These are summarized in Table No. 2 below and detailed in Appendix B: Treatment Options.

Table No. 2: Long List of Treatment Options

Option	Description	Comments	TACPAC Decision
1	Secondary treatment for flows up to two times ADWF	This meets the provincial and federal regulatory requirements	Recommend for conceptual study
2	Secondary treatment of all flows	This is the current configuration at the CVWPCC	Recommend for conceptual study
3	Advanced treatment/filtration of flows up to two times ADWF	This would meet reclaimed water requirements	Recommend for conceptual study
4	Advanced treatment/filtration of all flows	Highest quality treatment under all conditions	Recommend for conceptual study

It was noted by the operations staff that there is an existing bypass at the CVWPCC that allows for a partial bypass of secondary treatment in wet weather flows, the option one configuration, but that this is never used.

The TACPAC considered the four options and there was some discussion about excluding option one. However, since this is the base for regulatory compliance, it is appropriate to keep it as an option, as it will show in the LWMP report how the process included planning to meet or exceed all the current regulatory requirements.

It should be noted that doing full secondary treatment on flows greater than two times ADWF is not required for ocean discharge, and neither is advanced treatment of any portion of the flow. Thus options two and three are each different examples of actioning the evaluation system goal of quality of treatment exceeds current standards. Option four effectively combines attributes of options two and three, and is thus even further above the current standards.

Option three as shown in the detailed description has flow greater than two times ADWF bypassing the secondary and advanced treatment elements. But another variant of option three is also possible, whereby all flow goes through secondary treatment, and only flow less than two times ADWF goes through advanced treatment. This variant will be considered in the conceptual study of option three.

The TACPAC decided against excluding any of the treatment options and thus recommends all four treatment options to the CVSC for conceptual study and subsequent evaluation to the shortlist.

Resource Recovery

Resource recovery is mostly a discretionary activity, in that, with the notable exception of biosolids management, there are no regulatory requirements to recover resources. Resource recovery is typically only done when there is a strong business and/or environmental case for doing so, and this is reflected in the 50 per cent affordability weighting in the goals and evaluation system for resource recovery.

The resources available from wastewater are well known, but the technical and economic viability varies with treatment types, the scale of the plant and most importantly, the potential market for the recovered resource. Given the importance of the market for the resource, technical study of how to

recover resources can only take the business case so far before marketing of the product and logistics of delivery are required, which are outside the scope of a LWMP.

Table No. 3: Long List of Resource Recovery Options

Option	Description	Comments	TAC/PAC Decision
1	Reclaimed water	Opportunity for use at CVWPCC and beyond	Recommend for conceptual study
2	Heat recovery	Opportunity for use at CVWPCC and beyond	Recommend for conceptual study
3	Beneficial use of treated biosolids	Already being done, but there may be other opportunities or processes	Recommend for conceptual study
4	Biogas production	Not technically feasible at current plant scale, but may be in the future	Recommend for conceptual study
5	Nutrient recovery by struvite pellets	Not technically feasible at current plant scale, but may be in the future	Recommend for conceptual study
6	Hydro-electric generation	Not economically feasible	***Remove from long list***

In discussing the options, the TACPAC accepted WSP's recommendation that the hydroelectric turbine energy recovery option not be pursued further. The only possibility for installing a hydroelectric turbine at the CVWPCC would be at the outlet box. However, the elevation head is not likely high enough to produce energy that would make this option economically viable.

In discussion on options four and five, it is recognized that current scale of the plant likely precludes them. However, the TACPAC is interested to understand the scale at which biogas production and nutrient recovery by struvite pellets would become viable and, future work required to enact them. Thus, these stay on the long list even though it is recognized that they are unlikely to be implemented soon.

It was also noted that nutrient recovery can occur by other means, such as coagulant addition, and is already happening to some extent via the biosolids composting. Thus, while not being achieved by making struvite, it is possible that some level of increased nutrient recovery might be achieved by the treatment upgrades. The TACPAC recommended that the nutrient recovery goal be re-stated as enhanced nutrient recovery to recognize this fact and allow for recovery by means other than making struvite pellets.

Thus, the TACPAC recommended that resource recovery options one through five be carried through for conceptual study and subsequent evaluation.

Public Feedback

Two public information sessions taken place on January 30, 2019 in Comox, and January 31, 2019 in Courtenay, as well as an online survey were held as part of this long list options development exercise. Details of the long list options were provided to the public. Participants were asked if they had any concerns about any of the long list options as well as if there were alternatives that had been missed. A total of 56 people attended the information sessions and 111 people reviewed the long list options online, 19 of which provided further comments.

Public feedback on the conveyance options showed a range of opinions, but some common themes emerged:

- Avoid a raw sewage pipe in the estuary (options one and six).
- Consider lifecycle cost.
- Opposition of Comox No. 2 Pump Station.

The options most favoured by the public were the options three and four series, but also some support for option five, the decentralized treatment concept.

Public feedback on the treatment options reflect participants' interest in creating a treatment system that meets highest standards now, or can be adopted to in the future. Concern about emerging contaminants such as pharmaceuticals and micro plastics was also expressed. The common reasons were for enhanced environmental protection and enabling resource recovery, specifically reclaimed water. There were also some comments about wanting to see what the tax implications were first. The public feedback on resource recovery included support for options one and four (reclaimed water and biogas production), which are the most well-known resource recovery activities.

Timeline

The large number of conveyance options and the high level of engagement of the TACPAC and public on the conveyance issue suggests a change to the LWMP process. In the TACPAC meetings to date, it has been a struggle to get through an agenda involving all three components in one meeting. An in-depth discussion on one component uses up the time and energy that had been planned for the other two, but the in-depth discussions are valuable and are an essential part of the LWMP committee process.

The proposed change is to separate conveyance from treatment and resource recovery, and complete the options development and selection process (short listing and selection of preferred option) for conveyance first, and then go back and do the same for treatment and resource recovery.

This will enable several positive results:

- More focused and thorough examination of conveyance options by the TACPAC and public.
- A potentially faster decision by the TACPAC and CVSC on the preferred conveyance option.
- Show that the CVRD is prioritizing on the most urgent issue, while not ignoring the others.
- Empower the TACPAC with a completed and preferably consensus decision on conveyance to then try to achieve the same for treatment and resource recovery.
- Allow some time for field or lab testing of treatment and receiving water quality, if needed.

The proposed change is to complete the selection of the preferred conveyance option by the TACPAC by late June. Selection of the preferred treatment and resource recovery options by the TACPAC is to be finalized by late September/early October.

The proposed revised timeline is attached as Appendix F.

Analysis/Options

The three long lists of options for conveyance, treatment and resource recovery outlined in this report are the result of the TACPAC's deliberations and consideration of public feedback. However, the CVSC can choose to add or delete options, as appropriate.

Staff recommend that the long lists be adopted as presented; they are extensive, and will give a level of study and an equal footing evaluation to some long-held ideas, like decentralized treatment.

If the CVSC contemplates major changes, then this suggests that something has been either missed in the options development process, such that CVSC has seen something the TACPAC has not, or vice-versa. If this is the case then the CVSC is requested to clearly identify any areas for reconsideration, and the reasons for doing so, for communication back to the TACPAC.

Financial Factors
There is expected to be additional cost for consultant time and an extra two TACPAC meetings to complete the revised LWMP process.

Legal Factors
None

Regional Growth Strategy Implications
The long lists of options represent the actioning of the goals and evaluation system. The idea is to have the options achieve as many of the goals as possible, including affordability. These various options have the potential to action the same goals with the Regional Growth Strategy (RGS) and Sustainability Strategy as outlined for the goals and evaluation system.

RGS Goals

Goal 2.	Ecosystems, natural areas and parks: Protect, steward and enhance the natural environment and ecological connections and systems.
Goal 5.	Infrastructure: Provide affordable, effective and efficient services and infrastructure that conserves land, water and energy resources.
Goal 6.	Support and enhance the agricultural and aquaculture sectors and increase local food security.
Goal 8.	Climate change: Minimize regional greenhouse gas emissions and plan for adaptation.

RGS Objectives

3B-6.	Utilize an eco-industrial networking approach for industrial land development (i.e. work to locate businesses that can create collaborative networks to more efficiently and effectively use resources, such as materials and energy).
5-D.	Encourage sewage management approaches and technologies that respond to public health needs and maximize existing infrastructure.
5D-2.	New development will replace and/or upgrade aging sewer infrastructure or provide cash-in-lieu contributions for such upgrades through Development Cost Charges or similar financial contributions.
5D-3.	Promote eco-industrial development that turns waste into resources.
6-C.	Improve and expand agricultural irrigation practices and infrastructure.

Sustainability Strategy Implications
As part of the development of the goals for the three components, comparisons were made to the Comox Valley Sustainability Strategy, which contains numerous goals directly related to wastewater, and many others indirectly related (e.g. resource recovery). As with the overall intent of the strategy, these targets are for things to be achieved by 2050, which is at the end of the design horizon for this LWMP. However, by being aware of these aspirational targets and goals at the start of the LWMP process, appropriate emphasis can and has been placed on them, and many of the long list options action some of these goals.

Sustainability Strategy 2050 Targets

Climate	80 per cent reduction in greenhouse gases from 2007 levels.
Energy	50 per cent decrease in per capita energy use and/or will not increase energy use from current levels.
Water	All wastewater treatment in the Comox Valley will be advanced or reuse level.

Sustainability Strategy Goals & Objectives

2.2.2.	Existing local government buildings and facilities are retrofitted to achieve a 25-30 per cent improvement in energy and water efficiency.
3.2.3.	Energy is harnessed from waste sources in the community.
3.5.	Liquid waste is handled to minimize negative impacts and to turn wastes into resources.
3.5.1.	All wastewater is treated to standards that protect the environment and facilitate non-potable reuse where appropriate.
3.5.1(a).	Consider amending approach to Sewer Master Plan to make it a comprehensive LWMP that addresses all aspects of sustainable wastewater management. Ensure any update to sewer/LWMPs are aligned with sustainability objectives and targets.

Overall, this LWMP is a good opportunity to consider implementing many of the Sustainability Strategy goals.

All federal and provincial grant funding programs ask for references to sustainability plans, and preference is given to projects that action the sustainability goals that are aligned with provincial and federal goals. Special emphasis is placed on water conservation and greenhouse gas emission reductions.

Intergovernmental Factors

On February 20, 2019 the CVRD presented the long list options to KFN Chief and Council for their review and consideration. The CVRD is expecting a written response in due course and received the following immediate feedback at the presentation:

- Strong support for the installation of UV treatment at the wastewater treatment plant. The installation of UV would benefit shellfish resources in the area.
- KFN can demonstrate that there is significant historical evidence of KFN's history and traditions all along the foreshore and estuary from the Courtenay PS all the way to Goose Spit and beyond. KFN have mapped several Middens along this stretch as well as burial grounds and other culturally significant sites. For these reasons, KFN does not support the estuary conveyance options.
- Concern expressed about the process of consultation – the order of public versus first nations feedback. Consultation with KFN should occur prior to collecting public feedback.
- Interested in better understanding how the different treatment processes deal with pharmaceuticals.

Citizen/Public Relations

Public engagement is a cornerstone of the LWMP process, and is written into the Environmental Management Act.

The philosophy adopted for this LWMP is that each major decision contemplated by the TACPAC will be taken out to the public for input. The input from the public is then brought back to the TACPAC for review and consideration in their decisions and recommendations to the CVSC. The CVSC makes the final decisions based on recommendations from the TACPAC.

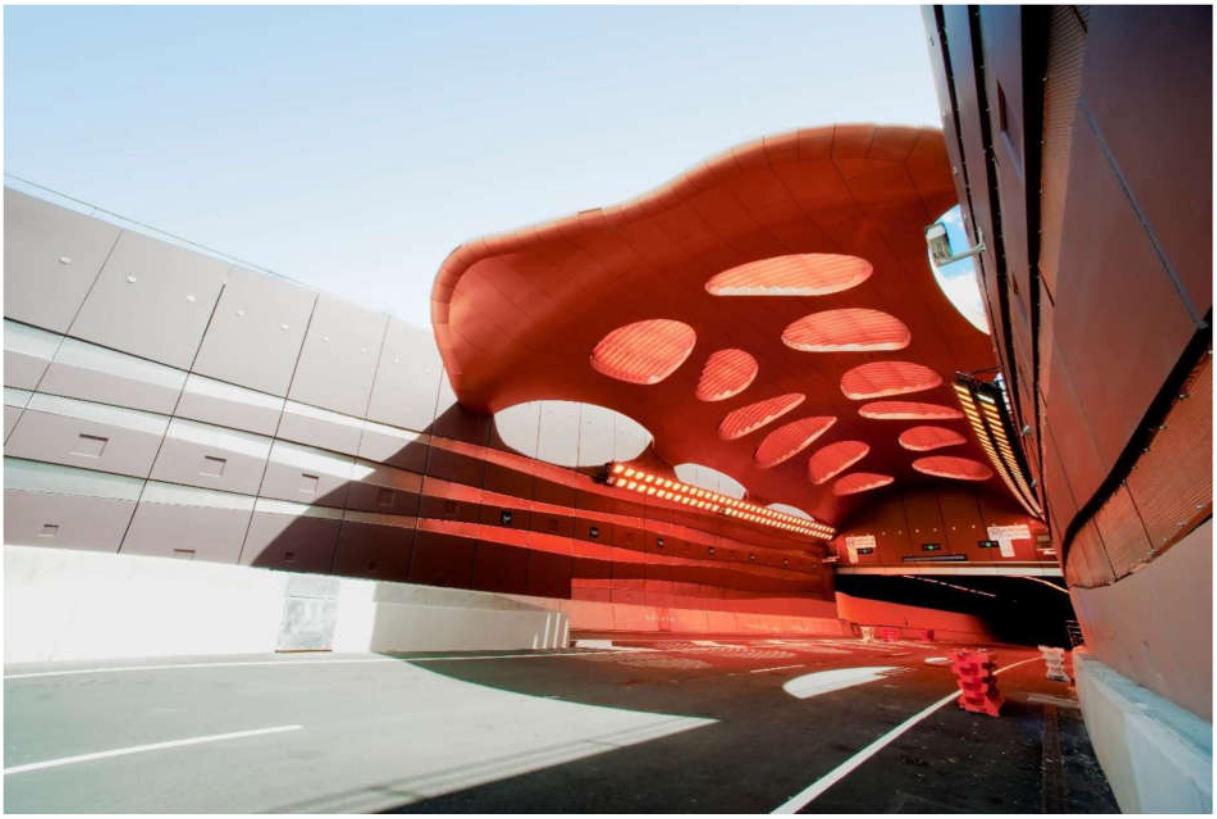
This decision by the CVSC on the long list will be communicated to the public and TACPAC as part of the ongoing public engagement process.

Attachments: Appendix A – Conveyance Options (WSP)
Appendix B – Treatment Options (WSP)
Appendix C – Resource Recovery Options (WSP)
Appendix D – Event Summary and Feedback Overview, Long List Options, Public Information Sessions January 30&31, 2019 (Zinc Strategies)
Appendix E – Revised LWMP Schedule

PRELIMINARY CONVEYANCE LONG LIST OPTIONS
FOR DISCUSSION ONLY

COMOX VALLEY REGIONAL DISTRICT LIQUID WASTE MANAGEMENT PLAN

JANUARY 18, 2019



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CONVEYANCE OPTIONS

Overview

The conveyance options presented here were brainstormed based on the location of the existing infrastructure, environmental and regulatory limitations, existing hydraulics of the Comox Valley Sewer System (CVSS) and typical hydraulic constraints associated with sewerage pumping. This is the level of analysis that is appropriate for Stage 1 of a Liquid Waste Management Plan (LWMP). More detailed engineering conceptual analysis such as a feasibility study is then undertaken for the shortlisted options as part of Stage 2 LWMP, to enable selection of the preferred option. After the LWMP, predesign studies are carried out to size and design the components of the infrastructure comprising the system that optimizes conveyance in the CVSS.

The CVSS serves the Town of Comox, the City of Courtenay, and the Canadian Forces Base Comox. It consists of the Comox Valley Water Pollution Control Centre (CVWPCC), six pump stations of varying size and criticality, and the associated piping network. Two sewer main systems discharge at the CVWPCC:

- North Side System consisting of
  - Hudson Trunk
  - Greenwood Trunk
  - CFB Comox gravity main
  - CFB Comox Pump Station
  - Colby Road Pump Station
- Foreshore System consisting of
  - Courtenay Pump Station
  - K'omoks First Nation Pump Station
  - Jane Place Pump Station
  - Foreshore forcemain along Comox Harbour
  - HMCS Quadra Pump Station and forcemain
  - Foreshore forcemain along Willemar Bluffs

Recent upgrades to the North Side system include the design and installation of the Hudson Trunk and Greenwood Trunk. These gravity sewer mains service the northwest corner of the CVSS and tie-in to the existing CFB Comox gravity sewer main.

The foreshore system is currently at capacity and the section of the sewer main along Willemar Bluffs requires abandonment/removal. The objective of the Conveyance Component of this LWMP is to identify the optimal relocation and upgrade plan for the entire Foreshore System for long-term planning purposes.

Existing Infrastructure Capacity and Condition

The existing Courtenay and Jane Place Pump Stations are approaching their hydraulic capacities and are also reaching the end of their useful life due to aging infrastructure.

As such, regardless of the conveyance option selected, there will likely be a need for renovation and capacity expansion at these two pump stations. However, if the selected alignment has significantly higher discharge pressures than at present, it will trigger a conversion of Courtenay and/or Jane Place PS to high pressure pumping stations. This brings additional design and cost considerations over and above renovation and capacity expansion, and may lead to a complete replacement pump station, rather than a renovation.

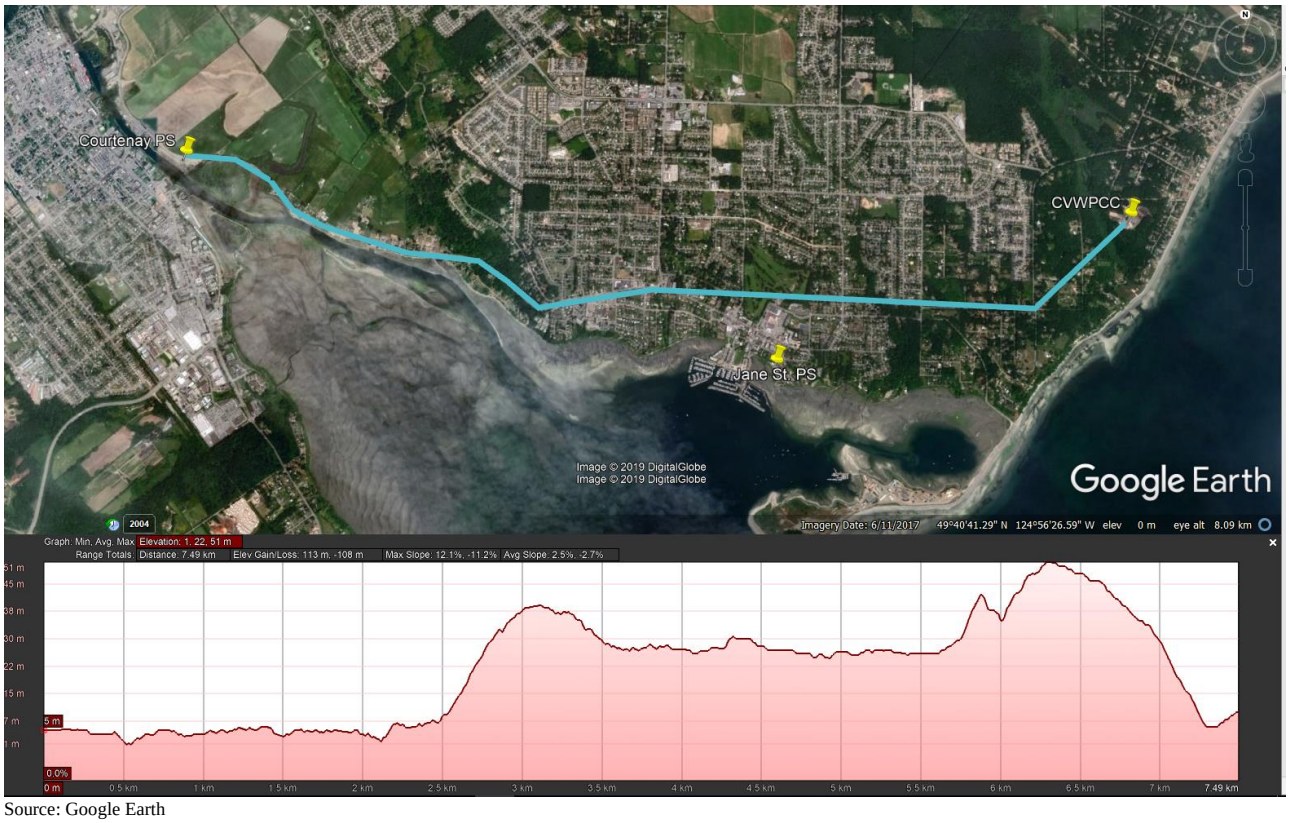
For the purpose of the LWMP, it is essential to consider the above, as even a low-pressure conveyance system will require some renovations and equipment upgrades to the existing pump stations, however these works would likely be achieved within the existing structure.

Options Boundaries and Limiting Factors

The location and number of pump stations depend on the location of the wastewater treatment plant and outfall, which are both fixed, and the hydraulics of the system, which is limited by the topography of the service area.

There are two high elevation sections within the Foreshore system of the CVSS; one at Comox Road, and one at Lazo Road, as shown on the figure below. For the purpose of the LWMP, any overland conveyance option will need to overcome the two high elevation locations within the CVSS. The overland routes are defined as any option not in the estuary or along the shoreline of the estuary. The hydraulics of the conveyance system will depend on the alignment selected. As such, multiple alignment alternatives are discussed within each option that may significantly vary in hydraulic requirements.

A sub-category of the overland routes involves the use of tunnels to convey the sewer through the hills rather than over them, and thus minimize the elevation of the pipe, compared to conventional overland forcemains. Tunneling alignment also have the advantage of being independent of surface features and road alignments. These options are referred to as “Tunneling Options” and two types have been considered, one using the tunnels as forcemains, and the second using the tunnels as gravity flow tunnels, or combinations of the two.



Source: Google Earth

Long-List Option No. 1	Estuary Alignment

Description

This alignment would involve installation of a new forcemain within or along the Comox harbour foreshore. The forcemain would transition to an overland pipe between Comox and the Lazo Road height of land. To convey the sewage over the Lazo Road height of land the following options are suitable:

A. The forcemain from Courtenay PS would continue directly to the CVWPCC such that there is no in-line pump station; however, a tunnel through the Lazo Road height of land would be used to reduce the required pressures in the system. Pending the tunnel elevation, a new pump station may be required in the general vicinity of the existing Jane Place PS. In which case, the existing Jane Place PS would be repurposed as a small subdivision pump station.

Advantages	Disadvantages
Potentially limited hydraulic changes to existing pump stations hydraulics subject to tunnel elevation. Minimizes construction of a forcemain through Comox. Only involves 2 large pump stations.	Involves work along and potentially in the estuary, including environmentally and archaeologically sensitive areas. Elevated maintenance and risk management needs due to proximity to marine environment. Elevated construction and operational risk associated with a tunnel.

B. The forcemain from Courtenay PS would continue directly to the CVWPCC such that there is no in-line pump station. In order to overcome the Lazo Road height of land, Courtenay PS would be upgraded to ensure the forcemain pressure is sufficiently high. As a result, the existing Jane Place PS would not be able to cope with this higher hydraulic requirement and therefore a new high head pump station would be required in the general vicinity of the existing Jane Place PS. This new facility would convey raw sewage into the forcemain between Courtenay PS and the CVWPCC. The existing Jane Place PS would be repurposed as a small subdivision pump station.

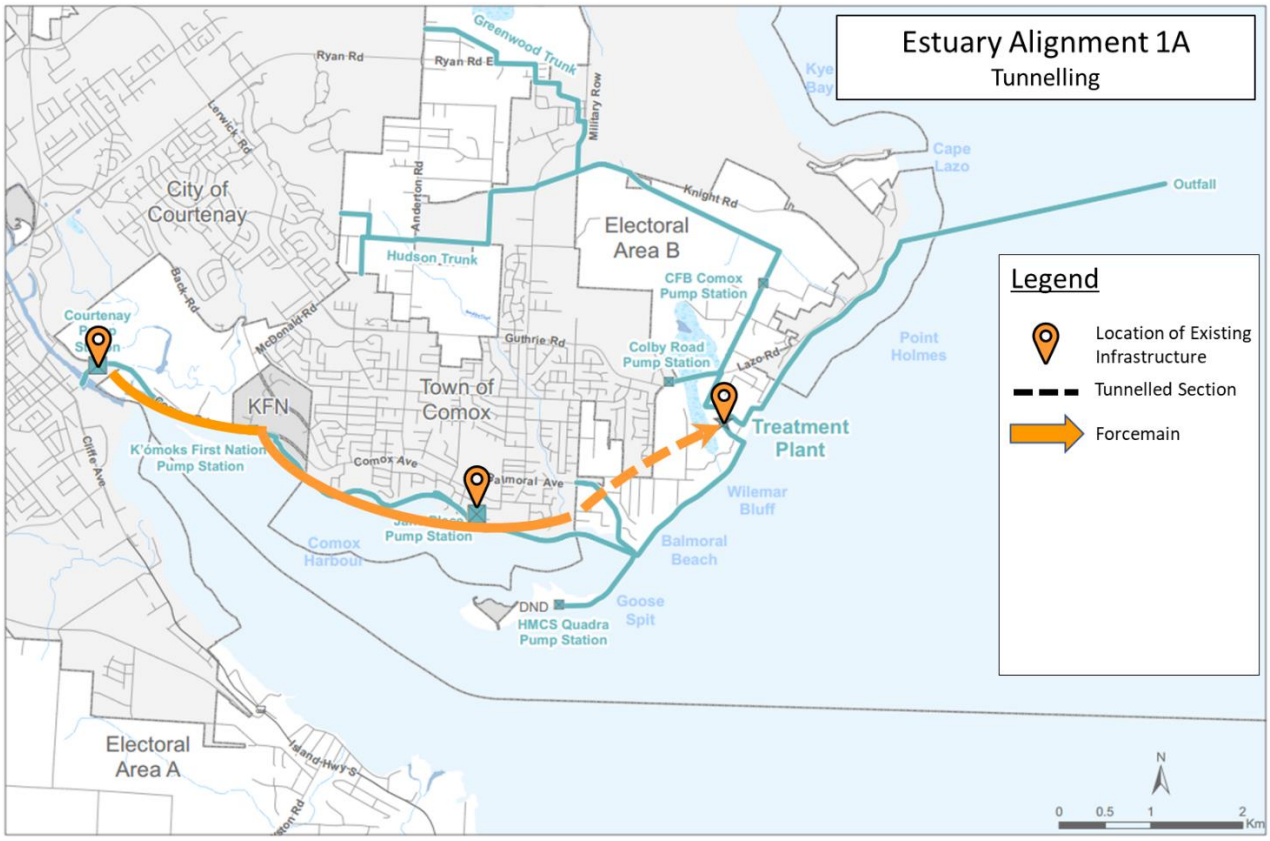
Advantages	Disadvantages
Minimizes construction of a forcemain through Comox. Only involves 2 large pump stations (Jane Place PS repurposed as local facility only).	Involves work along and potentially in the estuary, including environmentally and archaeologically sensitive areas. Elevated maintenance and risk management needs due to proximity to marine environment.

C. A new pump station facility located somewhere between Comox and the Lazo Road height of land. This would be an inline facility which receives raw sewage from the Courtenay PS discharge forcemain. The new pump station would pump the sewage over the Lazo Road height of land and the sewage would flow to the CVWPCC. The Jane Place pump station would tie-in to the Courtenay PS discharge forcemain at a location upstream of the new pump station. The elevation of the new pump station would have to be low enough to permit the Jane Place PS to hydraulically connect.

Advantages	Disadvantages
Minimize hydraulic changes to existing Courtenay and Jane Place PSs. Maximize useful life of existing foreshore forcemain. Minimizes construction of a forcemain through Comox.	Pump in series and single point of complete failure of sewage conveyance system. Involves operation and maintenance of 3 large pump station, one of high criticality.

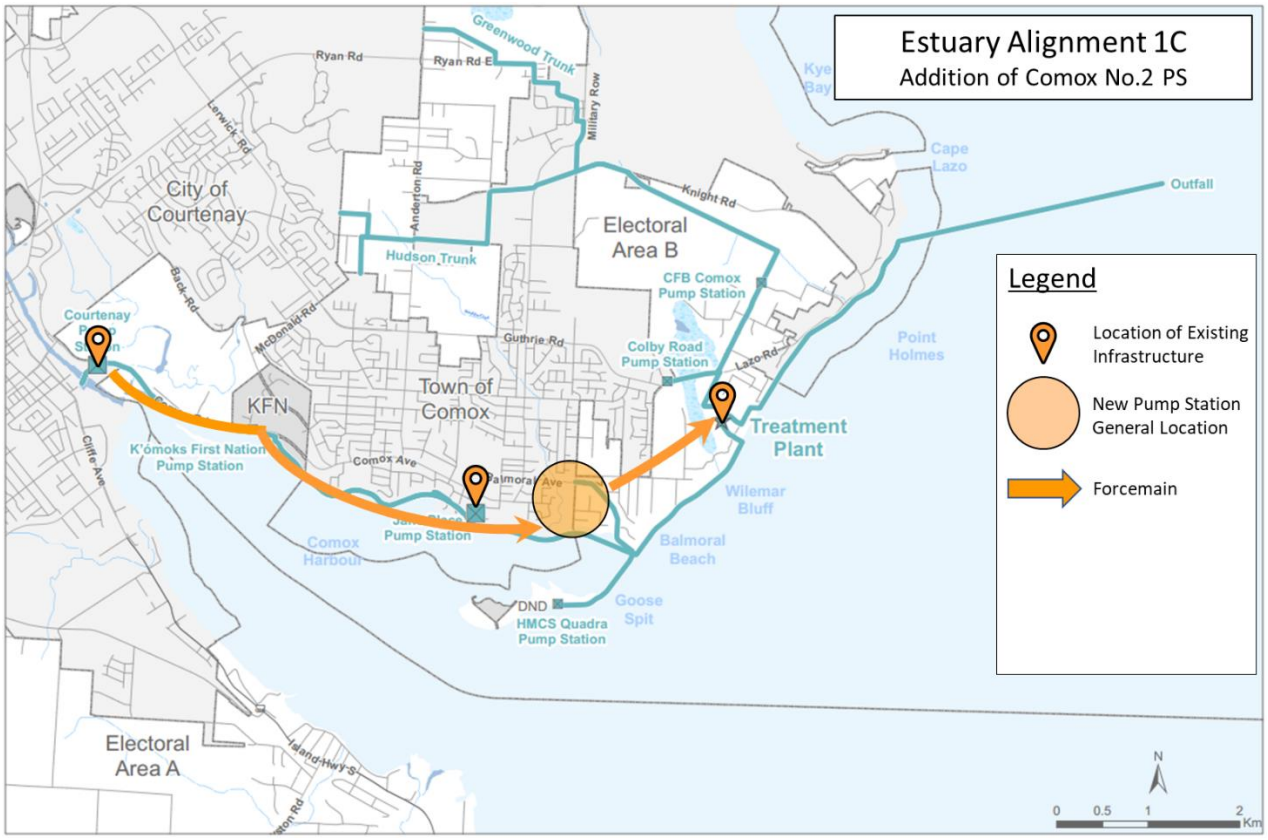
			Involves work along and potentially in the estuary, including environmentally and archaeologically sensitive areas. Elevated maintenance and risk management needs due to proximity to marine environment.

Option 1A



Option 1B

Option 1C



<table>
<tr><th colspan="2">Long-List Option No. 2</th><th>Overland Alignments</th></tr>
<tr><td>Description</td><td colspan="2">
This alignment would involve installation of a new forcemain overland from Courtenay pump station towards the CVWPCC. This forcemain would pass over the Comox Road hill. Due to the change in discharge pressure a significant upgrade or rebuild would be required at the Courtenay Pump Station. Several routing options are available including:

A. The forcemain from Courtenay PS would continue directly to the CVWPCC such that there is no in-line pump station. In order to overcome both the Comox Road hill and the Lazo Road height of land, the Courtenay PS would be upgraded to ensure forcemain pressure is sufficiently high. As a result, the existing Jane Place PS would not be able to cope with this higher hydraulic requirement and therefore a new high head pump station would be required in the general vicinity of the existing Jane Place PS. This new facility would convey raw sewage into the forcemain between Courtenay PS and the CVWPCC. The existing Jane Place PS would be repurposed as a small subdivision pump station.
<table>
<tr><th>Advantages</th><th>Disadvantages</th></tr>
<tr><td>No pipe in the estuary mitigating environmental and archaeological risks.
All pipe and structures on-land to maximize maintenance accessibility.
Only involves 2 large pump stations (Jane Place PS repurposed as local facility only).</td><td>Significant hydraulic changes to the Courtenay PS and Jane Place PS.
Construction of new conveyance system through an area with significant existing infrastructure.</td></tr>
</table>

B. The forcemain from Courtenay PS would convey raw sewage over the Comox Road hill and down into a new pump station, connected in series, somewhere between the Glacier View Drive/Comox Road and Lazo Road heights of land. The elevation of the new pump station would need to be at an elevation to suit the existing discharge pressures from the Jane Place PS. From the new pump station the raw sewage would be conveyed over the Lazo Road height of land to the CVWPCC.
<table>
<tr><th>Advantages</th><th>Disadvantages</th></tr>
<tr><td>No pipe in the estuary mitigating environmental and archaeological risks.
All pipe and structures on-land to maximize maintenance accessibility.
Minimize hydraulic changes to existing Jane Place PS.</td><td>Pump in series and single point of complete failure of sewage conveyance system.
Involves operation and maintenance of 3 large pump station, one of high criticality.
Significant hydraulic changes to the Courtenay PS.
Construction of new conveyance system through an area with significant existing infrastructure.</td></tr>
</table>
</td></tr>
</table>

Option 2A

Option 2B

Long-List Option No. 3	Tunnelling Alignments

Description

This alignment would involve installation of a combination of new forcemains and gravity sewer mains overland from the Courtenay pump station towards the CVWPCC. The tunnel alignments would be selected to either minimize pumping requirements or where possible, utilize gravity sewer mains. The primary areas where tunnelling would be appropriate are under the Comox Rd. and Lazo Rd heights of land. Several combinations of forcemain/gravity sewer mains are described below.

A. Sewage would be pumped from the Courtenay PS to an elevation where a tunnel would be constructed through the Comox Road hill. The forcemain would transition to an open cut installation through Comox and back to a tunnel to pass under the Lazo Road height of land and down to the CVWPCC. The Jane Place pump station could connect to the forcemain. To avoid major modifications to the Jane Place PS the tunnel elevations would have to be selected to suit the existing hydraulics of the Jane Place PS.

Advantages	Disadvantages
No pipe in the estuary mitigating environmental and archaeological risks. Reduces pressures at the existing pump stations. Significantly alleviates the high head requirements for the Courtenay PS and Jane Pl PS as compared to other overland options.	Elevated costs and risks due to tunneling. Construction of new conveyance system through an area with significant existing infrastructure.

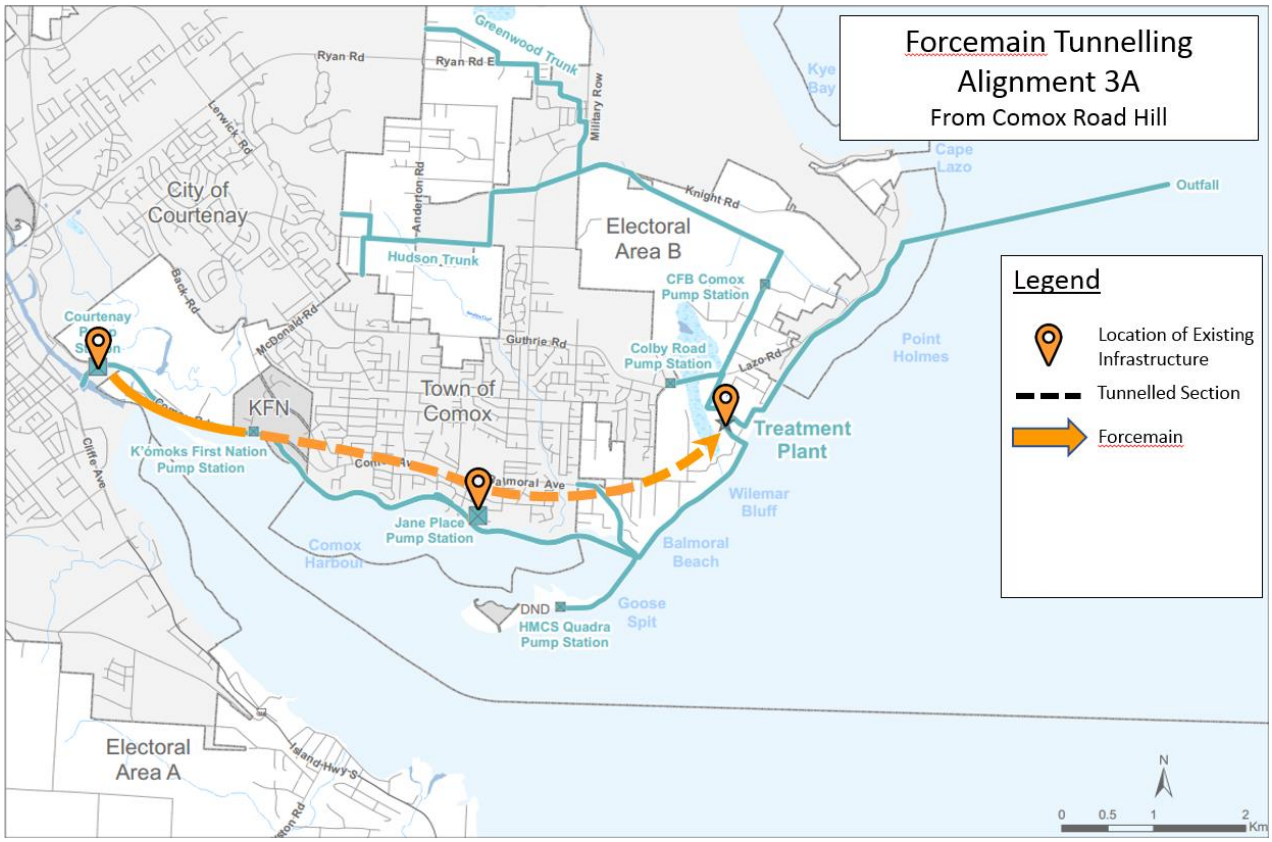
B. A new open cut forcemain would be installed from Courtenay PS and would continue directly to the CVWPCC such that there is no in-line pump station. To reduce pressures a tunnel would be used for the forcemain to pass through the Lazo Road height of land. The existing Jane Place PS would likely not be able to cope with this higher hydraulic requirement and therefore a new high head pump station would be required in the general vicinity of the existing Jane Place PS. This new facility would convey raw sewage into the forcemain between Courtenay PS and the CVWPCC. The existing Jane Place PS would be repurposed as a small subdivision pump station. If the tunnel elevation is sufficiently low, the existing Jane Place PS would be suitable.

Advantages	Disadvantages
No pipe in the estuary mitigating environmental and archaeological risks. All pipe and structures on-land to maximize maintenance accessibility. Alleviates some of the high head requirements as compared to other overland options.	Construction of new conveyance system through an area with significant existing infrastructure. Higher upgrade requirements at the Jane Place PS as compared to the other tunnel options.

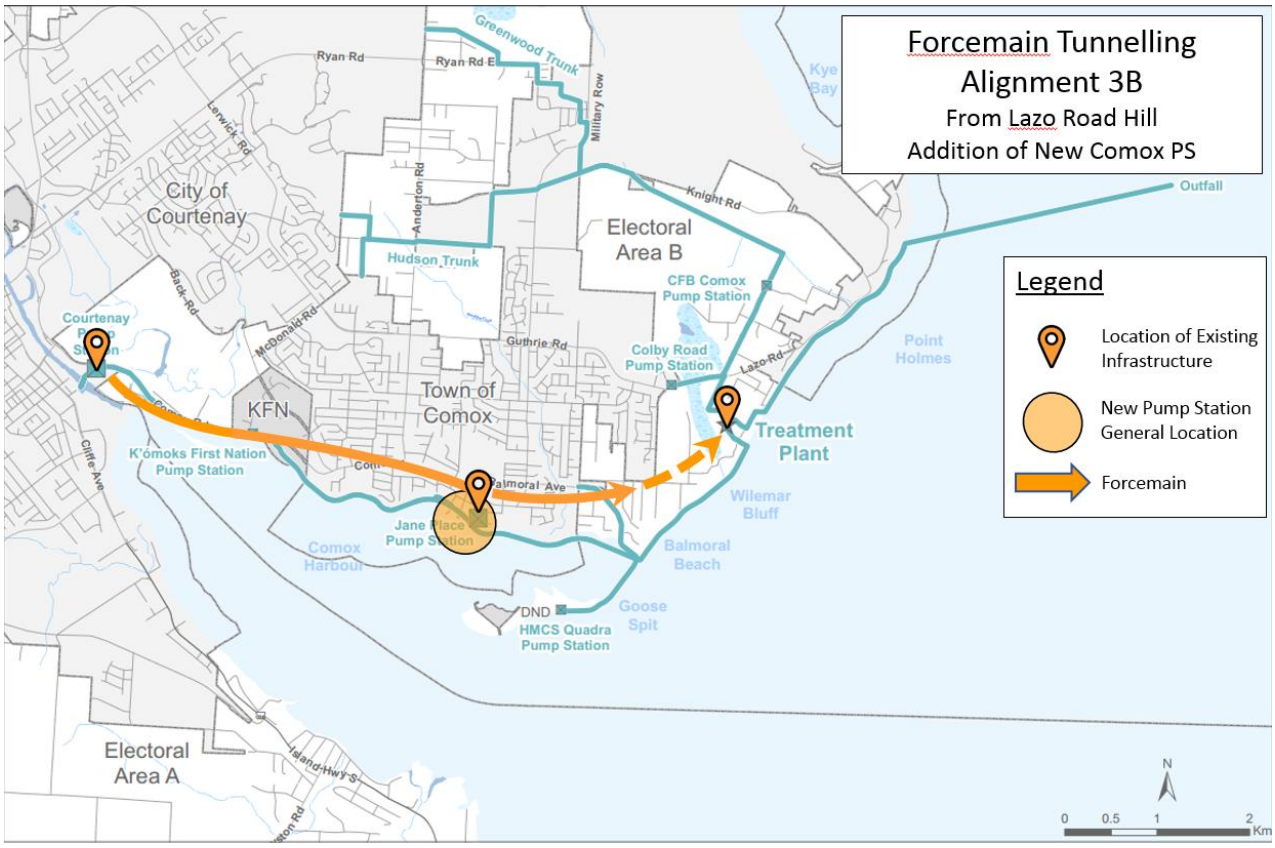
Description	C. A new open cut forcemain would be installed from Courtenay PS and would continue directly to the CVWPCC such that there is no in-line pump station. To reduce pressures a gravity sewer main tunnel would be used to pass through the Lazo Road height of land. Depending on the tunnel elevation the existing Jane Place PS may not require replacement to a high head pump station. The alignment options for the gravity sewer main would be restricted to those which accommodate the required slope. The Jane Place pump station would connect to the gravity sewer main through a new forcemain. The tie-in location would be governed by the gravity sewer main alignment.

Advantages	Disadvantages
No pipe in the estuary mitigating environmental and archaeological risks. All pipe and structures on-land to maximize maintenance accessibility. Alleviates some of the high head requirements for the Courtenay PS and most of the high head requirements for the Jane Place PS as compared to other overland options.	Construction of new conveyance system through an area with significant existing infrastructure. Gravity sewer main alignment must follow a specific slope which is dependent on the topography. Gravity sewer mains are larger diameter as compared to forcemains for the same flow.

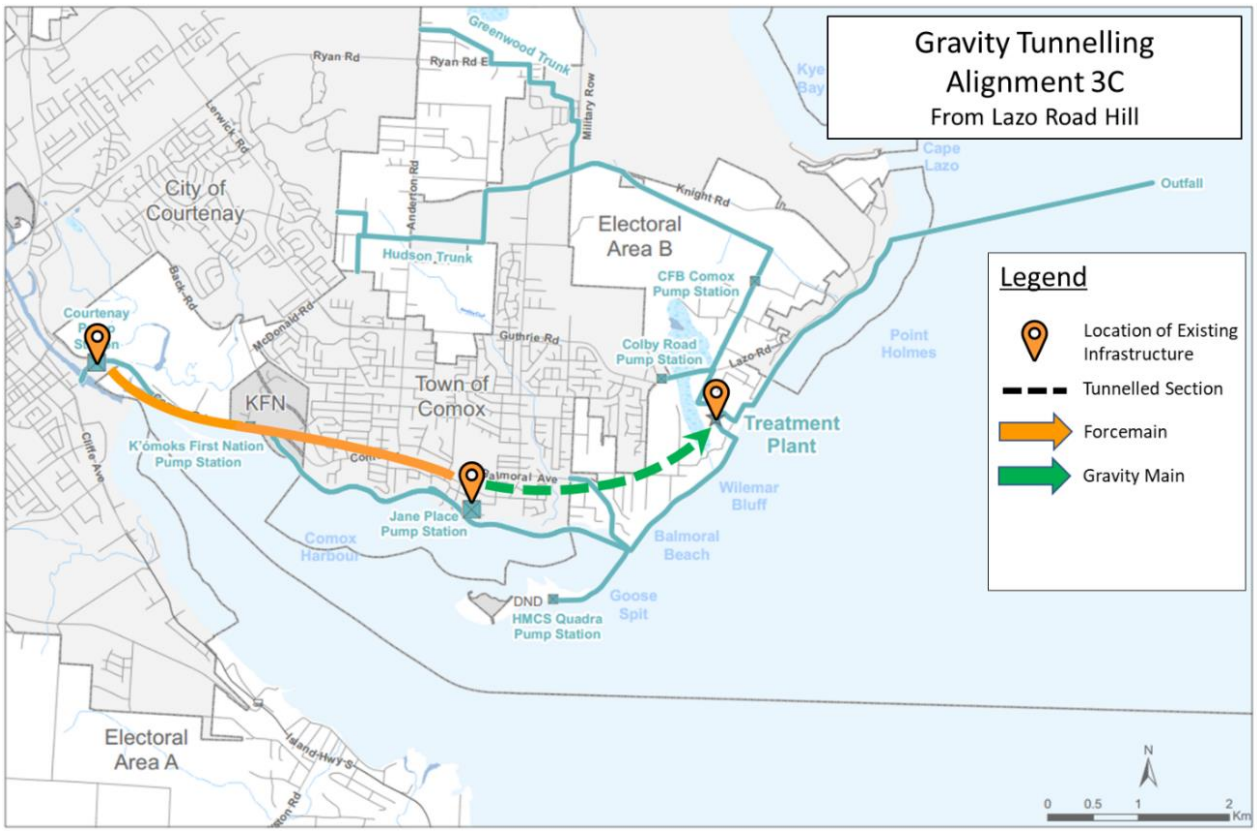
Option 3A



Option 3B



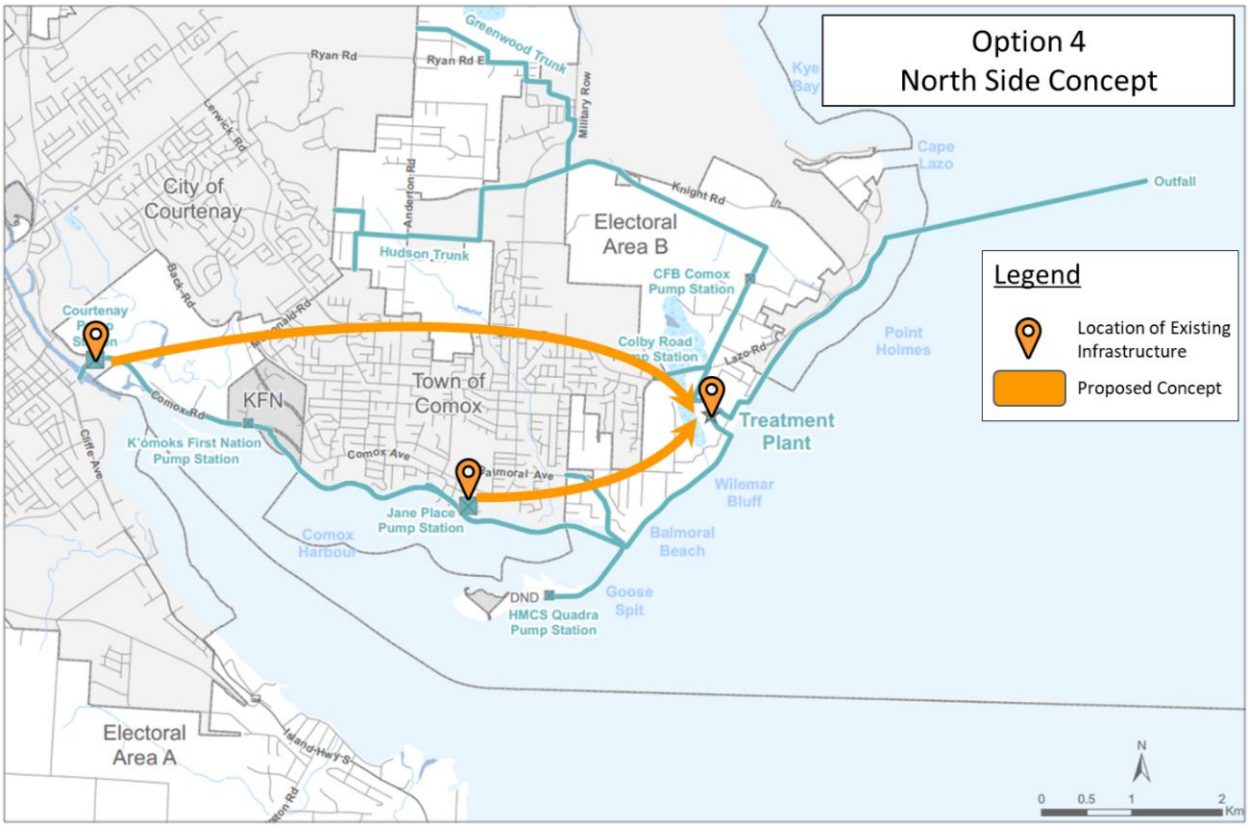
Option 3C



Long-List Option No. 4	North Side Concept
Description	In this concept, raw sewage would be pumped from the location of the existing Courtenay PS along the north side of the CVSS, and directly from the location of the existing Jane Pump Station to the CVWPCC. Courtenay PS would potentially be required to pump sewage to the CVWPCC over the highest elevation of East Courtenay hill (El. 73 m) in a forcemain. Jane Place PS would be required to pump sewage to the CVWPCC over the Lazo ill (El. 51 m) in a forcemain. The two forcemains will combine west of the Lazo hill and one common forcemain will convey the raw sewage to the CVWPCC. Alternately, the two alignments can continue separately over Lazo hill to the CVWPCC. Regardless of the alignment over Lazo hill, this option would trigger a high head upgrade at both the Courtenay and Jane PS, leading to the requirement for a rebuild of both pump stations.

Advantages	Disadvantages
Only involves 2 large pump stations (Jane Place PS repurposed as local facility only) Pump Stations operating in parallels as opposed to in series, minimizing need for a sophisticated control system. Avoids construction in areas with significant infrastructure development. No pipe in the estuary mitigating environmental and archaeological risks. All pipe and structures on-land to maximize maintenance accessibility.	Construction for the linear assets required along two separate alignments within the CVSS, increasing construction disturbance. Operating two partially separate high pressure forcemain networks. The North Side of Glacier View Drive is at a significant higher elevation than that of the South Side (73 m vs 39 m).

Option 4



Long-List Option No. 5	Decentralized Treatment Concept
Description	In this option, an additional wastewater treatment plant would be constructed in close proximity to the location of the existing Courtenay PS to treat the sewage collected and currently conveyed by the Courtenay PS. Due to the location of the outfall, the effluent of a decentralized wastewater treatment plant would have to be conveyed to the location of the existing outfall for discharge. Alignments for the conveyance of the effluent discharge are similar to those discussed within Options 1, 2, and 4, and include estuary, overland, tunnelled, and north side alignments. The sewage collected at the Jane PS will be conveyed to the existing CVWPCC for treatment using an overland or tunnelled option. Overland options would still require a new pump station for the Jane Place PS, and subject to the length and depth of the tunnelled option a new pump station in Comox maybe required.

Advantages	Disadvantages
Eliminates the need for conveyance of Courtenay's raw sewage through the CVSS to the CVWPCC. Alleviate capacity-driven upgrade requirements at the CVWPCC.	Requires the need for conveyance of the decentralized WWTP effluent to the outfall using a new pumping and conveyance system. Significant operational burden with two wastewater treatment plants. Significant cost associated with the construction of a new wastewater treatment plant, and maintenance and operation of two plants. Still requires conveyance of raw sewage overland from Comox.

Option 5

Long-List Option No. 6	Deep Marine Concept
Description	In this option, raw sewage would be pumped from the location of the existing Courtenay and Jane Pump Station to the CWPCC. The forcemain will be sited in deep water, placed on the sea-floor and only buried where there is less than 3m water depth at low tide. This option would require a deeper marine forcemain from Courtenay PS to the CVWPCC, with a forcemain from the Jane PS connecting into the forecemain in the estuary.

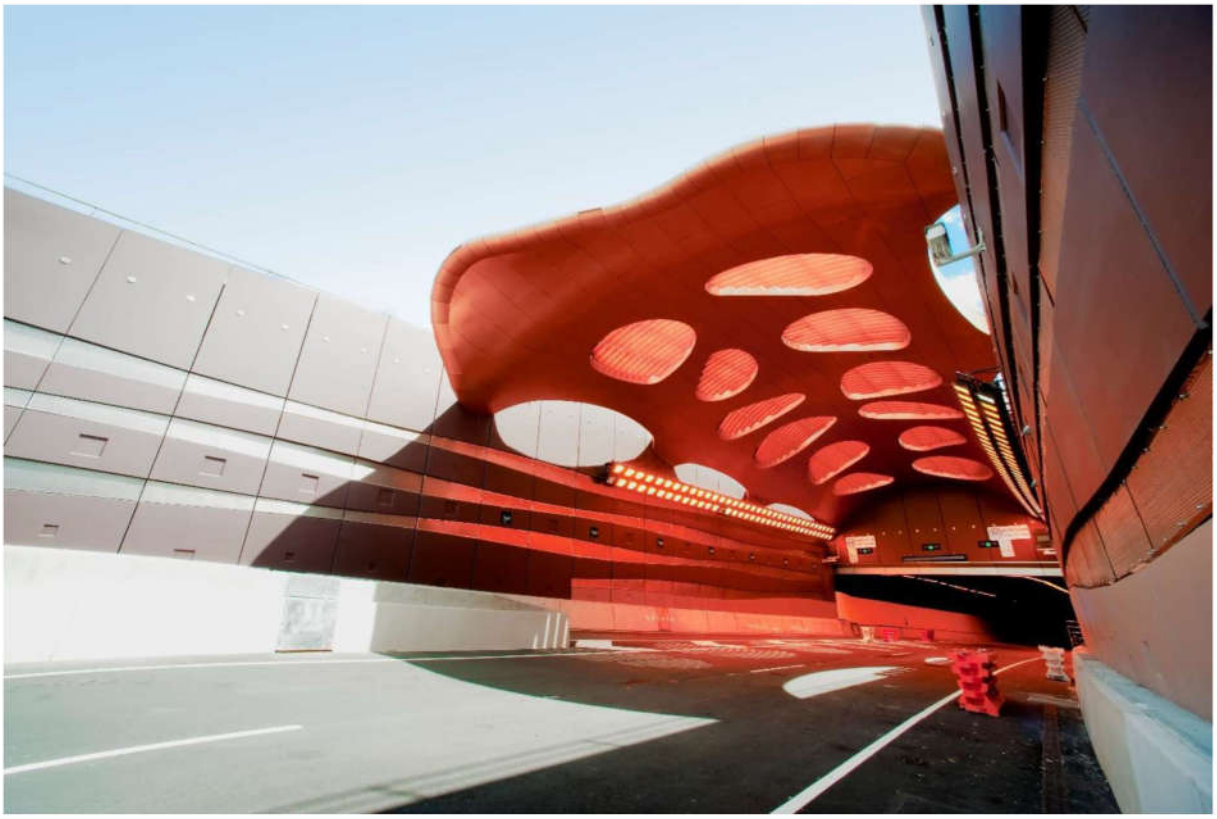
Advantages	Disadvantages
Minimizing pumping head and system pressure No new overland piping. Eliminate sewage pipes in the Comox Harbour foreshore.	Challenging constructability and maintenance. Environmental risk in case of a spill as sewage pipes are still in the estuary. Requires pipe from Jane PS to tie-in within the estuary which passes through sensitive environmental, ecological, and archaeological habitat. Difficult repair and maintenance as pipe is submerged.

Option 6

PRELIMINARY WASTEWATER TREATMENT LONG LIST OPTIONS
FOR DISCUSSION ONLY

COMOX VALLEY REGIONAL DISTRICT LIQUID WASTE MANAGEMENT PLAN

JANUARY 18, 2019



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WASTEWATER TREATMENT OPTIONS

Overview

The wastewater treatment options presented here are based on the level of treatment to be implemented (i.e., the effluent quality that will be produced). This is the level of analysis that is appropriate for a Liquid Waste Management Plan (LWMP). More detailed engineering analysis is then undertaken in feasibility and predesign studies (normally following completion of the LWMP), to select and size the treatment processes that will be used to achieve the recommended effluent standards.

Other aspects of wastewater treatment included in LWMPs typically include identification of wastewater treatment service areas (present and future), and the number and location of treatment facilities. For the CVRD LWMP, the study area is based on the service areas for the existing Comox Valley Water Pollution Control Centre (CVWPCC), namely the Town of Comox, the City of Courtenay, and Canadian Forces Base Comox.

The CVWPCC is a secondary treatment facility located at 445 Brent Road in Comox, that is owned and operated by the Comox Valley Regional District (CVRD). Treated wastewater is discharged from the CVWPCC to the Strait of Georgia through a submerged outfall pipe with diffuser that extends 2,825 metres from shore near Cape Lazo, with the outfall terminus 60 metres below the water surface at low tide.

Location and Number of Treatment Facilities

In some LWMPs, sites for one or more new treatment facilities must be selected.
Identifying one or more locations for a new wastewater treatment plant is a challenging undertaking. One of the challenges is to identify a suitable location for a new outfall discharge; among other things, this requires a right-of-way for the land section of the outfall from the treatment plant site to the water's edge, where the marine (submerged) section of the outfall pipe begins. The discharge itself is preferably located far from shore in deep water, so that swimming beaches and shellfish beds are not impacted. It is often practical to begin with identification of one or more feasible locations for an outfall discharge, and then identify potential sites for treatment facilities that are within a reasonable distance of the outfall location, and where a feasible route for the land section of the outfall can be developed. Environmental Impact Studies of the receiving environment are required when selecting the location of the outfall discharge; these studies typically consider receiving water ecology and use (marine flora and fauna, recreational use, etc.), local currents, prevailing winds, expected migration and dilution of the discharge plume, etc. The environmental impacts of construction (e.g. in the intertidal zone) must also be evaluated and mitigated.

The costs and benefits of a single wastewater treatment plant versus several smaller plants located throughout a service area (sometimes referred to as "distributed treatment") have been extensively evaluated in British Columbia at a number of locations (e.g., the Greater Victoria area, North Vancouver, and a number of smaller communities such as Powell River). In general, the evaluations have resulted in selection of the single treatment plant approach, due to the significantly higher costs associated with construction and operation of multiple treatment facilities, and the difficulties associated with finding multiple locations for treatment plants and outfall discharges that are acceptable to local residents and that meet all of the technical and regulatory requirements.

As mentioned earlier, a single existing wastewater treatment facility (located at Brent Road near Cape Lazo) and outfall serves the communities of Courtenay and Comox as well as CFB Comox. The existing treatment plant site has adequate unused area for major expansion of the facilities in future as required. Attempting to locate a site for a second treatment facility within the existing service area would be very difficult, partly due to the challenges associated with finding a suitable location for a second outfall to deep water. In this case, there is no apparent driver for constructing additional

treatment plants and outfalls to serve the Comox/Courtenay/CFB area, and consequently this does not form part of the wastewater treatment options analysis.

It is possible that a location may be identified within the service area where there is potential for significant use of reclaimed water (e.g., for irrigation or other purposes); in this case, it may be feasible to locate a water reclamation facility near the user(s) of reclaimed water, and direct a portion of the untreated wastewater to that location, thereby reducing the wastewater load to the CVWPCC at Brent Road. This possibility will be explored in the Resource Recovery part of the LWMP.

Costs of Wastewater Treatment

The costs of constructing wastewater treatment facilities have risen dramatically in recent years. Capital costs for constructing new facilities can sometimes be partially offset by grants from senior government. However, ongoing operating and maintenance (O&M) and replacement (asset management) costs are entirely borne by the local government. In general, the higher the effluent standards, the greater the capital and ongoing O&M costs of treatment. In general, it is more economical to have a single treatment plant, unless the service area is relatively large with development concentrated in nodes that are far apart.

For the purposes of the LWMP, it is important to carefully consider the capital and O&M costs of wastewater treatment, since these costs are borne by taxpayers. Therefore, it is essential to balance the desire for implementing the highest treatment standards possible with the financial resources available to the community; this particularly applies to O&M costs, which are not eligible for grant funding and fall entirely on local taxpayers.

Emerging Contaminants

Emerging Contaminants have been defined as *"Constituents, which have been identified in water, that are considered for regulatory action pending the development of additional information on health and environmental impacts"* (from Metcalf & Eddy, 2014). Examples of Emerging Contaminants may include pharmaceutically active compounds (e.g., antibiotics), endocrine disrupting compounds that affect natural hormones in animals and humans, personal care products, and disinfection byproducts. Many of these products are known to be potentially harmful, but much remains to be learned about their behavior in the environment, and potential methods of treatment. As it stands, domestic wastewater treatment plants are not specifically designed to remove this type of contaminant, although some may be degraded or transformed in the treatment processes, and some may be incorporated into the waste solids.

According to Water Research Foundation Fact Sheet (2016): *Detecting a compound in water does not mean that adverse health effects will occur or are likely. In general, no relationships have been established between pharmaceuticals in water at environmental levels and adverse effects in human Strategies for preventing endocrine disrupting compounds (EDCs) and pharmaceuticals and personal care products (PPCPs) from entering water supplies include improved wastewater treatment and other source water protection strategies. Once EDCs and PPCPs have entered a utility's water supply, no single treatment process can remove them all due to their wide range of physicochemical properties. In general, both conventional and advanced water treatment systems have the capability to reduce the concentration of EDCs and PPCPs in water to some degree, though removal by conventional treatment processes is limited. Advanced treatment processes such as nanofiltration, reserve osmosis, and activated carbon are more effective but can be expensive and energy-intensive.*

Metals may also be a concern where they accumulate to toxic concentrations. Domestic wastewater treatment plants are not designed to remove metals from the wastewater stream. However, it has been shown that many of the so-called "heavy metals" tend to associate with solid particles in water. Thus removal of suspended solids from wastewater will result in at least partial removal of these associated metals as well (the solids must also be dealt with but are much less in volume than the wastewater stream).

Microplastics have recently been identified as a concern as well. According to Water Research Foundation (2018): *Studies have found that WWTPs removed between 90-99% of microplastics (<0.5 cm), with most being captured in the sludge. However, when dealing with large volumes of effluent, even a small concentration of microplastics being released can result in a significant contribution to the environment. Current research indicates that the microplastics in the environment has not caused adverse effects on aquatic wildlife as opposed to macroplastics, which can cause physical harm to fish-eating birds, aquatic mammals, reptiles and fish. If it is shown that microplastics should be removed from effluent, filtration is likely the best treatment, though more research on removal of microplastics, particularly for sizes smaller than 300 um, is needed.*

Options for Treatment

For the purposes of Stage 1 of the LWMP, four options for treatment were identified for discussion with the TAC/PAC. The four options are based on the effluent quality to be produced as stated at the beginning of this discussion, and are presented as concepts for planning of future expansions and/or upgrades. Option 1 would be to meet the provincial and federal discharge standards; these standards have been developed to protect the receiving environment, and the provincial regulation allows the regulating body to impose additional standards in specific cases where this is shown to be needed to protect the environment. Options 2, 3 and 4 are based on voluntarily enhancing effluent quality beyond what is required by the regulations. Options 1 through 4 are described on the following pages. Note that Option 2 describes the current configuration of the CVWPCC, with the addition of disinfection.

Long-List Option No. 1	Meet Regulatory Discharge Standards

Description

Option 1 would meet federal and provincial regulatory requirements for secondary treatment with discharge to open marine waters (the CVWPCC outfall extends 2,825 metres from shore at Cape Lazo into the Strait of Georgia and the discharge diffuser is 60 metres below water at low tide). As with the other options, an updated Environmental Impact Study (EIS) would be required to identify any additional treatment requirements that might be needed to address protection of the receiving environment according to provincial regulations. If the EIS did not identify any additional requirements beyond what is required to meet the secondary treatment discharge standards set out in the B.C. Municipal Wastewater Regulation (MWR) and the Canada Wastewater Systems Effluent Regulations (WSER), the following treatment and discharge standards would apply to Option 1:

MWR

Secondary treatment for flows up to two times average dry weather flow (2xADWF):

- 5-day Biochemical Oxygen Demand (BOD_5): max. day 45 mg/L
- total suspended solids (TSS): max. day 45 mg/L
- pH 6 to 9
- ammonia concentration does not cause chronic toxicity at the edge of the initial dilution zone (IDZ)

Primary treatment for flows in excess of 2xADWF (interim):

- 5-day Biochemical Oxygen Demand (BOD_5): max. day 130 mg/L
- total suspended solids (TSS): max. day 130 mg/L
- note that if flows are > 2xADWF during a storm or equivalent snowmelt event with a less than 5-year return period, a discharger must (have a liquid waste management plan or specific study and implement the plan's or study's measures.

WSER

- 5-day Biochemical Oxygen Demand (BOD_5): monthly avg. not to exceed 25 mg/L
- total suspended solids (TSS): monthly avg. not to exceed 25 mg/L
- total residual chlorine < 0.02 mg/L
- un-ionized ammonia < 1.25 mg N/L at 15°C
- note that the WSER standards apply to the combined discharge – this may require chemical addition to enhance primary treatment or other measures to ensure that the secondary treatment bypass does not cause the combined effluent to exceed the WSER discharge standards for BOD_5 and TSS

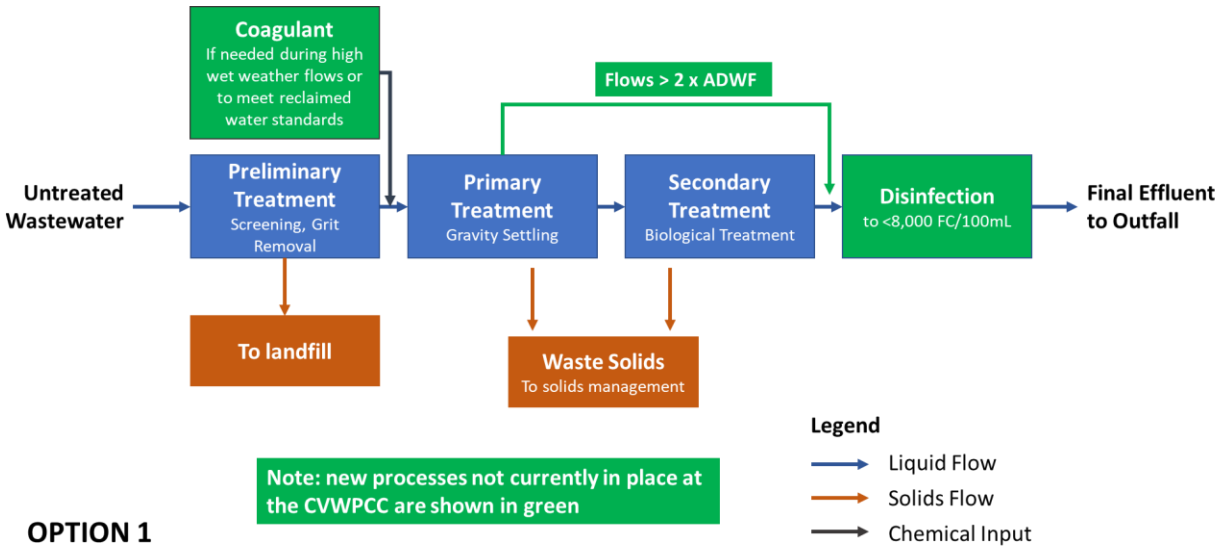
An EIS was completed for the CVWPCC discharge in 2010; this showed that disinfection of the effluent to achieve a fecal coliform count of less than 8000/100 mL in the CVWPCC discharge would be required to protect local shellfish resources outside the initial dilution zone (IDZ). Disinfection to this standard was assumed for Option 1.

Note that plant data from 2013 to 2017 show that the number of days when flows exceeded 2xADWF ranged from 0 days (2013) to 31 days (2015) – over the 5 years of record, flow exceeded 2xADWF on a total of 58 days (the total volume of flow greater than 2xADWF represented only about 1% of the total plant flow over that period)

Advantages	Disadvantages
• meets regulatory requirements for discharge to open marine waters • avoids the cost of subjecting relatively infrequent high wet weather flows to secondary treatment	• flows in excess of 2xADWF would bypass secondary treatment and so would not receive biological treatment

• coagulating chemicals can be added to enhance primary treatment if needed when flows exceed 2xADWF • includes disinfection to protect shellfish resources outside the IDZ	

Process Schematic for Option 1



Long-List Option No. 2	Provide Secondary Treatment for all Flows

Description

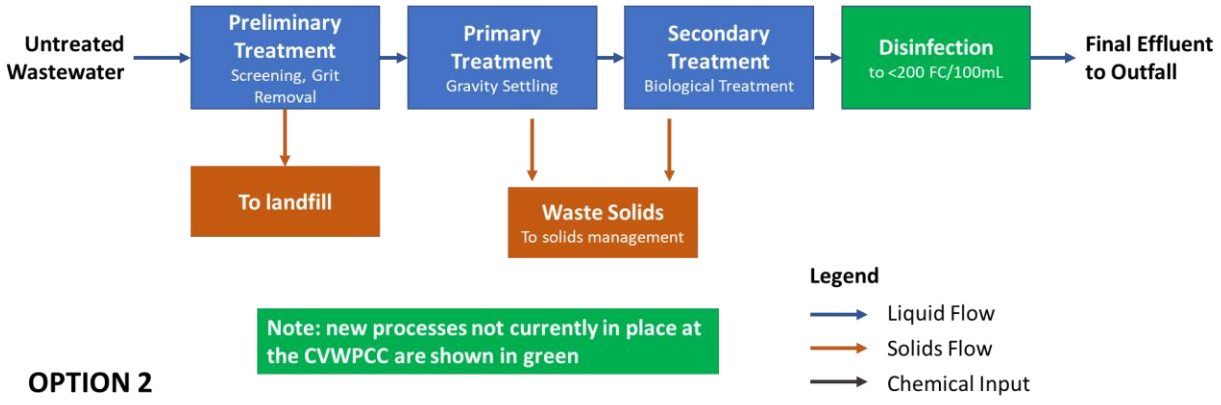
Option 2 is similar to Option 1, except that there would be no wet weather bypass of flows in excess of 2xADWF around secondary treatment. For Option 2, the entire plant influent flow would pass through secondary treatment (this is the current configuration of the CVWPCC). As with the other options, an updated Environmental Impact Study (EIS) would be required to identify any additional treatment requirements that might be needed to address protection of the receiving environment. For Option 2, it was assumed that the disinfection process would be designed to achieve recreational standards (i.e. 200 FC/100 mL) in the undiluted effluent. The following treatment and discharge standards would apply to Option 2.

Secondary treatment for the entire plant flow:

- 5-day Biochemical Oxygen Demand (BOD_5): max. day 45 mg/L, monthly avg. not to exceed 25 mg/L
- total suspended solids (TSS): max. day 45 mg/L, monthly avg. not to exceed 25 mg/L
- pH 6 to 9
- ammonia concentration does not cause chronic toxicity at the edge of the initial dilution zone (IDZ)
- total residual chlorine < 0.02 mg/L
- un-ionized ammonia < 1.25 mg N/L at 15°C
- disinfection - fecal coliforms not to exceed 200 FC/1900 mL

Advantages	Disadvantages
• exceeds regulatory requirements for discharge to open marine waters • entire plant flow is subjected to secondary (biological) treatment • includes enhanced disinfection to protect shellfish resources • effluent meets standards for reclaimed water use for lower exposure potential	• secondary treatment must be sized accommodate all wet weather flows, increasing capital and operating costs compared to Option 1

Process Schematic for Option 2



Long-List Option No. 3	Advanced Treatment for up to 2xADWF

Description

Option 3 would incorporate the same preliminary, primary and secondary treatment processes as Option 2. In addition, Option 3 would include advanced filtration of the secondary treated effluent for flows up to two times the average dry weather flow (2xADWF) to enhance removal of suspended solids. As with the other options, an updated Environmental Impact Study (EIS) would be required to identify any additional treatment requirements that might be needed to address protection of the receiving environment. For Option 3, it was assumed that the disinfection process would be designed to achieve standards for lower exposure potential (i.e. 200 FC/100 mL) in the undiluted (combined) effluent. The following treatment and discharge standards would apply to Option 3.

Advanced treatment (filtration) for flows up to 2xADWF:

- 5-day Biochemical Oxygen Demand (BOD_5): max. day 10 mg/L, avg. 5 mg/L
- total suspended solids (TSS): max. day 10 mg/L, avg. 5 mg/L
- pH 6 to 9
- ammonia concentration does not cause chronic toxicity at the edge of the initial dilution zone (IDZ)
- total residual chlorine < 0.02 mg/L
- un-ionized ammonia < 1.25 mg N/L at 15°C
- future addition of processes that are proven for removal of emerging contaminants at municipal wastewater plants

Primary treatment for flows in excess of 2xADWF (interim):

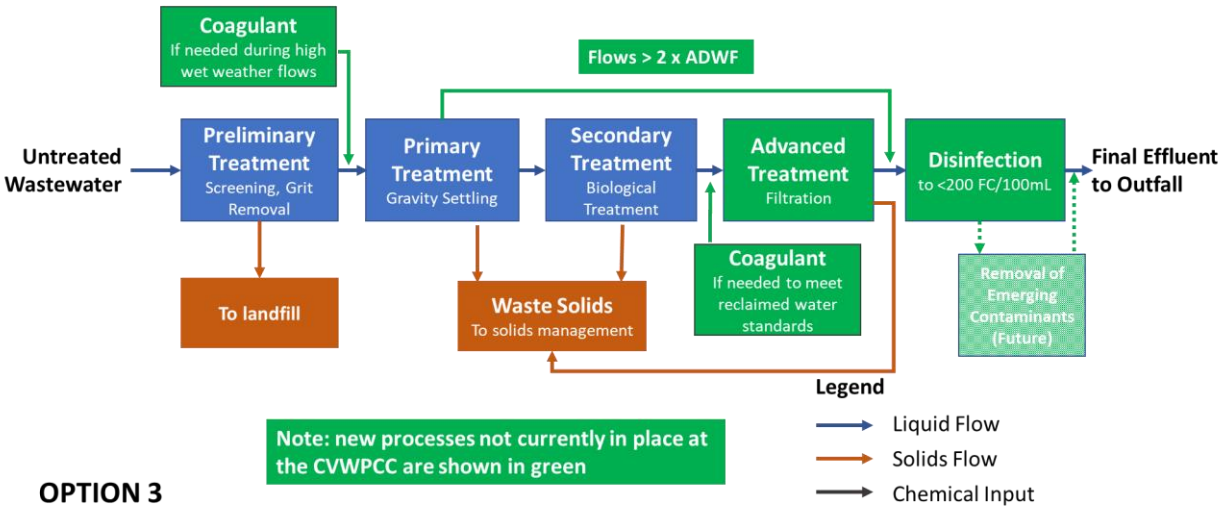
- 5-day Biochemical Oxygen Demand (BOD_5): max. day 130 mg/L
- total suspended solids (TSS): max. day 130 mg/L
- note that if flows are > 2xADWF during a storm or equivalent snowmelt event with a less than 5-year return period, a discharger must (have a liquid waste management plan or specific study and implement the plan's or study's measures.

Disinfection of combined effluent - fecal coliforms not to exceed 200 FC/100 mL

note that plant data from 2013 to 2017 show that the number of days when flows exceeded 2xADWF ranged from 0 days (2013) to 31 days (2015) – over the 5 years of record, flow exceeded 2xADWF on a total of 58 days (the total volume of flow greater than 2xADWF represented only about 1% of the total plant flow over that period)

Advantages	Disadvantages
• exceeds regulatory requirements for discharge to open marine waters • majority of plant flow is subjected to advanced treatment • includes enhanced disinfection to protect shellfish resources • combined effluent meets standards for reclaimed water use for lower exposure potential • ability to increase coagulation and disinfection to meet standards for moderate or greater exposure potential	• higher capital and operating costs than Options 1 and 2 • flows > 2xADWF do not pass through advanced treatment • higher operational costs if treating reclaimed water to greater exposure potential standard

Process Schematic for Option 3



Long-List Option No. 4	Advanced Treatment for all Flows

Description

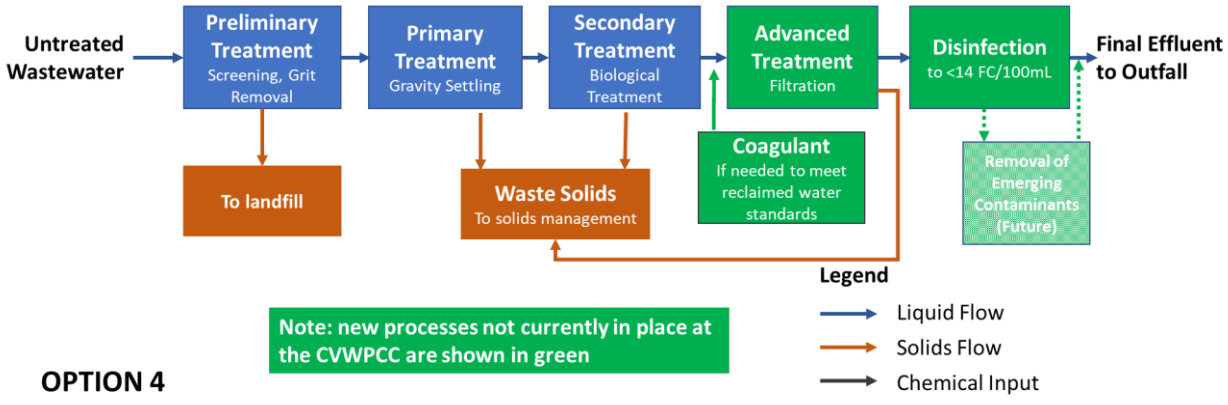
Option 4 would incorporate the same preliminary, primary, secondary, and advanced treatment processes as Option 3. However, for Option 4, the entire plant influent flow would pass through advanced filtration to enhance removal of suspended solids. As with the other options, an updated Environmental Impact Study (EIS) would be required to identify any additional treatment requirements that might be needed to address protection of the receiving environment. For Option 4, it was assumed that the disinfection process would be designed to achieve shellfish standards (i.e. 14 FC/100 mL) in the undiluted effluent, and disinfection could be increased to meet the reclaimed water standards for greater exposure potential (<1FC<100mL) if desired. The following treatment and discharge standards would apply to Option 4.

Advanced treatment for the entire plant flow:

- 5-day Biochemical Oxygen Demand (BOD_5): max. day 10 mg/L, avg. 5 mg/L
- total suspended solids (TSS): max. day 10 mg/L, avg. 5 mg/L
- pH 6 to 9
- ammonia concentration does not cause chronic toxicity at the edge of the initial dilution zone (IDZ)
- total residual chlorine < 0.02 mg/L
- un-ionized ammonia < 1.25 mg N/L at 15°C
- disinfection - fecal coliforms not to exceed 14 FC/100 mL
- future addition of processes that are proven for removal of emerging contaminants at municipal wastewater plants

Advantages	Disadvantages
• exceeds regulatory requirements for discharge to open marine waters • entire plant flow is subjected to advanced treatment • includes enhanced disinfection to protect shellfish resources • effluent meets standards for reclaimed water use for greater exposure potential	• higher capital and operating costs than Options 1, 2 and 3 • higher operational costs if treating reclaimed water to greater exposure potential standard

Process Schematic for Option 4

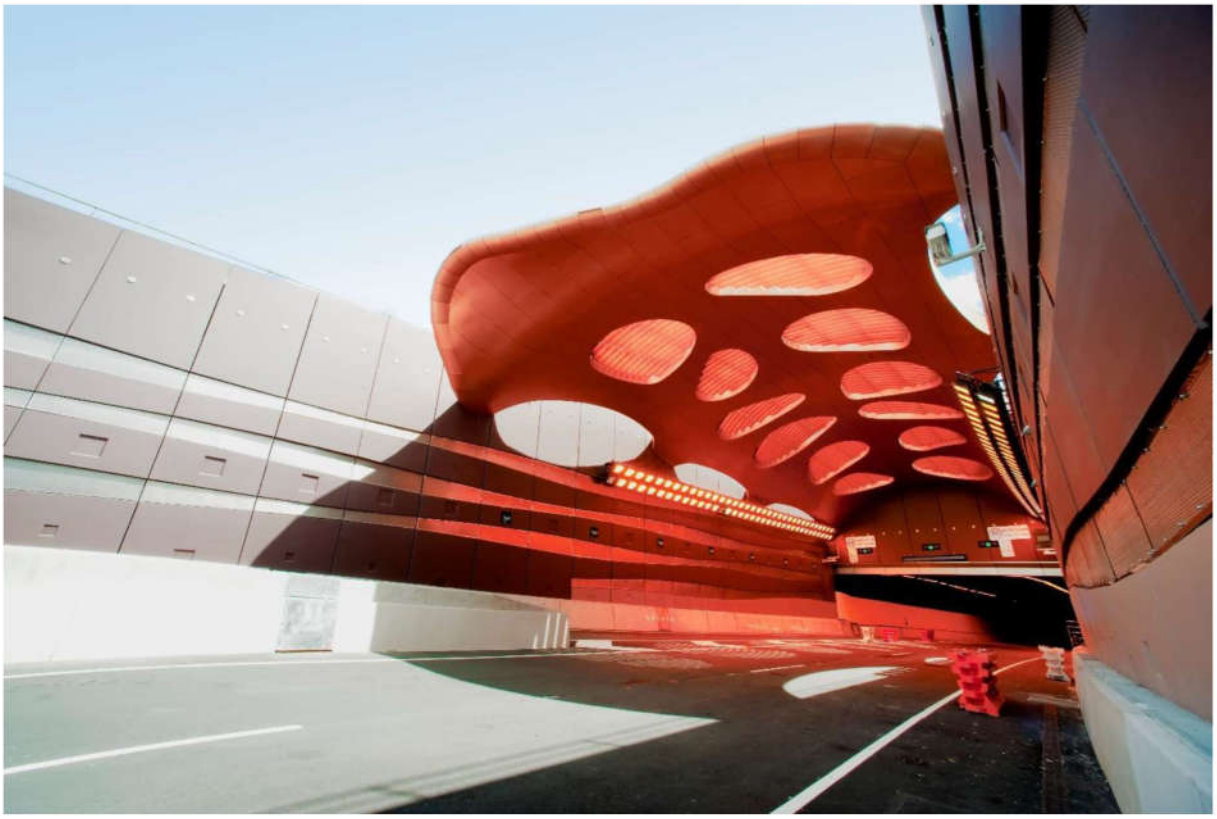


Appendix C

PRELIMINARY RESOURCE RECOVERY LONG LIST OPTIONS
FOR DISCUSSION ONLY

COMOX VALLEY REGIONAL DISTRICT LIQUID WASTE MANAGEMENT PLAN

JANUARY 18, 2019



wsp

RESOURCE RECOVERY OPTIONS

Overview

In recent years, there has been an increasing emphasis on recovery of resources that can be extracted from the wastewater stream or that can be produced during treatment. In British Columbia, the success of applications for grant funding assistance from senior government for design and construction of wastewater conveyance and treatment facilities often depend in part upon inclusion of resource recovery, which may include the following:

- use of reclaimed effluent for irrigation or other purposes;
- installation of heat exchangers in the wastewater stream for heating and cooling of buildings;
- production of biogas (methane) through treatment of waste solids, which can be used in combustion facilities designed for cogeneration of electrical power and heat or in boilers for hot water heating systems;
- use of digested waste solids as a natural solid conditioner/fertilizer, and/or use of waste solids as a feedstock to produce compost for household or commercial use;
- production of mineral pellets rich in nitrogen and phosphorus (struvite) for use as fertilizer; and
- use of hydroelectric turbines to generate electrical power from the outfall discharge.

The feasibility of the various resource recovery option must be carefully evaluated. The design and installation of resource recovery facilities can add substantially to the capital and operating costs of wastewater treatment facilities. If there are no potential customers for the recovered resources or if those customers are located far from the recovery location, investment in resource recovery may be inadvisable. Each situation must be evaluated on its own merits, beginning with identification of potential uses and users of the reclaimed resources. Brief discussions of each resource recovery option in the context of the CVRD LWMP are presented below.

Reclaimed Water

Some of the wastewater treatment options (namely Options 3 and 4) are designed to produce effluent quality that meets the requirements for use of reclaimed water. For Options 1 and 2, if one or more uses for reclaimed water are identified, the appropriate amount of secondary treated effluent can be diverted to a dedicated filtration and disinfection system to produce reclaimed water. As set out in the Municipal Wastewater regulation, it is required to maintain a chlorine residual in the reclaimed water at the point of use *unless the addition of chlorine will detrimentally impact flora or fauna, or at the point of use fecal coliforms remain below levels set in municipal effluent quality requirements for reclaimed water, and users are adequately informed regarding appropriate use of the reclaimed water.* Disinfection of reclaimed water is normally accomplished through the addition of sodium hypochlorite (bleach).

Production of reclaimed water adds to the cost of treatment, so it is important to identify the potential market for this resource. It is normally cost effective to use a portion of the treated effluent for non-potable applications within the treatment plant itself (e.g., for equipment sprays, washdown water, landscape irrigation, etc.). This typically represents a relatively small portion of the total wastewater flow, but it does offset use of potable water at the plant. A small amount of reclaimed effluent is currently used at the CVWPCC for washdown in enclosed areas. Opportunities for expanding use of reclaimed water within the plant should be considered during design of future upgrades.

Offsite applications may represent opportunities for use of larger amounts of reclaimed water (irrigation, industrial use, or stream and wetlands augmentation). The economics of offsite use depend heavily on the distance from the reclaimed water production facility to the user. Other factors include the seasonal pattern of demand for water, the cost of alternative water sources, and the water quality requirements of the potential user.

In cases where a significant potential user of reclaimed water has been identified but the distance between the main wastewater treatment plant and the user makes the project unfeasible for economic reasons, it may be possible to locate a relatively small water reclamation plant near the user and divert some of the untreated wastewater to that location for treatment and use. The feasibility of this will depend on the amount of reclaimed water to be produced and other local factors.

Heat Recovery

Extraction of heat from the wastewater stream at pumping stations and treatment facilities for space heating of buildings is becoming more common (the same system can also be used for cooling in summer). As with reclaimed water, heat recovery for use onsite at wastewater treatment facilities is generally the most feasible from a cost standpoint. Use of this type of system can be considered for incorporation into future upgrades at the CVWPCC.

If a potential user or users of heat is located near the pumping station or wastewater treatment plant, it may be feasible to expand the system to export heat to a nearby specific user (an example of such a system is in place at the Saanich Peninsula wastewater treatment plant, where heat is extracted from the effluent for use at an adjacent municipal swimming pool). In some cases, if there is high density development near the treatment plant, it may be feasible to install a District Heating System that circulates recovered heat through a heating loop for use by multiple customers. Due to the cost involved in installing a District Heating System, it is preferred if there is a year-round demand for the recovered heat (e.g., swimming pool, commercial laundry).

Production of Biogas

At larger wastewater treatment plants (service population of at least 50,000 to 100,000 people), it may prove economical to install anaerobic digestion facilities for treatment of waste solids. Anaerobic digesters reduce the amount of solids and produce methane gas that can be scrubbed and then used in cogeneration engines for production of combined heat and electrical power for use at the treatment plant, or the gas may be cleaned to the required standard for sale to the local natural gas utility. Anaerobic digestion is not currently practiced at the CVWPCC, and economies of scale mean that it would not be economical at present. This may be considered in future as a possible resource recovery strategy when the plant service population increases.

Beneficial Use of Treated Solids

Where digestion of waste solids is practiced at wastewater treatment plants, the solids product of digestion can be used as a solid conditioner and natural fertilizer, proved that it meets all of the required regulatory standards. Land spreading of treated biosolids to fertilize agricultural land, for reforestation, and for reclamation of disturbed sites is commonly practiced in British Columbia; however, this can be a costly undertaking, depending on the transportation distance to the biosolids use site and the topography of the site. In some cases there has been public resistance to land spreading of biosolids, due mainly to concerns over odours and the presence of potentially harmful substances.

The CVWPCC dewaters waste solids and transports the dewatered cake to a nearby site for use as a composting feedstock. This does not require digestion prior to composting, and it produces a product called SkyRocket that is much more marketable that dewatered biosolids. Production of Class A compost (SkyRocket) as practiced by the CVRD allows sale of the compost product to householders and commercial users. Proceeds from the sale of compost help to offset operating costs for solids handling. This is a sustainable strategy for beneficial use of treated wastewater solids as long as the local market can absorb the compost.

Extraction of Nitrogen and Phosphorus for Fertilizer Pellets

Depending on the treatment processes used, some wastewater treatment plants produce relatively low-volume side streams of high-strength wastewater that would normally be routed back to join the plant influent wastewater for treatment (e.g., water produced as a result of dewatering digested waste solids or waste biological solids from biological nutrient removal processes). For these high-strength side streams it is in some cases economical to extract nitrogen and phosphorus in a small treatment reactor that causes precipitation of a mineral called magnesium ammonium phosphate, commonly referred to as struvite. The struvite pellets can be marketed as a commercial fertilizer, offsetting the production and use of chemical fertilizers. This would not be feasible at the CVWPCC at present, due to economies of scale and the treatment processes currently in use; however, it could be considered for use in future.

Hydroelectric Turbine for Generation of Electrical Power at Outfall

In some cases where there is a large elevation difference between the treatment plant and the receiving water (i.e., the land section of the outfall has a steep downward slope), it is possible to install a small hydroelectric turbine to generate electricity. In our experience, this is not cost-effective at smaller plants, even if there is a large head loss available on the discharge to drive the turbine. In the case of the CVWPCC where there is minimal head loss under certain tidal conditions and effluent pumping is required, this type of energy recovery is unlikely to be a viable option.

Summary

In general, the most cost-effective resource recovery option for the LWMP is likely to be ongoing (and possibly expanded) use of reclaimed water for non-potable applications at the CVWPCC, and potentially for offsite use as well, if one or more users can be identified. In future when upgrades to the treatment facilities are undertaken, the addition of other resource recovery processes can be considered; this may include extraction of heat from the effluent for space heating (and cooling), struvite crystallization for fertilizer production, and eventually anaerobic digestion for generation of biogas when the service population grows to make this economically feasible or new technologies make this economically viable for smaller plants. Technologies for treatment of wastewater and waste solids are continually evolving, and research and development are ongoing. Design of future upgrades at the CVWPCC should be undertaken with this in mind, so that new facilities for resource recovery can be added to the plant without major disruptions or modifications to the existing facilities at that time.

Appendix D

Comox Valley Sewer Service LWMP

Phase 3 Outreach – Summary Report

Long List of Options

March 6, 2019

Comox Valley
REGIONAL DISTRICT

comoxvalleyrd.ca

CONTENTS

APPENDICES

1.0 Executive Summary

With the education and goals and objectives phase of public consultation complete, the third phase of public engagement – conducted in a tight timeline through January 2019 – introduced a long list of options for the conveyance and treatment of liquid waste and resource recovery options resulting from those operations.

The public participation focus in this phase was largely to INFORM the public about the ideas on the long list. Residents were also asked about any options that may have been missed. This feedback is important to ensure that technical consultants are assessing all possible options to help the advisory committees form a short list.

Two key tools were used to complete this stage of work:

- *Information Sessions:* Two events were held (one at K'omoks Community Hall and the other at Rotary Hall – lower Filberg Centre in Courtenay). These included a series of informational displays providing overviews of the options, an informational handout with more technical details and representation from technical experts to provide information and answer questions.
- *Online Consultation*: To supplement the information sessions, a survey was created on ConnectCVRD to mimic the feedback process at the in-person events. An online ad campaign was implemented to draw audiences to the online engagement tool.

The results of this outreach included interaction with roughly 160 people through both the online and in-person components. About 75 of those were actively engaged – attending an event or submitting a survey online.

Themes of feedback included a focus on protecting the foreshore, interest in high treatment standards, and continued concern with the any option that includes a Comox No. 2 pump station.

The Long List was also presented to K'ómoks First Nation Chief and Council and a letter containing their feedback is attached to this report. The project team will return to Chief and Council and to the broader KFN community to CONSULT on the shortlist of options under consideration in the spring.

Following consultation with KFN, the project team will hold additional public events to seek more specific feedback from the community on the options. The consistency of this engagement has allowed for the establishment of a relationship with those members of the public interested in participating, and this approach will continue.

2.0 Introduction

2.1 PROJECT BRIEF & CONSULTATION OVERVIEW

The Comox Valley Regional District launched the public consultation process for the Comox Valley Sewer System LWMP in June 2018. While work in 2018 was focused on establishing the process (ie: forming public and technical advisory committees, retaining technical consultants, confirming goals and objectives), 2019's workplan will include three very concrete steps required to achieve a draft plan. In January 2019, the first of those steps was completed with the identification of a long-list of options that were presented to the community.

This report summarizes the findings from Phase 3 of the public engagement plan for this LWMP. The chart below provides an outline of the five-phase consultation process.

PHASE	OBJECTIVES	TOOLS
PHASE 1: Educate/Kick-Off (May-Aug. 2018) **COMPLETE**	• INFORM: provide info about the sewer system and LWMP start • INVOLVE: connect with public to collect feedback on goals/values in sewer planning	• Project Webpage: create dedicated pages on regional district + ConnectCVRD websites • Advertisements: Promote online tool and sessions • Public Sessions #1 • Online Consultation Survey
PHASE 2: Kick off & Goals/Objectives (Sept.-Dec. 2018) **COMPLETE**	• INFORM: introduce LWMP process • COLLABORATE: work with the public advisory committee • CONSULT: collect feedback on goals and objectives	• Open House #1: including promotional and info materials • Public Sessions #2 • Online Consultation Survey
PHASE 3: Longlisted Options (Jan-Mar. 2019)	• COLLABORATE: PAC/TAC meetings, long list established • CONSULT: KFN Chief and Council, host information sessions for public to review long list options, support with online consultation.	• Public Sessions #3 • Online Consultation Survey • Meet with KFN Chief and Council
PHASE 4: Shortlisted Options (Mar-June. 2019)	• COLLABORATE: PAC/TAC meetings, short list established • CONSULT: KFN Chief and Council, host facilitated workshops for KFN community and public to review and rank short list options, support with online consultation	• Public Sessions #4 • Online Consultation Survey • Meetings with KFN Chief and Council and community
PHASE 5: Preferred Option (Summer-Fall. 2019)	• COLLABORATE: PAC/TAC meetings, consensus on preferred solution • CONSULT: KFN Chief and Council • INFORM: Sewage Commission signs off on preferred solution • INFORM: Present preferred solution to KFN community and public, report on feedback obtained in consultation	• Open House #2: including promotional and info materials • Meetings with KFN Chief and Council and community

The goals set to guide this engagement are:

1. Provide information about the LWMP process.
2. Offer opportunities for active public involvement.
3. Clearly explain how feedback will be received and considered.
4. Create a record of engagement at the end of the process.
5. Demonstrate how engagement was considered and how input influenced final decisions.

2.2 OVERVIEW OF PREVIOUS PHASES

Phase 1 of consultation centered on collecting feedback to establish the values of the community as they pertain to decision making in the sewer planning process, along with promoting the new online consultation tool and advertising for public advisory committee nominees.

Phase 2 of engagement asked for the community's input in establishing the goals and objectives for the planning process.

Both phases have included hosting two public sessions (one in each impacted community) as well as online consultation opportunities to collect feedback on priorities and values for sewer planning.

3.0 Phase 3 Consultation Results

The primary objective of this phase of consultation was to bring forward the long list of options identified by the technical consultants and the public and technical advisory committees for review by the community. Engaged residents were asked to identify any options that have been missed to date, or to highlight any considerations they felt should be looked at as a short list is determined.

3.1 BY THE NUMBERS

497	Visitors to the project page
56	People who attended the information sessions
111	Residents who reviewed the long list online
19	Submissions providing feedback on the long list

3.2 THEMES OF FEEDBACK

- *Concern over protection of the foreshore:* The most consistent comments were centered around interest in protecting the foreshore of Comox estuary in the long term, with interest particularly in options that would see all new conveyance piping kept out of the estuary.

- *Interest in new ideas:* Both the highest degree of treatment standards and the idea of tunneling for conveyance stood out to those who participated in the online and in-person consultation. At in-person events, the issue of higher costs associated with those options was raised by technical consultants, but there was still general interest from the public in learning more about the options and about their associated costs before removing from the table.

- *Continued opposition to Comox No. 2 Pump Station:* Many of those attending the open houses remained generally opposed to any option that included the Comox No. 2 Pump Station, regardless of impacts of alternatives to cost and other areas.

A full breakdown of the feedback is included in appendices to this report.

3.3 CONSULTATION WITH K'OMOKS FIRST NATION

Phase 3 involved the presentation of the Long List to K'ómoks First Nation Chief and Council. KFN is in support of the objective of the LWMP but is opposed to any options involving a forcemain to be installed along the foreshore, or within the inter-tidal zone, due to the high cultural value of the area. Chief and Council also indicated a preference for UV disinfection of treated effluent to minimize the potential for contamination to Baynes Sound.

A letter containing KFN's feedback is attached to this report.

4.0 Conclusion

The community is responding well to the options for participation in the LWMP process and interested residents continue to provide input when provided with the opportunity to do so. There is interest in the coming steps as more tangible solutions are presented and opportunities for direct feedback increase.

There is now an established core group of public participants who are following and providing feedback, and watching for subsequent steps.

5.0 Next Steps

- *Maintain online information hubs and ensure content is up to date*: Ensuring that informational materials are available online and accessible during this interim period will be important to maintaining interest in the project.
- *Prepare for next step of engagement*: With an established structure now for outreach to the community, the project team can prepare ahead for the next phase of consultation.

APPENDICES

APPENDIX 1 – EVENT AND FEEDBACK REPORT: JAN. 29 + 30, INFORMATION SESSIONS
APPENDIX 2 – CONNECTCVRD ANALYTICS: JAN. 28-FEB. 5, LONG LIST OPTIONS
APPENDIX 3 – FEEDBACK FROM K'OMOKS FIRST NATION
APPENDIX 4 – SAMPLE ADVERTISEMENTS
APPENDIX 5 – INFORMATIONAL MATERIALS (EXAMPLES)

APPENDIX 1 – EVENT AND FEEDBACK REPORT: JAN. 29 + 30, INFORMATION SESSIONS

EVENT SUMMARY & FEEDBACK OVERVIEW

Comox Valley Sewer Service Liquid Waste Management Plan – Long List Options
Public Information Sessions – January 30 & 31, 2019

Prepared By: ZINC Strategies
Prepared For: Christianne Wile (Manager, External Relations)

EXECUTIVE SUMMARY

In January 2019, phase three of the public consultation process for the Comox Valley Sewer Service planning process got underway. This stage followed earlier outreach steps focused on introducing the process (phase one) and collecting feedback on goals and objectives (phase 2).

Phase three focused on the presentation of the long-list of options for treatment, conveyance and resource recovery to the public, with the goal of collecting their feedback on whether any additional options should be considered.

Two information sessions were held in late January with 56 participants. Themes of feedback included a focus on foreshore/marine environment protection and ongoing opposition to the Comox No.2 Pump Station. Generally, there were no glaring oversights to the public, who was eager to start weighing in on the ideas as well. The events support the continued establishment of consistent and ongoing outreach for the liquid waste planning process.

PART 1 – EVENT SUMMARY

OVERVIEW

Tools used to collect feedback on the long list options included two information sessions held January 30 and 31, 2019. These public events offered an opportunity for community members to learn about the liquid waste management planning process, review the long list options and provide thoughts on any options that have been missed or comment on other factors that should be considered.

The drop-in sessions were held at two locations: in Comox at the K'òmoks First Nation Hall, and in Courtenay at the Rotary Hall (Florence Filberg Centre) – from 5-7 pm both evenings.

The below report summarizes the event and feedback collected.

1. EVENT GOALS

- To inform the public about details of each of the long list options selected by the Public and Technical Advisory Committees (PAC/TAC).
- To gather feedback on the long list options, and understand whether any relevant options have been missed and should be considered.
- To provide information on the LWMP process and future opportunities for public engagement.
- To provide residents with an overview of the current Comox Valley sewer system, and explain why the management planning process is needed.
- To bring awareness to and encourage residents to register for the online tool, ConnectCVRD.

2. BY THE NUMBERS

3. EVENT DETAILS

- Approximately 56 people attended the open houses: est. 27 at the first (Jan. 30) and est. 29 at the second (Jan. 31).
- Thirteen information boards were on display, outlining the planning process, public engagement timeline and long list options for treatment, conveyance and options for resource recovery.
- Two of these boards offered a direct opportunity for feedback – residents were encouraged to write down thoughts/ideas and place on boards as a method of sharing.
- Sixteen-page booklets, detailing technical specifications of each long list option for treatment and conveyance, were made available to attendees, in addition to an LWMP backgrounder.
- Reflective outdoor open house signs were posted to help direct visitors to event locations.
- Kris La Rose, senior manager, water & wastewater, was event host, with support from CVRD staff Marc Rutten, Adem Idris and Christianne Wile. They were supported by ZINC Strategies consultants + Walt Bayliss of WSP.
- While the majority of feedback was received directly by team members, seven feedback forms were submitted.
- Two members of the LWMP public advisory committee attended to hear feedback from the public, as did three elected officials from Courtenay, Comox + CVRD.

PROMOTION/OUTREACH

As free, public events, the info sessions were promoted via regular media and social media channels:

- A news release was issued Jan. 8 and was published in local media outlets.
- Newspaper print ads ran Jan. 17, 24 & 29.
- Radio ads ran Jan. 14-28 inclusive.
- Posters and save-the-date cards where shared at community hubs (rec centres, municipal halls).
- The event was posted on Facebook and promoted, reaching 2,327 people and generating 21 event responses.
- Sewage commission members were advised/invited by email.

PART 2 – FEEDBACK THEMES

THEMES OF COMMENTS

The info sessions provided an opportunity for many in the service area to better understand the LWMP process and have a first look at the long list of options. Comments gathered by regional district staff and consultants at the events generally fell into the following themes:

1. **Focus on Foreshore Protection**: There is strong concern about conveyance routes along the estuary/foreshore – environmental protection should be a priority.
2. **High Treatment Standards**: There is strong support to further investigate options for higher/highest level of treatment.
3. **Tunneling Peaks Interest**: There is generally support for tunneling and for "doing it right the first time", no matter the costs – though there is some concern about impacts to groundwater from tunneling and overland conveyance.
4. **Comox No. 2 Opposition Remains**: Participants attending from Lazo Road area are strongly opposed to the long list options that involve the addition of Comox No.2 Pump Station.

FEEDBACK SUMMARY

The following feedback was collected from the feedback forms, interactive boards and summary notes from staff participants. Note: comments are shared as written.

WASTEWATER TREATMENT + RESOURCE RECOVERY

Are there any other options that should be considered?

- Limiting the size of the population of the Comox Valley. If we can't handle more sewage, why should we allow more people to live here?
- Why not a total system at Fields site where sewage is treated and returned to water clean + potable, Alert Bay has such a system

Is there any other information you would like the committee to consider?

- Recovery of as much as possible
- Ideally, I would like to see all wastewater re-used
- Perhaps beyond your scope, but reducing the amount of effluent – particularly stormwater
- What are the possibilities of dealing with waste in neighbourhood manure composting facilities?
- Why is the area south (Baynes Sound), which has no sewer service, not a higher priority?

Additional comments:

- If possible, for each option could info about energy requirements be included?
- More info, if possible, on technologies for secondary + tertiary processes
- It may be useful to research efficacy of microplastic washing machine filters to reduce household laundry sources
- Support Option 4 + recovery of resources
- Build in capabilities for future improvements in sewage treatment and resource recovery. Even if non-economical now.
- Recovering resources should be explored to the full extent. Option 4 – spend money now!
- Where will the $$ come from to implement these options?
- Requesting more info around disinfection technologies (UV, Ozone, Chlorine, etc.)
- Will the odour implications of the various options be evaluated?
- Why keep using a system that was a bad idea to start with: Brent Rd. plant stinks, Forcemain in foreshore
- Any system that adds pollutants to the straight is clearly not sustainable

CONVEYANCE

Are there any other options that should be considered?

- N/A

Is there any other information you would like the committee to consider?

- Use 3C if possible

- What is the approximate size of these main lines? RE: Deep marine concept – how is the condition of the exposed pipe going to be monitored? Would you use "smart pigs" like those used in the oil patch?

Additional comments:

- No option in the estuary is the only way to keep it half decent. Did you look at the old pipe from the base? It was a sieve.
- Option # 4 or 5 only ones acceptable
- With the least risk of contaminating marine environment
- More info please on lifespan of each option if there is any difference
- Option #1 goes through a swath of area that is on well water. My understanding is that projects must not put potable water at risk. A sewer line going through an area where residents rely on well water puts their water source at risk. How can this proposal be justified?
- 3 A, B, C – Spend the money now
- Why is Area B not represented on Sewage Commission? Why is Croteau Beach still in the crosshairs of a system we can't access?
- Why is Regional District not on the sewage board? We need system that keeps the s*** out of the bay (Comox).

PHOTOS

CONCLUSION

These events were another positive step to engage the public in the LWMP process, with clear feedback from many that the outreach process has been reliable and consistent. Attendees now have an understanding of the options being considered, and while there was interest and discussion, no large "gaps" were identified in the list.

The feedback collected at these events, in combination with input collected through the online consultation tool ConnectCVRD, will serve as valuable insight for committees as they consider options for the short list.

APPENDIX 2 – CONNECTCVRD ANALYTICS: JAN. 28-FEB. 5, LONG LIST OPTIONS

Survey Report

28 January 2019 - 06 February 2019

Reviewing the Long List: Are we on track?

PROJECT: Help shape the future of our Sewer System in Courtenay and Comox

Connect CVRD

engagement hq by Bang the Table

Q1 Are there any other treatment plant options you would like considered? Please share.

RPearson 1/30/2019 10:59 AM	No other considerations
Edi Johnston 1/30/2019 12:24 PM	Is tertiary the same as "Disinfection" if not, please consider tertiary as well.
gu3 1/30/2019 07:19 PM	Our preferred option is #4 - the community and the CVRD have Stewardship Responsibilities that extend well into the future. Option #4 sets the stage to deliver on those responsibilities. This is the option we can be proud of for years to come as we will have made the effort and investment to do our best for the long-term health and sustainability of the environment, and related resources such as shellfish.
fmayhood 1/31/2019 09:31 AM	Separate storm water and waste water systems. Reuse grey water locally, rather than dump it in the ocean.
dbroten 1/31/2019 01:10 PM	Capture and use of methane
jrsmith1 1/31/2019 08:07 PM	No
Michele.jones 2/02/2019 10:59 AM	No
johnrushforth 2/02/2019 11:18 PM	I don't know if it is economically viable but basically I think we should be studying/considering biomethane production from sewage and not dumping our poop in the ocean.
Linda-Claire Steager 2/04/2019 09:48 AM	Does biological treatment mean filtering through a wetland area with rushes similar to what has been used in apartment complexes in France and China?
edonalds 2/04/2019 10:21 AM	I support Option #3. We might as well pay now for the highest possible contamination-free system. it begins aging the minute it is in operation. Consider it a long -term investment. Hope it lasts longer than a new car!!
bcmills 2/04/2019 06:07 PM	This feedback is coming from Association for Denman Island Marine Stewards. We support advanced treatment of all flows (#4). This would prepare the region most effectively for the impact of climate change on the region. The idea of protecting shellfish removal of contaminants, reclaiming water for other uses and optimal filtration will make a difference as climate change and population increase effects us.

Optional question (11 responses, 8 skipped)

Q2 Is there any other information on treatment you'd like the committee to consider? Please share.

Jennysteel 1/30/2019 10:50 AM	Ellimination of odours in the surrounding community is mandatory. Even today there ar still strong odours in the Curtis Rd community on a frequent basis. If this is not fixed and taken into consideration in any plans CVRD WILL face a nuisance law suit..
Edi Johnston 1/30/2019 12:24 PM	As our oceans are in crisis, what can be done to remove excreted pharmaceuticals, micro-plastics etc.?
fmayhood 1/31/2019 09:31 AM	Ballpark costs and benefits for each option? Why do storms double (or more) inflow to the treatment plant?
vincevt 1/31/2019 11:29 AM	Some discussion on source control to raise public awareness of their role in keeping emerging contaminants out of the wastewater system
jrsmith1 1/31/2019 08:07 PM	No
Michele.jones 2/02/2019 10:59 AM	Not at this time
Tim 2/02/2019 08:40 PM	The 4 options presented are a good template for a series of long term plans. Option 1 is current practice. Option 2 should be considered the goal of a 5 (?) year plan to reduce the # of days >2xADWF to zero (if possible) through the reduction of I & I. This would reduce or eliminate the need for additional capacity. Option 3/4 should be considered the goal for a 20(?) year plan to move to tertiary treatment which I imagine is the ultimate long term goal for any waste treatment system. Included in this goal would be the future inclusion of any new technologies to deal with emerging contaminants.
Linda-Claire Steager 2/04/2019 09:48 AM	The above mentioned method if not being considered.
edonalds 2/04/2019 10:21 AM	My main concern is the 1. The Estuary is not negatively affected – for any species that uses the waterways 2. The smelly station at the end of 20 ST becomes redundant or is updated 3. The ocean is not negatively impacted. 4. Tax increases are related and reasonable.
bcmills 2/04/2019 06:07 PM	WE wonder about the taking of solid wastes to the landfill, as the pharmaceuticals and microplastics that are inevitably in the solid waste will just be returning to the water table and thus ultimately into the ocean.
salty 2/06/2019 08:20 AM	Seems like option number 4 is the obvious choice. Will be interesting to see the difference in capital and operating costs between options 3 and 4.

Optional question (11 responses, 8 skipped)

Q3 Are there any other conveyance options you'd like considered? Please share.

RPearson 1/30/2019 10:59 AM	Efficiencies and costs should be the consideration and not local interests in what might be the best approach for a route. Let the engineers decide what is best for the community.
gu3 1/30/2019 07:19 PM	The deep sea conveyance option sounds very expensive. It also hints at potential problems related to spills, leakages, challenging maintenance, and so forth. I don't have a clear understanding of the benefits and drawbacks of each option, but like the idea of upgrading the Courtenay station. Decentralized sounds reasonable, but would there be unnecessary duplications of infrastructure?
fmayhood 1/31/2019 09:31 AM	Above ground/elevated pipe?
Jill 1/31/2019 04:47 PM	I like the overland option 4. No pipes in the water, please
edonalds 2/04/2019 10:21 AM	I was the best possible long-term option for ALL Species that share this habitat. If it means front end loading, then so be it.
bcmills 2/04/2019 06:07 PM	Conveyance systems #3 or #4 seem appropriate to us. We support no system that requires tunneling though archelological sites, estuaries, or marine areas. These methods would impact vital spawning and nursery grounds, would disrupt marine habitat and vegetation;, and would result in the release of persistent organic pollutants, micropastics, and stored CO2 into the atmosphere or water column.

Optional question (6 responses, 13 skipped)

Q4 Is there any other information on conveyance that you'd like the committee to consider? Please share.

Edi Johnston 1/30/2019 12:24 PM	With sea level rise, increased tide height and storm damage, please stay away from the shoreline or any marine involvement.
gu3 1/30/2019 07:19 PM	What are the implications for each option in the event of an earthquake?
fmayhood 1/31/2019 09:31 AM	Earthquake survival properties of each option?
vincevt 1/31/2019 11:29 AM	Unless costs are significantly lower for options that include Comox #2 pump station, it seems that proceeding with any of those options would be a tough sell given the prior public backlash. Tunnelling seems like the least disruptive option for construction, but it will be interesting to see how costs compare
Tim 2/02/2019 08:40 PM	I believe that any new conveyance system must be overland in order to avoid any undue threat to our estuary, the health of our marine environment, and the shellfish industry among others. It is also my understanding that designing a conveyance system where these types of pump stations are built in series is considered "not best practice" and results in high risk of disaster These considerations seem to eliminate 5 of the 11 options right off the bat. (1A,B& C. 2A. and 6) Option 4 seems to require very high head (79m?) and seems a bit fanciful. Option 5 seems to involve very high costs for very little benefit. The tunnelling options seem to allow us to avoid major pump station construction and long term maintenance of same. Option 3C seems to be optimal.
Linda-Claire Steager 2/04/2019 09:48 AM	How safe is each location, ie pipes bursting or leaking with resulting contamination of the land and water?
edonalds 2/04/2019 10:21 AM	I think that one-way streets should be attempted for 5 years as a minimum. Traffic flows lights on 17th St bridge. No one knows whether traffic will increase given electronic vehicles, improved public transportation, again populations possible train service etc. I do think that large trucks and other such vehicles should use By pass roads and not go through the urban environment.
salty 2/06/2019 08:20 AM	Would an upgrade to the KFN pump station help alleviate pressure on the Courtenay Pump station (help to get waste up and over the hill) in any of the overland/tunnelling options?

Optional question (8 responses, 11 skipped)

Q5 Are there any other resource recovery options you'd like considered? Please share.

RPearson 1/30/2019 10:59 AM	I am in favor of any of the recovery solutions if they have a sound ROI on the community over the long run.
Edi Johnston 1/30/2019 12:24 PM	Please explore all options, the less we pump into the ocean, the better.
gu3 1/30/2019 07:19 PM	Please take a look at Abbotsford's system. We toured it years ago and were very impressed. Abbotsford uses treated solids and reclaims water. Very impressive system and approach, but have to assume that things have advanced even further.
dbroten 1/31/2019 01:10 PM	METHANE - biodigester
Linda-Claire Steager 2/04/2019 09:48 AM	Has methane capture from sewage been considered?. We could generate power. The library has a small book- the Pooh Book, I think. It tells of a city in Sweden that caotures the methane from excrement and powers the city. Toronto is now using zoo pooh to capture methane.
edonalds 2/04/2019 10:21 AM	solar solar, solar find out what other other nordic countries are doing. Possibly also China. They are far ahead of us regarding green alternatives.
bcmills 2/04/2019 06:07 PM	We support both the recovery of reclaimed water ant heat recovery. We support innovating for future health of the planet and its resources. Thank you

Optional question (7 responses, 12 skipped)

Q6 Is there any other information on resource recovery you'd like the committee to consider? Please share.

gu3 1/30/2019 07:19 PM	Please tour Abbotsford's system and consider their approach . . . with perhaps some advances that have evolved as a result of their system.
vincevt 1/31/2019 11:29 AM	The ability to use reclaimed water for irrigation seems compelling, considering long-term climatic trends towards drier summers, and the impacts that will have on local agriculture
Linda-Claire Steager 2/04/2019 09:48 AM	Use of excrement to capture methane. Plus, the then clean poop can be used as fertilizer.
edonalds 2/04/2019 10:21 AM	Are there no recycling of poop options? In China and Latin America human waste have been used for centuries.

Optional question (4 responses, 15 skipped)

IDEAS TOOL SUMMARY

IDEAS SUMMARY

3	Ideas
5	Contributors
7	Contributions

TOP 3 IDEAS BASED ON CONTRIBUTORS

4	2	1
Contributed to	Contributed to	Contributed to
Treatment Solutions	Conveyance Solutions	Resource Recovery Solutions

IDEAS

Treatment Solutions

VISITORS 5	CONTRIBUTORS 4	CONTRIBUTIONS 4

01 February 19

Sharon P.

VOTES	UNVOTES
0	0

Mini Treat sewage at each pump station. By the tim e it gets to the sewage plant the process wouldn't ha ve to be so intense.

05 February 19

greendog

VOTES	UNVOTES
0	0

Get the system away from the water--off the foresho re, out of the estuary and off the ocean floor. Has th e CVRD learned nothing in 40-years

04 February 19

Kal

VOTES	UNVOTES
0	0

Biofuel production from the renewable sewage slud ge is becoming a feasible reality all over the world . Why not here too?

Biofuel

04 February 19

Jim Elgie

VOTES	UNVOTES
0	0

Boydel Wastewater Technologies Inc. is a Vancouv er Island company located in Chemianus. Very envir onmental and cost effective system.

Boydel.ca

IDEAS

Conveyance Solutions

VISITORS 7	CONTRIBUTORS 2	CONTRIBUTIONS 2

05 February 19

greendog

VOTES	UNVOTES
0	0

Get the system away from the water--off the foresho re, out of the estuary, forget the ocean floor. Has the CVRD learned nothing in 40-years

23 January 19

Sid Lodewyk

VOTES	UNVOTES
0	0

Satellite sewer truck dumping station

To limit truck traffic through residential areas, trucking distances and odours associated with sewer truck dumping, the long term plan should include a dumping st ation in an industrial area.

IDEAS

Resource Recovery Solutions

VISITORS 1	CONTRIBUTORS 1	CONTRIBUTIONS 1

05 February 19

greendog

VOTES	UNVOTES
0	0

What do you intend to do by way of reclamation of t he pipeline that should be taken off the foreshore an d removed from the inland portion

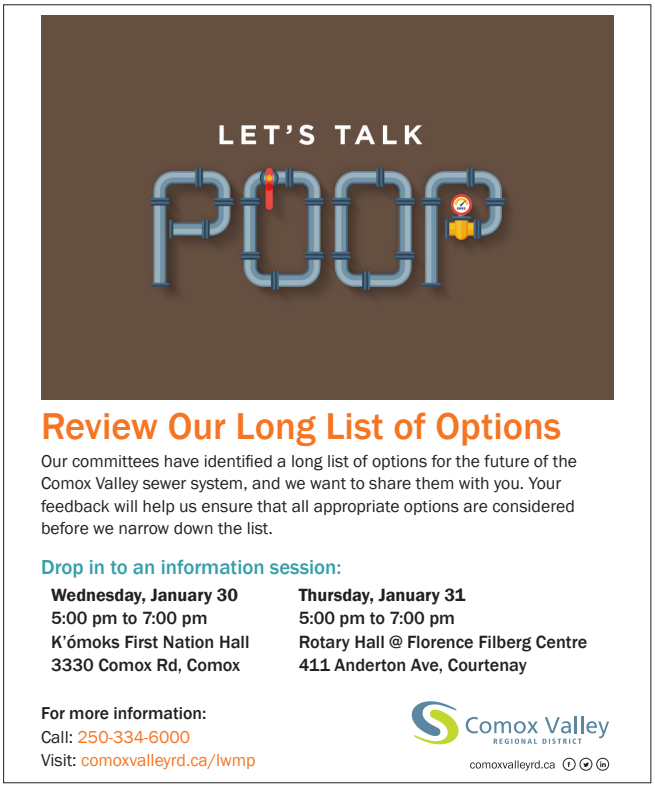
carrying sewage up to the plant. There are cost savings to be had!

APPENDIX 3 – FEEDBACK FROM K'OMOKS FIRST NATION

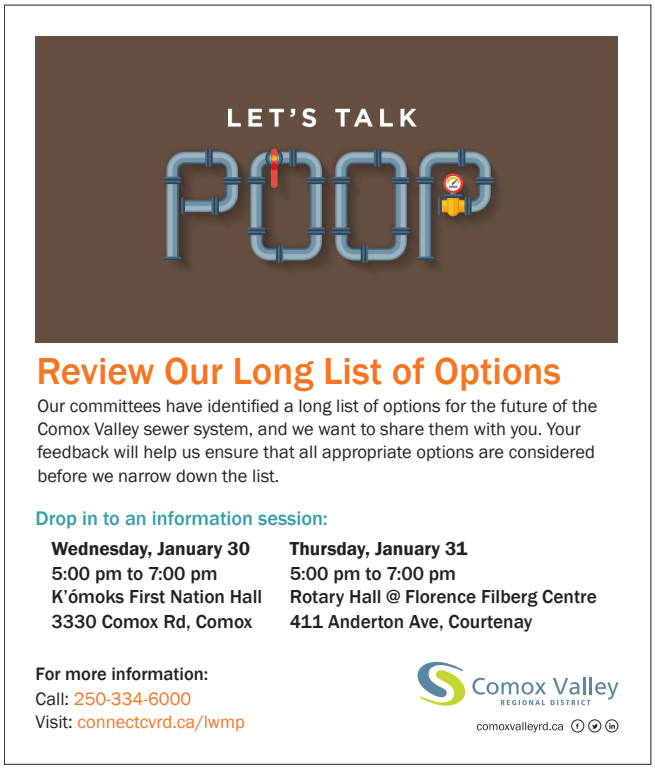
Letter to be inserted.

APPENDIX 4 – SAMPLE ADVERTISEMENTS

Posters + “Save the Date” Cards: Distributed at recreational facilities throughout Courtenay/Comox

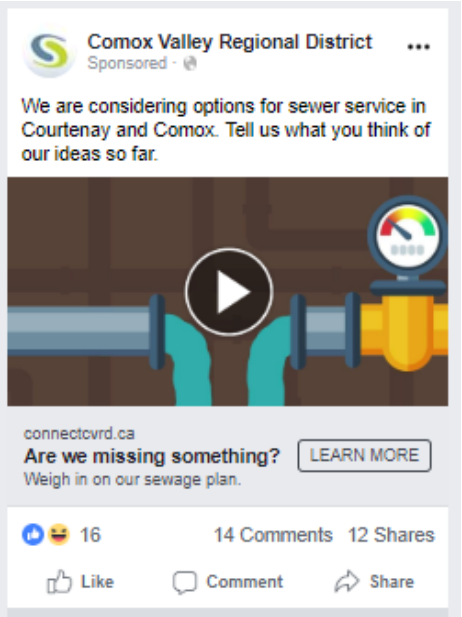


Print Ad: Comox Valley Record



Digital Display Ad: Displayed on screens at recreational facilities throughout Courtenay/Comox

Social Media Ad: Facebook & Instagram



Radio Ad Script

PROJECT: CV Sewer Service LWMP
MEDIA: 30 second ads
CAMPAIGN: Facilitated Session 3 Invite
RUN DATES: Jan. 14-28, 2019
FREQUENCY: TBD

SCRIPT
Want your say on the future of sewer service in Courtenay and Comox? Planning for the service is now underway and a long list of options has been developed. Now - it's your turn to learn more about the options and let us know if we've missed anything before the list is narrowed down. Information sessions will be held Wednesday January 30th at the K'omoks First Nation Hall and Thursday January 31st at Rotary Hall in Courtenay's Filberg Centre. Both run from 5 to 7 p.m. – drop in when it suits you. Learn more at comoxvalleyrd<dot>c-a<backslash>l-w-m-p.

APPENDIX 5 – INFORMATIONAL MATERIALS (EXAMPLES)

Long List Backgrounders

Long List Option No.1 — Conveyance (Estuary Alignments)

This alignment would involve installation of a new forcemain within or along the Comox harbour foreshore. The forcemain would transition to an overland pipe between Comox and the Lazo Road height of land. To convey the sewage over the Lazo Road height of land the following options are suitable:

1A. The forcemain from Courtenay Pump Station (PS) would continue directly to the treatment plant through a new tunnel at the Lazo Road height of land. The tunnel would reduce the required pressures in the system. Pending the tunnel elevation, a new pump station may be required in the general vicinity of the existing Jane Pl. Pump Station (PS). In which case, the existing Jane Pl. PS would be repurposed as a small subdivision pump station.

Advantages

- Potentially limited hydraulic changes to existing pump stations hydraulics subject to tunnel elevation.
- Minimizes construction of a forcemain through Comox
- Involves only two large pump stations

Disadvantages

- Involves work along and potentially in the estuary, including environmentally and archaeologically sensitive areas
- Elevated maintenance and risk management needs due to proximity to marine environment
- Elevated construction and operational risk associated with a tunnel

1B. The forcemain from Courtenay Pump Station (PS) would continue directly to the treatment plant such that there is no in-line pump station. In order to overcome the Lazo Road height of land, Courtenay PS would be upgraded to ensure the forcemain pressure is sufficiently high. As a result, the existing Jane Pl. Pump Station (PS) would not be able to cope with this higher hydraulic requirement and a new pump station would be required to convey raw sewage into the forcemain between Courtenay PS and the treatment plant. The existing Jane Pl. PS would be repurposed as a small subdivision pump station.

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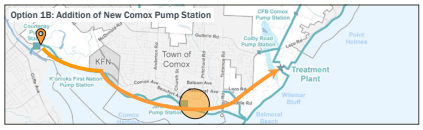
Advantages

- Minimizes construction of a forcemain through Comox
- Involves only two large pump stations (Jane Pl. PS repurposed as local facility only)

Disadvantages

- Involves work along and potentially in the estuary, including environmentally and archaeologically sensitive areas.
- Elevated maintenance and risk management needs due to proximity to marine environment



1C. A new pump station facility located somewhere between Comox and Lazo Road height of land. This would be an inline facility which receives raw sewage from Courtenay Pump Station (PS) discharge and pumps it over Lazo Road height of land to the treatment plant. The Jane Pl. Pump Station (PS) would tie-in to the Courtenay PS discharge forcemain at a location upstream of the new pump station. The elevation of the new pump station would have to be low enough to permit the Jane Pl. PS to hydraulically connect.

Advantages

- Minimize hydraulic changes to existing Courtenay and Jane Pl. Pump Stations
- Maximize useful life of existing foreshore forcemain
- Minimizes construction of a forcemain through Comox

Disadvantages

- Single point of failure of sewage conveyance system
- Involves operation and maintenance of three large pump stations, one highly critical
- Involves work along and potentially in the estuary, including sensitive areas
- Elevated maintenance and risk management needs due to proximity to marine environment

Long List Option No.2 — Conveyance (Overland Alignments)

This alignment would involve installation of a new forcemain overland from Courtenay Pump Station (PS) towards the treatment plant. This forcemain would pass over the Comox Rd. hill. Due to the change in discharge pressure a significant upgrade or rebuild would be required at the Courtenay PS. Several routing options are available, including:

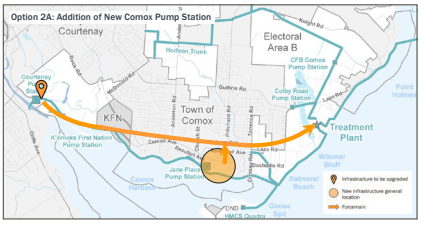
2A. The Courtenay PS would be upgraded to allow sewage from Courtenay to be pumped directly to the treatment plant. As a result, the existing Jane Pl. Pump Station (PS) would not be able to cope with this higher hydraulic requirement and a new high pressure head pump station would be required in the general vicinity of the existing Jane Pl. PS. This new facility would convey raw sewage into the forcemain between Courtenay PS and the treatment plant. The existing Jane Pl. PS would be repurposed as a small subdivision pump station.

Advantages

- No pipe in the estuary, mitigating environmental and archaeological risks
- All pipe and structures on-land to maximize maintenance accessibility
- Involves only two large pump stations (with Jane Pl. repurposed as local PS)

Disadvantages

- Significant hydraulic changes to the Courtenay PS and Jane Pl. PS
- Construction of new conveyance system through an area with significant existing infrastructure



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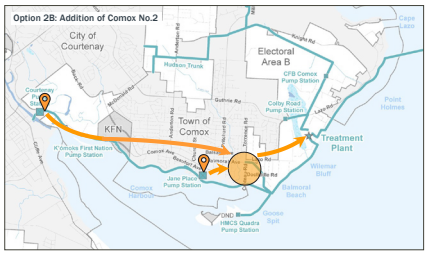
2B. The forcemain from the Courtenay Pump Station (PS) would convey raw sewage over the Comox Rd. hill and down into a new pump station located between Glacier View Drive and Comox Rd. The elevation of the new pump station must allow enough pressure to convey the sewage over Lazo Road to the treatment plant without exceeding the pressure capacity at Jane Pl. Pump Station (PS).

Advantages

- No pipe in the estuary mitigating environmental and archaeological risks
- All pipe and structures on-land to maximize maintenance accessibility
- Minimize hydraulic changes to existing Jane Pl. PS

Disadvantages

- Pump in series and single point of complete failure of sewage conveyance system
- Involves operation and maintenance of three large pump stations, one of high criticality
- Significant hydraulic changes to the Courtenay PS
- Construction of new conveyance system through an area with significant existing infrastructure



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Long List Option No.3 — Conveyance (Tunnelling Alignments)

This alignment would involve installing a combination of new forcemains and gravity sewer mains overland from the Courtenay Pump Station (PS) towards the treatment plant. The tunnel alignments would be selected to either minimize pumping requirements or, where possible, utilize gravity sewer mains. The primary areas where tunnelling would be appropriate are under the Comox Rd. and Lazo Rd heights of land. Several combinations of forcemain/gravity sewer mains are described below:

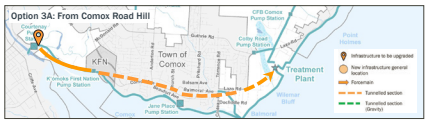
3A. Sewage would be pumped from the Courtenay PS to a tunnel constructed through Comox Rd. hill. The forcemain would transition to an open cut installation through Comox and back to a tunnel to pass under the Lazo Road height of land and down to the treatment plant. The Jane Pl. Pump Station (PS) could connect to the forcemain without modifications if the elevation of the tunnel does not require additional pumping capacity.

Advantages

- No pipe in the estuary mitigating environmental and archaeological risks
- Reduces pressures at the existing pump stations
- Significantly alleviates the high pressure head requirements for the Courtenay PS and Jane Pl PS as compared to other overland options

Disadvantages

- Elevated costs and risks due to tunnelling
- Construction of new conveyance system through an area with significant existing infrastructure



3B. A new forcemain would be installed from the Courtenay Pump Station (PS) directly to the treatment plant with a tunnel installed for the forcemain to pass through the Lazo Rd height of land. The existing Jane Pl. Pump Station (PS) would likely not be able to cope with this higher hydraulic requirement and therefore a new high pressure head pump station would be required near the existing Jane Pl. PS. This new facility would convey raw sewage into the forcemain between Courtenay PS and the treatment plant. The existing Jane Pl. PS would be repurposed as a small subdivision pump station. If the tunnel elevation is sufficiently low, the existing Jane Pl. PS would be suitable.

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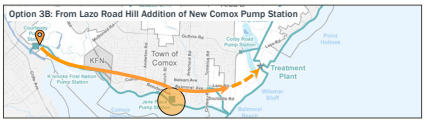
Advantages

- No pipe in the estuary mitigating environmental and archaeological risks
- All pipe and structures on-land to maximize maintenance accessibility
- Alleviates some of the high pressure head requirements as compared to other overland options

Disadvantages

- Construction of new conveyance system through an area with significant existing infrastructure
- Higher upgrade requirements at the Jane Pl. PS as compared to the other tunnel options



3C. A new forcemain from Courtenay Pump Station (PS) would continue directly to the treatment plant. A gravity sewer main tunnel would pass through the Lazo Rd height of land at the required slope. The Jane Pl. Pump Station (PS) would connect to the gravity sewer main through a new forcemain and the tie-in location would depend on the gravity sewer main alignment. The elevation of the new tunnel would determine whether Jane Pl. PS would need to be replaced to accommodate a high pressure head pump.

Advantages

- No pipe in the estuary mitigating environmental and archaeological risks
- All pipe and structures on-land to maximize maintenance accessibility
- Alleviates some of the high pressure head requirements for the Courtenay PS and most of the high head requirements for the Jane Pl. PS as compared to other overland options

Disadvantages

- Construction of new conveyance system through an area with significant existing infrastructure
- Gravity sewer main alignment must follow a specific slope which is dependent on the topography.
- Gravity sewer mains are significantly larger diameter as compared to forcemains for the same flow

Long List Backgrounders

Long List Option No.1 — Wastewater Treatment (Meet Regulatory Discharge Standards)

Option 1 would meet federal and provincial regulatory requirements for secondary treatment with discharge to open marine waters (the treatment plant outfall extends 2,825 m from shore at Cape Lazo into the Strait of Georgia and the discharge diffuser is 60 m below water at low tide). As with the other options, an updated Environmental Impact Study (EIS) would be required to identify any additional treatment requirements needed to protect the environment according to provincial regulations. If no additional requirements are identified, the B.C. Municipal Wastewater Regulation (MWR) and the Canada Wastewater Systems Effluent Regulations (WSER) would apply to Option 1. These include:

Municipal Wastewater Requirements

Secondary treatment for up to two times average dry weather flow (2xADWF):

- 5-day Biochemical Oxygen Demand (BOD5): max. day 45 mg/L
- Total suspended solids (TSS): max. day 45 mg/L
- pH 6 to 9
- Ammonia concentration does not cause chronic toxicity at the edge of the initial dilution zone (IDZ)

Primary treatment for flows in excess of 2xADWF (interim):

- 5-day Biochemical Oxygen Demand (BOD5): max. day 130 mg/L
- Total suspended solids (TSS): max. day 130 mg/L
- Note: If flows are > 2xADWF during storm or snowmelt event with a less than 5-year return period, a discharger must have a liquid waste management plan or specific study and implement the plan's or study's measures.

WSER

- 5-day Biochemical Oxygen Demand (BOD5): monthly avg. not to exceed 25 mg/L
- Total suspended solids (TSS): monthly avg. not to exceed 25 mg/L
- Total residual chlorine < 0.02 mg/L
- Un-ionized ammonia < 1.25 mg N/L at 15oC
- Note: The WSER standards apply to the combined discharge – this may require chemical addition to enhance primary treatment or other measures to ensure that the secondary treatment bypass does not cause the combined effluent to exceed the WSER discharge standards for BOD5 and TSS

An EIS was completed for the treatment plant discharge in 2010; this showed that disinfection of the effluent to achieve a fecal coliform count of less than 8000/100 mL in the discharge would be required to protect local shellfish resources outside the initial dilution zone (IDZ). Disinfection to this standard was assumed for Option 1.

Note: Plant data from 2013 to 2017 show that the number of days when flows exceeded 2xADWF ranged from 0 days (2013) to 31 days (2015) – over the 5 years of record, flow exceeded 2xADWF on a total of 58 days (the total volume of flow greater than 2xADWF represented only about 1% of the total plant flow over that period)

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Advantages

- Meets regulatory requirements for discharge to open marine waters
- Avoids the cost of subjecting relatively infrequent high wet weather flows to secondary treatment
- Coagulating (thickening) chemicals can be added to enhance primary treatment if needed when flows exceed average dry weather flows
- Includes disinfection to protect shellfish resources outside the initial dilution zone

Disadvantages

- Flows in excess of average dry weather flows would bypass secondary treatment and so would not receive biological treatment

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Long List Option No.2 — Wastewater Treatment (Provide Secondary Treatment for all Flows)

Option 2 is similar to Option 1, except that there would be no wet weather bypass of secondary treatment for increased flows. For Option 2, the entire plant influent flow would pass through secondary treatment (this is the current configuration of the treatment plant). As with the other options, an updated Environmental Impact Study (EIS) would be required to identify any additional treatment requirements that might be needed to address protection of the receiving environment. For Option 2, it was assumed that the disinfection process would be designed to achieve recreational standards in the undiluted effluent. The following treatment and discharge standards would apply to Option 2:

Secondary treatment for the entire plant flow:

- 5-day Biochemical Oxygen Demand (BOD5): max. day 45 mg/L, monthly avg. not to exceed 25 mg/L
- Total suspended solids (TSS): max. day 45 mg/L, monthly avg. not to exceed 25 mg/L
- pH 6 to 9
- Ammonia concentration does not cause chronic toxicity at the edge of the initial dilution zone (IDZ)
- Total residual chlorine < 0.02 mg/L
- Un-ionized ammonia < 1.25 mg N/L at 15oC
- Disinfection - fecal coliforms not to exceed 200 FC/1900 mL

Advantages

- Exceeds regulatory requirements for discharge to open marine waters
- Entire plant flow is subjected to secondary (biological) treatment
- Includes enhanced disinfection to protect shellfish resources
- Effluent meets standards for reclaimed water use for lower likelihood for direct human contact

Disadvantages

- Secondary treatment must be sized to accommodate all wet weather flows, increasing capital and operating costs compared to Option 1

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Long List Option No.3 — Wastewater Treatment (Advanced Treatment for Increased Flows)

Option 3 would incorporate the same preliminary, primary and secondary treatment processes as Option 2. In addition, Option 3 would include advanced (tertiary) filtration of the secondary treated effluent for increased flows during wet weather events to enhance removal of suspended solids. As with the other options, an updated Environmental Impact Study (EIS) would be required to identify any additional treatment requirements that might be needed to address protection of the receiving environment. For Option 3, the disinfection process would be designed to achieve a higher standard than Option 2 but would still only be treated to a standard of 'lower likelihood for direct human contact'. The following treatment and discharge standards would apply to Option 3:

Advanced treatment (tertiary filtration) for flows up to 2xADWF:

- 5-day Biochemical Oxygen Demand (BOD5): max. day 10 mg/L, avg. 5 mg/L
- Total suspended solids (TSS): max. day 10 mg/L, avg. 5 mg/L
- pH 6 to 9
- Ammonia concentration does not cause chronic toxicity at the edge of the initial dilution zone (IDZ)
- Total residual chlorine < 0.02 mg/L
- Un-ionized ammonia < 1.25 mg N/L at 15oC
- Future addition of processes that are proven for removal of emerging contaminants at municipal wastewater plants

Primary treatment for flows in excess of 2xADWF (interim):

- 5-day Biochemical Oxygen Demand (BOD5): max. day 130 mg/L
- Total suspended solids (TSS): max. day 130 mg/L
- Note: If flows are > 2xADWF during a storm or equivalent snowmelt event with a less than 5-year return period, a discharger must (have a liquid waste management plan or specific study and implement the plan's or study's measures.
- Disinfection of combined effluent - fecal coliforms not to exceed 200 FC/100 mL

Note: Plant data from 2013 to 2017 show that the number of days when flows exceeded 2xADWF ranged from 0 days (2013) to 31 days (2015) – over the 5 years of record, flow exceeded 2xADWF on a total of 58 days (the total volume of flow greater than 2xADWF represented only about 1% of the total plant flow over that period).

SEE OVER FOR FURTHER DETAILS

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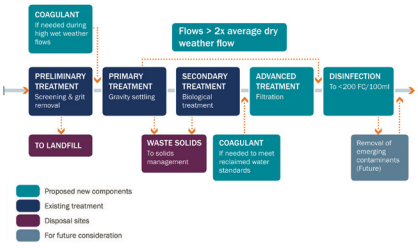
Advantages

- Exceeds regulatory requirements for discharge to open marine waters
- Majority of plant flow is subjected to advanced (tertiary) treatment
- Includes enhanced disinfection to protect shellfish resources
- Combined effluent meets standards for reclaimed water use for lower likelihood for direct human contact
- Ability to increase coagulation (thickening) and disinfection to meet standards for moderate or greater likelihood for direct human contact

Disadvantages

- Higher capital and operating costs than Options 1 and 2
- Flows > twice the average dry weather flow do not pass through advanced treatment
- Higher operational costs if treating reclaimed water to greater likelihood for direct human contact



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Long List Option No.4 — Wastewater Treatment (Provide Secondary Treatment for all Flows)

Option 4 would incorporate the same preliminary, primary, secondary, and advanced (tertiary) treatment processes as Option 3. However, for Option 4, the entire plant influent flow would pass through advanced (tertiary) filtration to enhance removal of suspended solids. As with the other options, an updated Environmental Impact Study (EIS) would be required to identify any additional treatment requirements that might be needed to address protection of the receiving environment. For Option 4, the disinfection process would be designed to achieve shellfish standards in the undiluted effluent, and disinfection could be increased to meet the reclaimed water standards for greater direct human contact if desired. This is the highest standard proposed. The following treatment and discharge standards would apply to Option 4:

Advanced (tertiary) treatment for the entire plant flow:

- 5-day Biochemical Oxygen Demand (BOD5): max. day 10 mg/L, avg. 5 mg/L
- Total suspended solids (TSS): max. day 10 mg/L, avg. 5 mg/L
- pH 6 to 9
- Ammonia concentration does not cause chronic toxicity at the edge of the initial dilution zone (IDZ)
- Total residual chlorine < 0.02 mg/L
- Un-ionized ammonia < 1.25 mg N/L at 15oC
- Disinfection - fecal coliforms not to exceed 14 FC/100 mL
- Future addition of processes that are proven for removal of emerging contaminants at municipal wastewater plants

Advantages

- Exceeds regulatory requirements for discharge to open marine waters
- Entire plant flow is subjected to advanced (tertiary) treatment
- Includes enhanced disinfection to protect shellfish resources
- Effluent meets standards for reclaimed water use for greater likelihood for direct human contact

Disadvantages

- Higher capital and operating costs than Options 1, 2 and 3
- Higher operational costs if treating reclaimed water to greater likelihood for direct human contact

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Treatment Planning Considerations

The Comox Valley Sewer Service treats its wastewater at a treatment plant located on Brent Road, Comox. That facility opened in 1984 and will require upgrades in order to accommodate our communities' continued growth and meet increasing environmental regulations.

To plan for the future of treatment for the service's wastewater, technical consultants and advisory committees have considered:

AREA GROWTH AND TREATMENT STANDARDS

- **FUTURE GROWTH:** Capacity of the treatment plant needs to increase to accommodate growth of the service area.
- **EFFLUENT QUALITY:** Federal and provincial regulations for effluent quality have changed. As a community should we be aiming to achieve or do better than regulatory limits?
- **ENVIRONMENTAL PROTECTION:** Cape Lazo and neighbouring Baynes Sound are environmentally sensitive areas that support many activities, including the shellfish aquaculture sector. Achieving a standard that best protects these resources is considered in options for the treatment plant.

COSTS OF WASTEWATER TREATMENT

- **COST:** Generally speaking, the higher the degree of treatment, the higher the construction and operating costs.
- **HOW TO PAY:** Future planning has to balance treatment goals with the financial resources available to the community. While capital costs can be eligible for grant funding, ongoing operations and maintenance costs are not.
- **SETTING GOALS:** One option presented on the long list meets the provincial standards while three offer a voluntary improvement to what is required.

EMERGING CONTAMINANTS

- **INCREASED FOCUS:** The impacts of emerging contaminants has drawn increasing attention in the public and was flagged as a concern in earlier stages of this planning process.
- **PREVENTION:** There is still a lot to learn about many contaminants (ie: antibiotics or personal care products), and limiting their entry into the system is likely the best approach to managing them.
- **LOOKING AT OPTIONS:** Including the necessary components to address metals or microplastics is being considered.

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Recovering Resources

In recent years, there has been increasing interest in recovering resources created through the collection and treatment of wastewater – such as reusable water, or heat. Resource recovery can have environmental benefits and generate revenue streams, but these must be weighed against increased capital and operations costs. As part of this planning process, options for resource recovery are being considered.

RECLAIMED WATER

- Some of the treatment plant options on the long list are designed to produce effluent that meets requirements for reclaimed water.
- Since this adds to cost of treatment, it's key to find a market for the resulting product.
- Onsite, this could include expanded use of reclaimed water, or offsite applications could use larger amounts (ie: irrigation or industrial use) – but this would require installation of pipes to get the water to where it is needed.

HEAT RECOVERY

- The use of heat extracted from the treatment process for space heating of buildings is becoming more common.
- Along with water reclamation, heat recovery for use onsite at wastewater treatment facilities is more cost effective than heat recovery at pump stations.
- Need to consider whether there's a nearby user who could use exported heat.

BENEFICIAL USE OF TREATED SOLIDS

- The CVRD already has a system in place to recover nutrients from the solids collected through the wastewater treatment process using a composting system.
- The final product – SkyRocket – is a Class A compost and is allowed for sale to individuals and commercial use.

Technical consultants also looked at other resource recovery options but suggest they are not feasible at this point:

- Production of Biogas: The current plant production is not large enough to make this economical.
- Extraction of Nitrogen and Phosphorus for Fertilizer Pellets: Due to the treatment processes currently in place, and cost, this is not feasible.
- Hydroelectric Turbine at Outfall: There is insufficient pressure head at the treatment plant's outfall for this.

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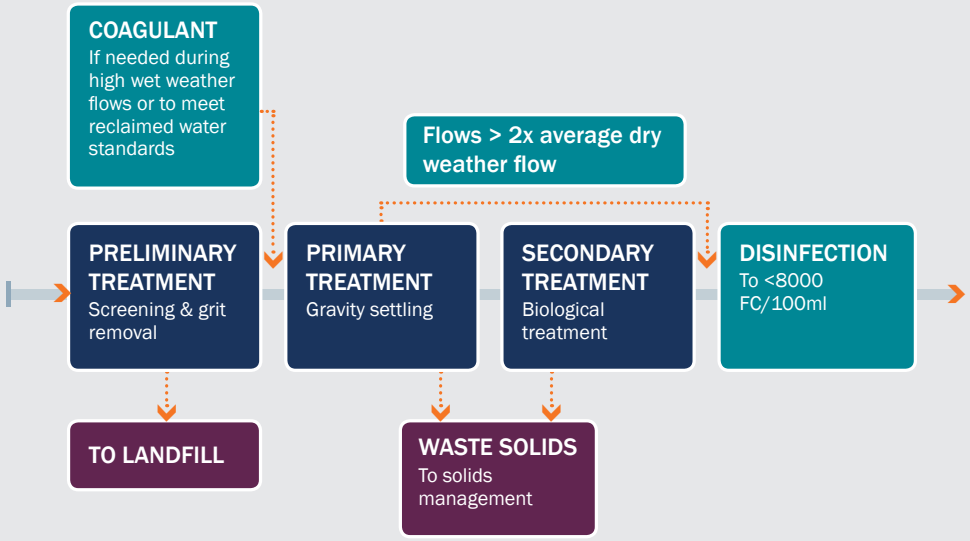
Treatment Planning: Options 1 and 2

Four options have been developed for consideration. Below is a summary of Options 1 and 2 – please refer to your background package for thorough details about treatment standards for each.

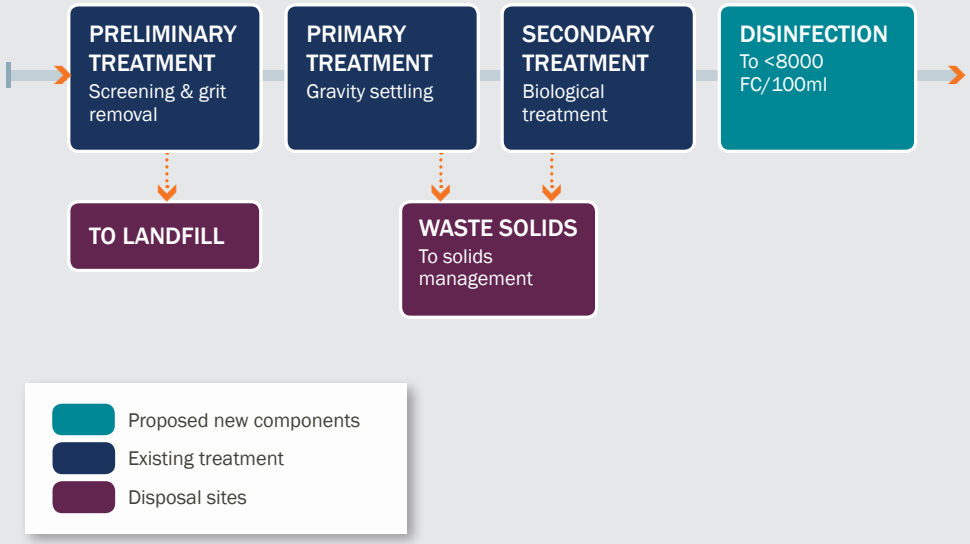
OPTION 1: Meets regulatory discharge standards

- Three-stage treatment (primary, secondary and disinfection)
- Bypass of secondary treatment for days of heavy inflows due to storms to avoid high infrastructure costs
- Addition of a coagulating (thickening) agent to enhance primary treatment in cases of high inflows
- Addition of disinfection to protect shellfish



OPTION 2: Secondary treatment for all flows (current system)

- Similar to Option 1, but with no bypass for heavy inflows, meaning all wastewater will move through secondary (biological) treatment
- Infrastructure must be sized to process max inflow - although majority of the time it is unused - resulting in increased capital and operating costs
- This is the current process at the treatment plant with the addition of disinfection for shellfish protection outside the initial dilution zone



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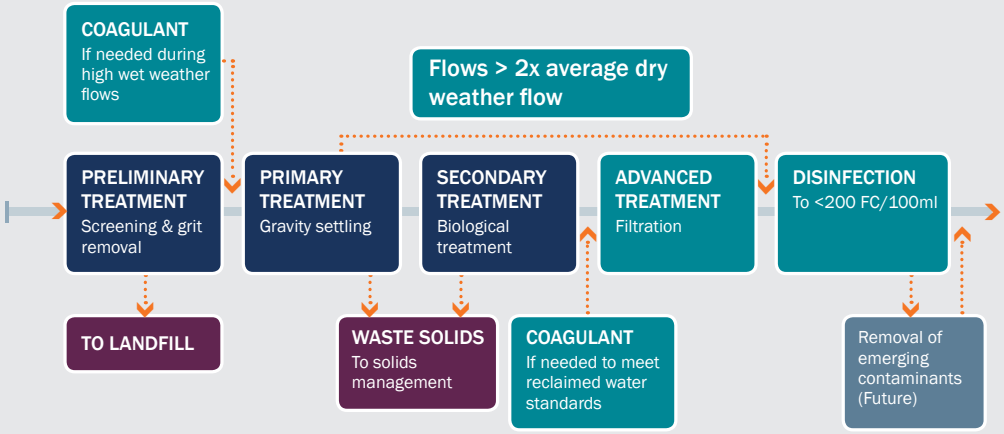
Treatment Planning: Options 3 and 4

Four options have been developed for consideration. Below is a summary of Options 3 and 4 – please refer to your background package for thorough details about treatment standards for each.

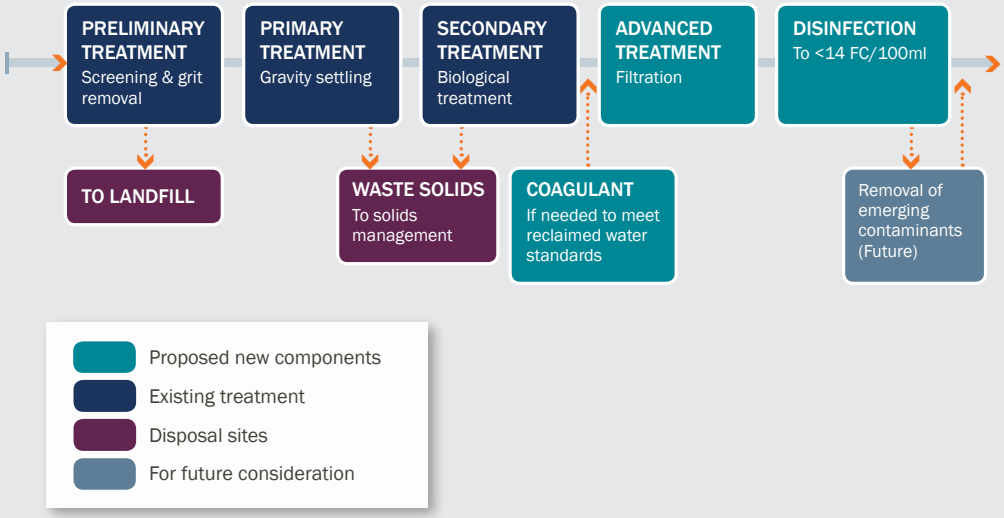
OPTION 3: Advanced treatment for up to 2x the average dry weather flow

- Similar to Option 2, with the addition of filtration for flows up to two times the average daily water flow
- Further protect shellfish and provide the best opportunity for reclaimed water by combining with installation of disinfection
- Increased capital/operating costs to Options 1 and 2



OPTION 4: Advanced treatment for all flows

- Similar to Option 3, but with all flows – regardless of amount – moving through filtration
- Further protect shellfish and provide the best opportunity for reclaimed water by treating and disinfecting all wastewater
- Increased capital/operating costs to Options 1, 2 and 3



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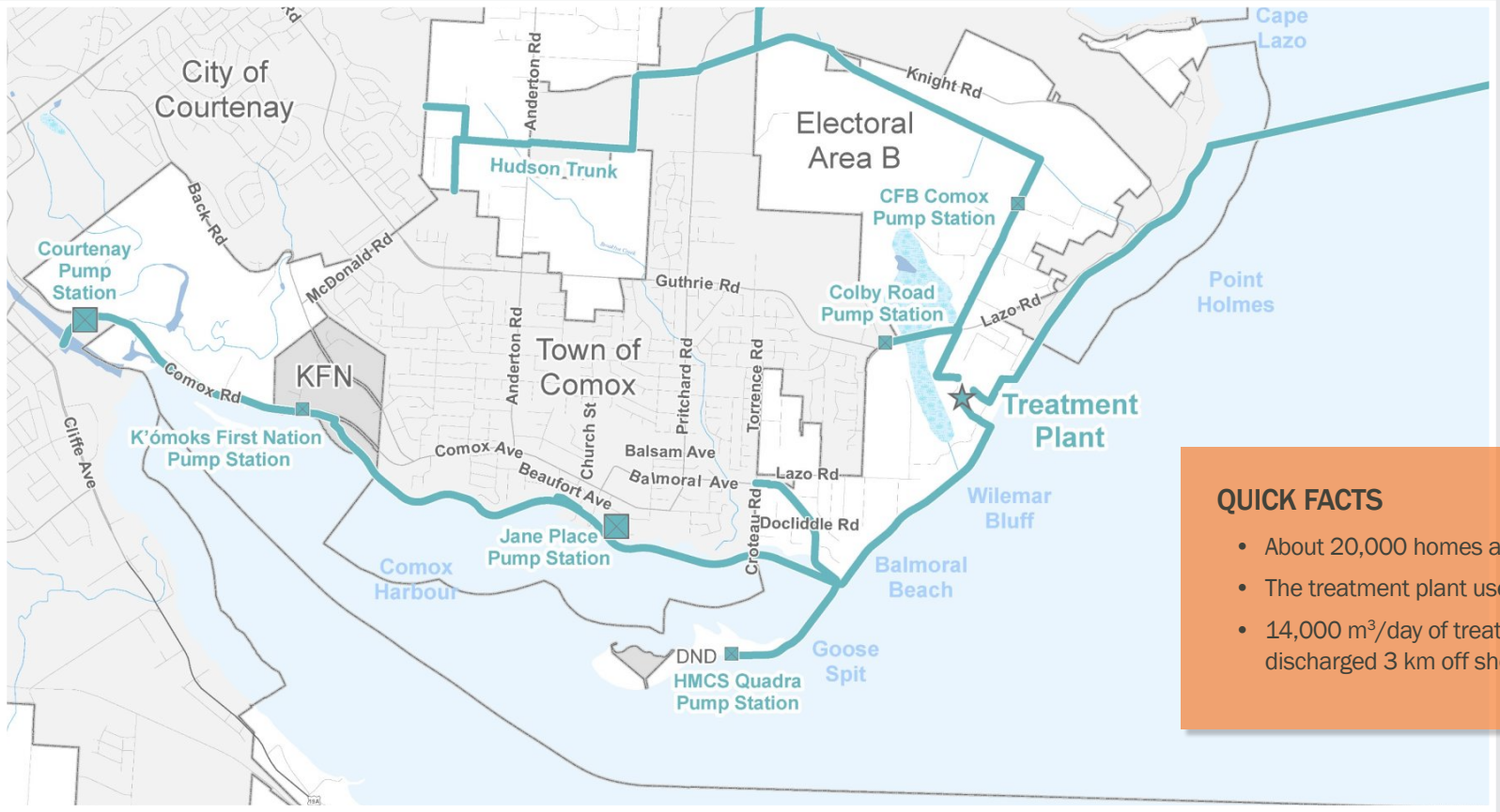
Sewer System Map

To understand the options proposed for a new conveyance system to serve Comox and Courtenay residents in the long term, it's important to understand the current system.



QUICK FACTS

- About 20,000 homes are connected to the service
- The treatment plant uses secondary treatment
- 14,000 m^3/day of treated effluent on average is discharged 3 km off shore

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Your Ideas: Treatment and Resource Recovery

Share your thoughts on the options presented for wastewater treatment and resource recovery here.
Have we missed anything? Are there any that should be removed?

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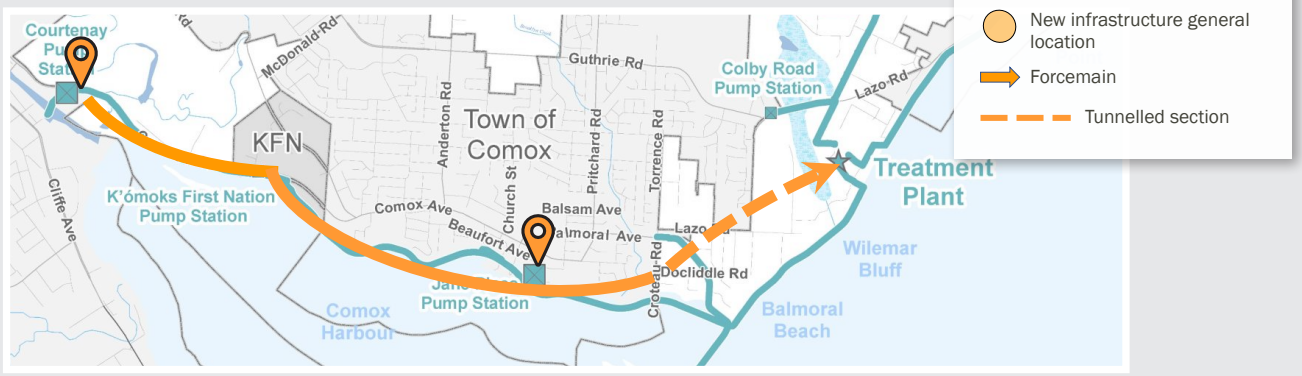
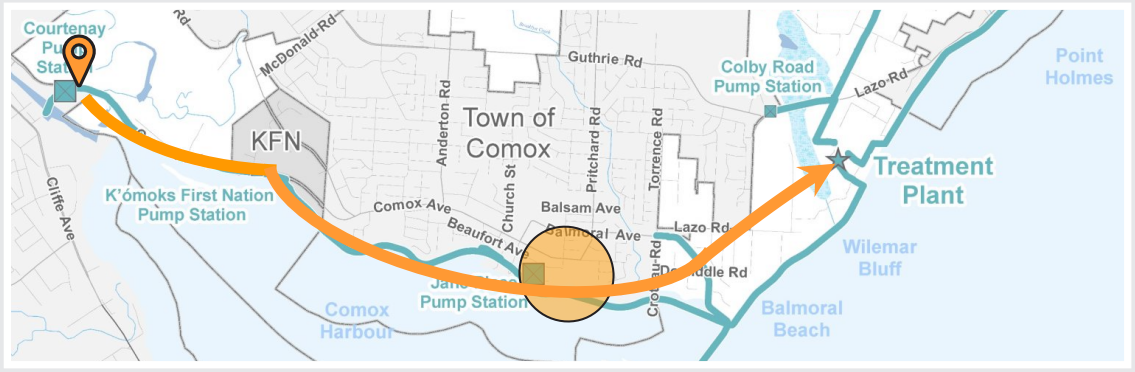
Moving Wastewater: Estuary Routes

Eleven options for conveyance are included on the long list. Below is a summary of the three options that use an estuary route for the conveyance system (moving wastewater from major pump stations to the treatment plant). Please refer to your background package for thorough details about each option.

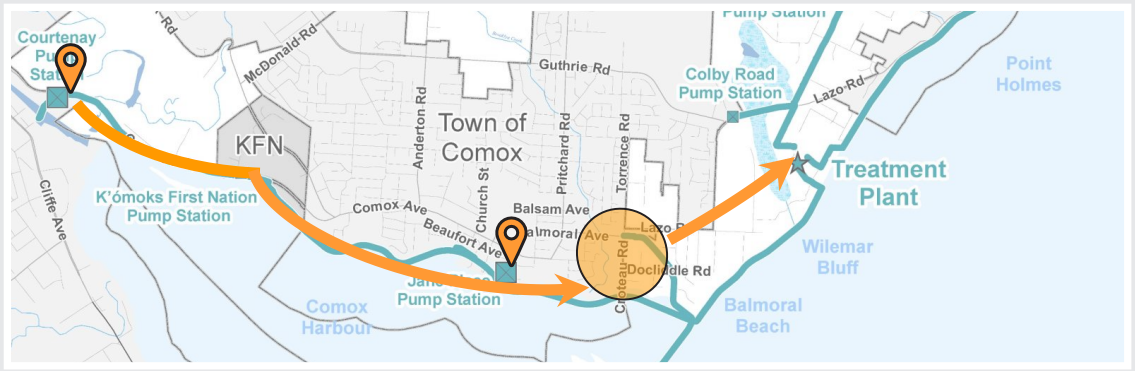
1a. Estuary Alignment – Tunnelling: Foreshore forcemain with tunneled route through Lazo Road height of land and (possibly) new pump station at low elevation in Comox.



1b. Estuary Alignment – Addition of New Comox Pump Station: Foreshore forcemain route with upgrades to Courtenay pump station and new high-head station at low elevation in Comox.



1c. Estuary Alignment – Addition of Comox No.2: Foreshore forcemain route with addition of new in-line pump station between Comox and Lazo Road height of land.



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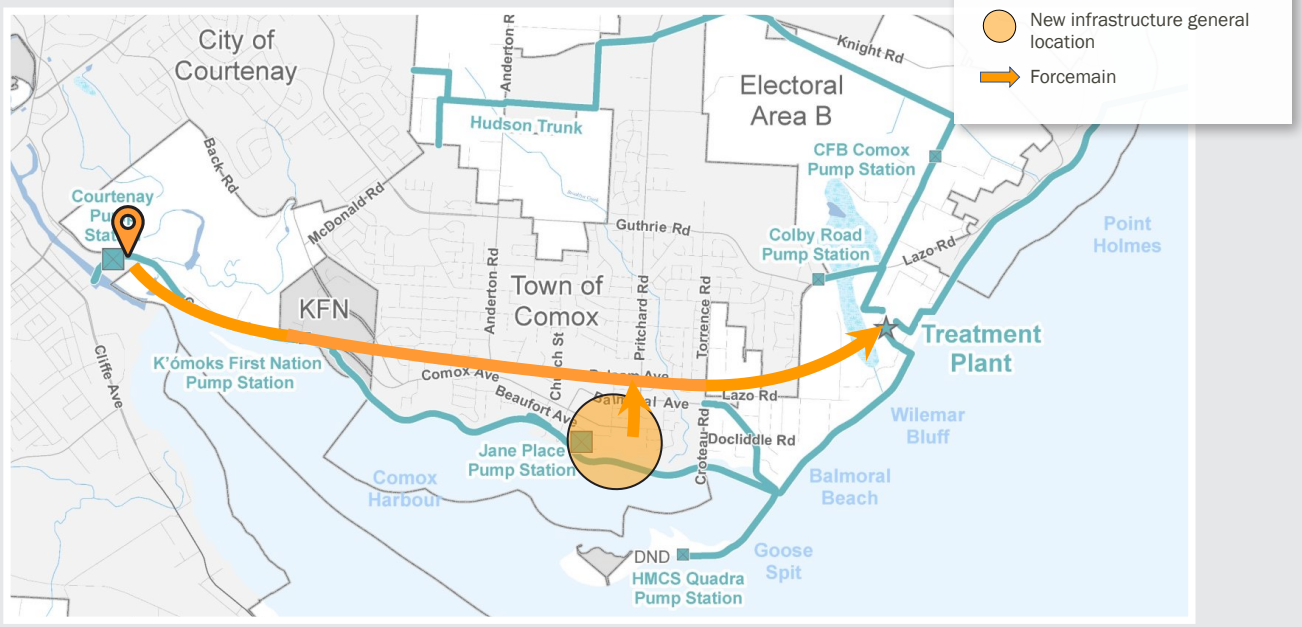
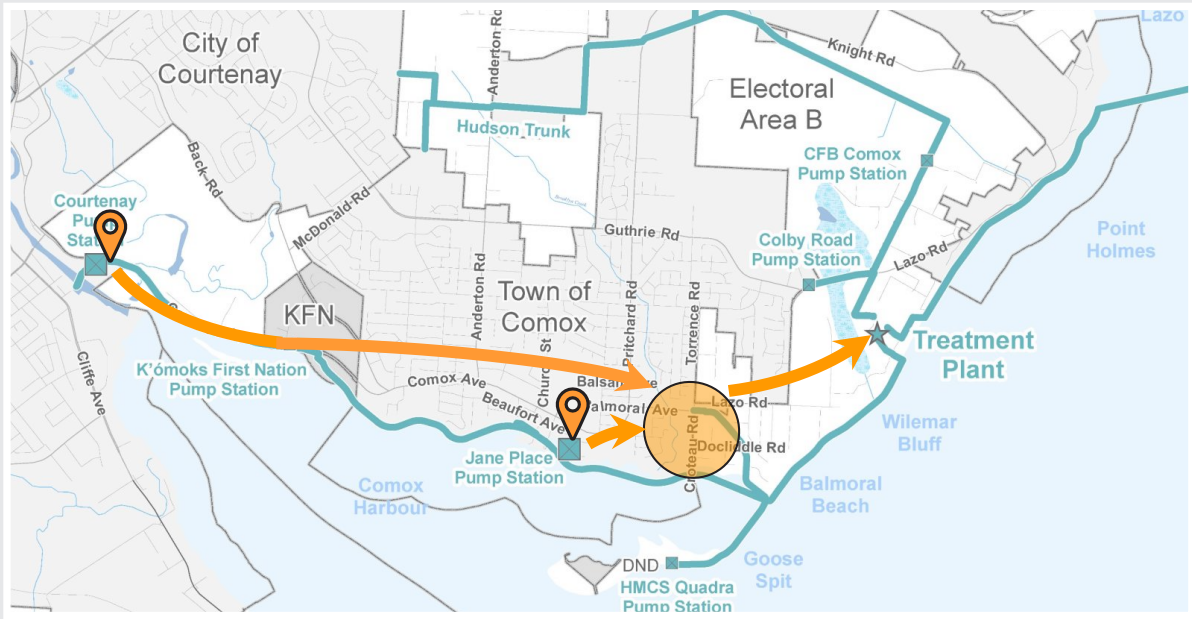
Moving Wastewater: Overland Routes

Eleven options for conveyance are included on the long list. Below is a summary of two options that include an alignment overland for the conveyance system (moving wastewater from major pump stations to the treatment plant). Please refer to your background package for thorough details about each option.

2a. Overland Alignment – Addition of New Comox Pump Station: New forcemain along Comox Road from upgraded Courtenay pump station and new pump station at low elevation in Comox.



2b. Overland Alignment – Addition of Comox No.2: New forcemain from Courtenay pump station along Comox Road, with new in-line pump station.



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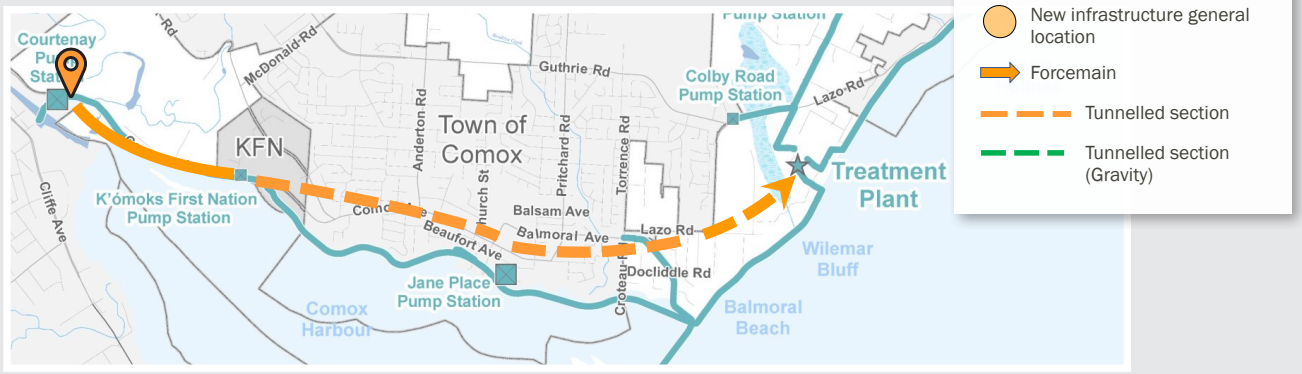
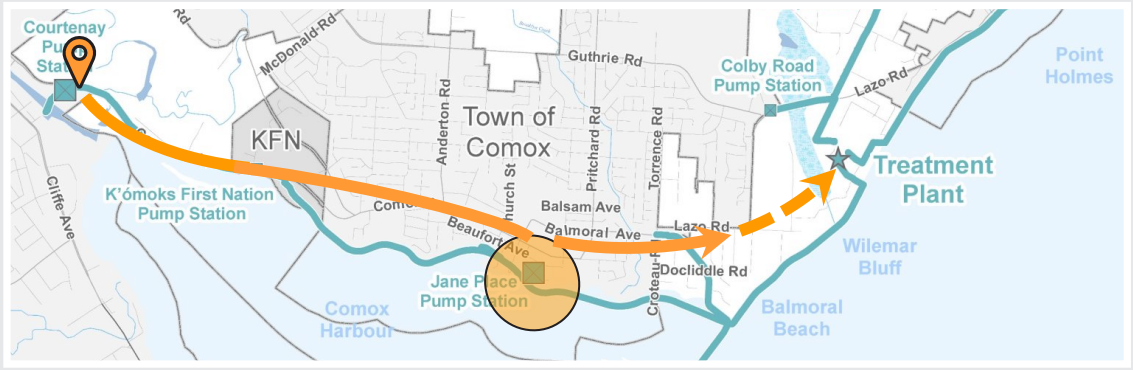
Moving Wastewater: Tunnelling

Eleven options for conveyance are included on the long list. Below are three options that include tunnelling for the conveyance system (moving wastewater from major pump stations to the treatment plant). Please refer to your background package for details about each option.

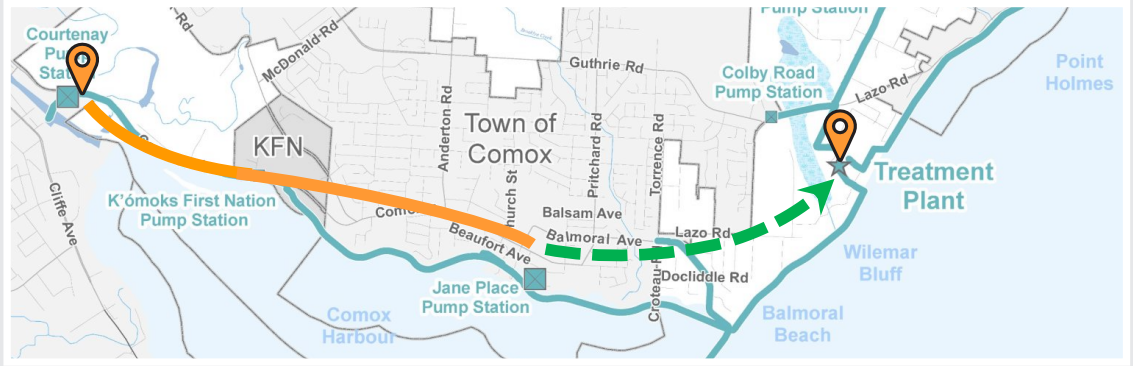
3a. Forcemain Tunnel Alignment – From Comox Road Hill:
Tunnel through Comox Road and Lazo Road hills and forcemain installed through Comox, with Jane Place connecting in.



3b. Forcemain Tunnel Alignment – From Lazo Road Hill Addition of New Comox Pump Station: Open cut forcemain with tunnel through Lazo Road hill and new pump station at low lying area in Comox (or modify existing pump station if possible).



3c. Gravity Tunnel Alignment – From Lazo Road Hill: Open cut forcemain to gravity main at Lazo Road with route determined by required slope.



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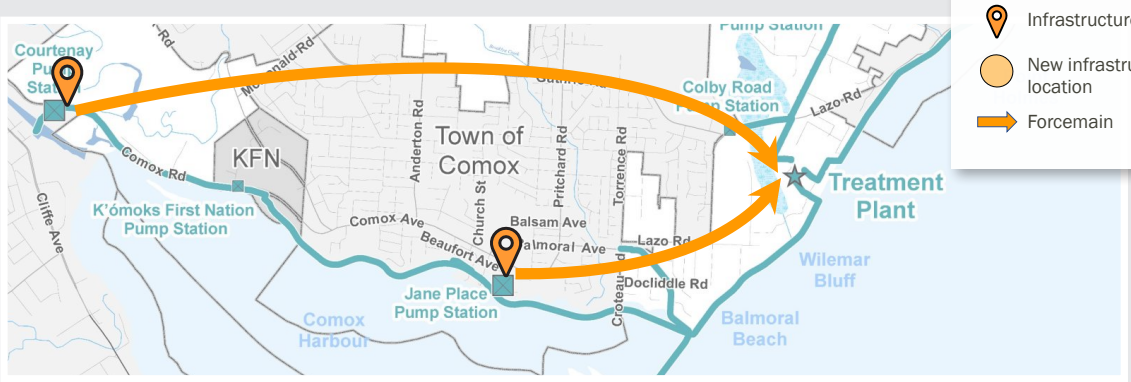
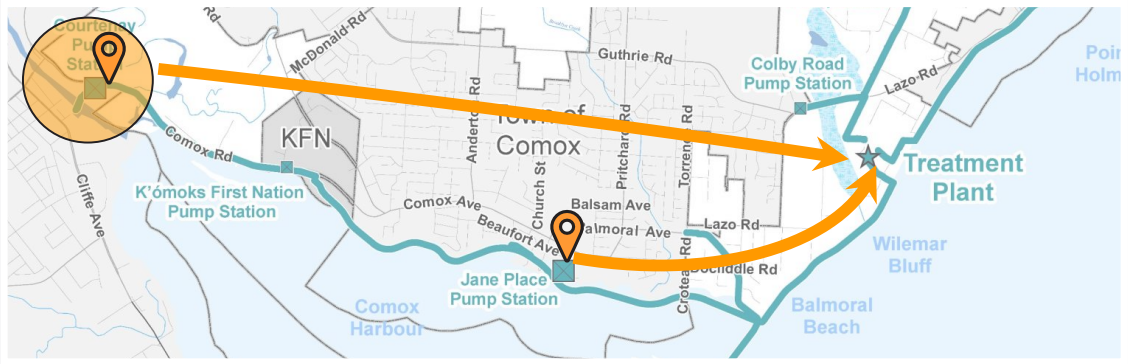
Moving Wastewater: Alternatives

Eleven options for conveyance are included on the long list. Below are three alternative options for the conveyance system (moving wastewater from major pump stations to the treatment plant). Please refer to your background package for thorough details about each option.

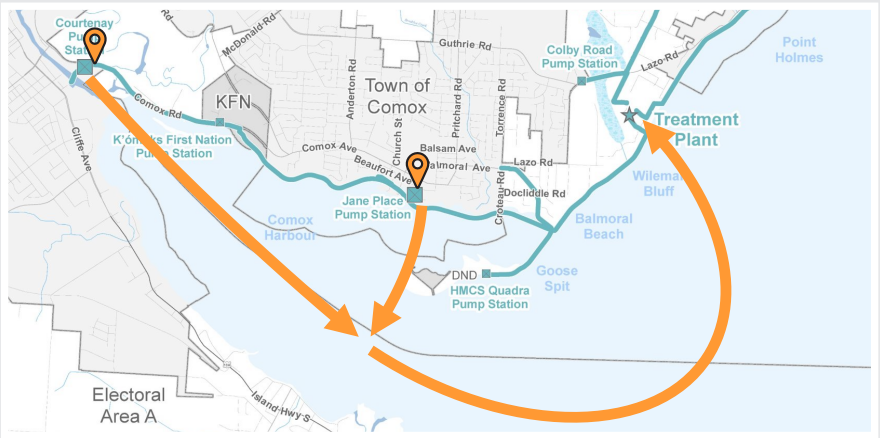
4. North Side Concept: Routing new forcemain to the north side of the service, maintaining separate one from Jane Place.



5. Decentralized Treatment: Addition of a new treatment plant near Courtenay pump station, treated effluent piped to existing outfall.



6. Deep Marine Concept: Siting forcemain in deep water, connecting existing pump stations to existing treatment and discharge points.



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Your Ideas: Conveyance

Share your thoughts on the options presented for conveyance (moving wastewater) here. Have we missed anything? Are there any that should be removed?

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Comox Valley Sewerage Service LWMP Timeline

Appendix E

2018				
Date	**Level of Public Involvement**	**Who?**	**Activity**	**Status**
May 31		Staff	Advisory Committee - Consider TAC/PAC Terms of Reference/Public Consultation report	Completed
June 12	DECISION	Sewage Commission	Approve TAC/PAC Terms of Reference/Public consultation report	Completed
June 18, 19	INVOLVE	PUBLIC	Workshop #1 (values)	Completed
June 20 – Aug 6	INVOLVE	PUBLIC	Online Consultation #1 (values)	Completed
August 2		Staff	Advisory Committee - Propose TAC/PAC membership	Completed
August 7		Sewage Commission	Propose TAC/PAC membership (PAC meeting delayed to after municipal election)	Completed
August 30		Staff	Advisory Committee -Update on PAC Recruitment	Completed
September 10		Staff	Advisory Committee - Recommended TAC/PAC membership, bios and TAC/PAC meeting schedule	Completed
September 18	DECISION	Sewage Commission	Approve TAC/PAC membership, bios and TAC/PAC meeting schedule	Complete
			October 20, 2018 - Municipal Election Day	
Nov 6, 8	INFORM	PUBLIC	Open Houses to introduce LWMP process	Complete
Nov 13	COLLABORATE	TAC/PAC 1	Orientation, primer on goal setting, results of workshop #1	Complete
Nov 23 (Fri)	COLLABORATE	TAC/PAC 2	Produce set goals and objectives	Complete
NOV 27&28	CONSULT	PUBLIC	Workshop #2 (goals and objectives)	Complete
Nov 28 – Dec 9	CONSULT	PUBLIC	Online consultation #2 (goals and objectives)	Complete
December 4		Sewage Commission	Sewage Commission – For information, orientation LWMP process	Complete
Dec 11		TAC/PAC 3	Review Workshop/Online #2 (goals and objectives)	Complete
2019				
Date	Spectrum		Activity	
Thurs Jan 24	COLLABORATE	TAC/PAC 4	Finalize goals and objectives recommendation for SC. Develop long list of options. ***Consultants can then begin preliminary study on the Long List options.***	
Jan 30, 31	CONSULT	PUBLIC	Workshop #3 - Present long list(rank list and add any options that may be missing)	
Jan 30-Feb 5	CONSULT	PUBLIC	Online consultation #3 (long list)	
Feb 7		Staff	Report for Advisory Committee – Goals and Objectives	
Feb 8	COLLABORATE	TAC/PAC 5	Finalize longlist, Recommend to AC/SC. ***Consultants can study any late inclusions on the Long List of options.***	
Feb 11		Staff	Special Advisory Committee – Review Goals and Objectives (Canceled, feedback to be received via email)	
Feb 21		Staff	Report for Advisory Committee Agenda – Long List	
Feb 25	DECISION	Sewage Commission	Special Sewage Commission Meeting – Approve Goals and Objectives	

Comox Valley Sewerage Service LWMP Timeline

Feb 28		Staff	Advisory Committee Meeting - Review long list	
March 6	REVIEW	WSP	WSP submits, to the CVRD, DRAFT Conceptual Study of Long List options (conveyance)	
March 12		Sewage Commission	Sewage Commission Decision – Approve long list options for conveyance, treatment and resource recovery. Update Sewage Commission regarding the decision to separate treatment and resource recovery options from conveyance to allow more time to analyse treatment and resource recovery and to expedite the selection of preferred option for conveyance.	
March 13	INFORM	PUBLIC	Press Release – Publish approved long list options for conveyance, treatment and resource recovery. Inform public about next steps and upcoming options for consultation on short list.	
March 13	REVIEW	WSP	WSP submits, to the CVRD, FINAL Conceptual Study of long list options (conveyance), CVRD to distribute to TACPAC	
March 21 (9 am to 12 pm)	COLLABORATE	TAC 6A	TAC to review and evaluate long list options (technical category, conveyance) Paul to write up summary of TAC discussion for presentation to TACPAC	
March 22 (9 am to 3 pm)	COLLABORATE	TAC/PAC 6	WSP present study of long list options (conveyance). Finalize evaluation to short list (conveyance) and recommend to AC/SC. Provide update on treatment & resource recovery long list options. ***Consultants begin detailed study of short list options for conveyance***	
March (TBD)	CONSULT	CVRD	CVRD to present short list options to KFN chief and council and obtain their feedback to be noted in the staff report	
March 25	REVIEW	Paul	Paul to submit staff report for conveyance short list options	
March 28		Staff	Report for Advisory Committee Agenda – conveyance short list options	
April 4		Staff	Advisory Committee - Review conveyance short list options	
April 16	DECISION	Sewage Commission	Sewage Commission - Approve conveyance short list options	
April 17	INFORM	PUBLIC	Press Release – Announce conveyance short list options, explain next steps and invite public to participate in consultation opportunities to choose a preferred option	
April 17	REVIEW	WSP	WSP submits, to CVRD, DRAFT Conceptual Study of Treatment and Resource Recovery Long List options	
April 17- June 7	CONSULT	PUBLIC	Online consultation #4 (review and rank short listed options)	
April 30	REVIEW	WSP	WSP submits, to CVRD, FINAL Conceptual Study of Treatment and Resource Recovery Long List options, CVRD to distribute to TACPAC	
May 13	REVIEW	WSP	WSP submits, to CVRD, DRAFT Detailed Study of Conveyance short list options	
May 21	REVIEW	WSP	WSP submit FINAL detailed study of conveyance short list, CVRD to distribute to TACPAC	
May 29 (9 am to 12 pm)	COLLABORATE	TAC 7A	TAC to: • Review and evaluate conveyance short list options (technical category) • Paul to write up summary of TAC discussion for presentation to TACPAC	

Comox Valley Sewerage Service LWMP Timeline

May 30 (9 am to 3 pm)	COLLABORATE	TAC/PAC 7	WSP presents detailed study of Short list options (conveyance). TACPAC consider ranking of conveyance short list options, preliminary evaluation and identification of preferred conveyance solution Provide update on the treatment & resource recovery long list options	
May 29&30	CONSULT	PUBLIC	Workshop #4 (Review and rank conveyance short list options), share TACPAC's preferred solution for conveyance and provide an update on the treatment & resource recovery long list options	
Thurs June 13 (9 am to 3 pm)	COLLABORATE	TAC/PAC 8	Final review of short listed conveyance options. Evaluate and reach consensus on preferred solution, recommend to AC/SC. Consultants present conceptual study of long list options (treatment and resource recovery). Review and evaluate treatment and resource recovery long list options ***Consultants begin detail study of short list options for treatment and resource recovery*** (***Optional: Priority given to reaching consensus on conveyance***)	
June 20	REVIEW	Paul	Paul to submit DRAFT staff report for conveyance preferred solution Paul to submit DRAFT staff report for treatment and resource recovery short list options	
June 27		Staff	Report for Advisory committee Agenda –preferred solution (conveyance) Report for Advisory Committee Agenda – short list options (treatment and resource recovery)	
July 4		Staff	Advisory Committee – Review preferred solution (conveyance) Advisory Committee – Review short list options (treatment and resource recovery)	
July 16	DECISION	Sewage Commission	Sewage Commission – Approve preferred solution (conveyance) and breaking out of conveyance from LWMP Sewage Commission – Approve short list options (treatment and resource recovery)	
July 17	INFORM	PUBLIC	Press Release – Announce selection of preferred conveyance solution and short list options (treatment and resource recovery) , explain next steps and invite public to participate in consultation opportunities to choose a preferred option	
July 23	REVIEW	WSP	WSP submits, to CVRD, DRAFT Detailed Study of treatment and resource recovery short list options	
August 15	REVIEW	WSP	WSP submits FINAL detailed study of treatment and resource recovery short list, CVRD to distribute to TACPAC	
Sept 10 (9 am to 4 pm)	COLLABORATE	TAC/PAC 9	WSP presents detailed study of treatment and resource recovery short list options. TACPAC consider ranking of treatment and resource recovery short list options. Evaluate and reach consensus on preferred solution, recommend to AC/SC.	
Sept 11&12	CONSULT	PUBLIC	Workshop #5 (Review and rank treatment and resource recovery short list options), share TACPAC's preferred solution for treatment and resource recovery	
Sept 11 to Sept 26	CONSULT	PUBLIC	Online consultation #5 (review and rank short listed treatment and resource recovery options)	
Sept 26 (9am to 12 pm)	COLLABORATE	TAC/PAC 10	Final review of short listed treatment and resource recovery options. Evaluate and reach consensus on preferred solution, recommend to AC/SC.	

Comox Valley Sewerage Service LWMP Timeline

October 10		Staff	Report for Advisory Committee Agenda – preferred solutions (treatment and resource recovery)	
October 24		Staff	Advisory Committee - Review preferred solution (Conveyance+ treatment and resource recovery)	
November 5	DECISION	Sewage Commission	Sewage Commission - Approve preferred solution (treatment and resource recovery)	
November 6	INFORM	PUBLIC	Press Release – Announce preferred solution for treatment and resource recovery, report back on feedback obtained from public consultation process	
November TBD	INFORM	PUBLIC	Open House #2 – Present preferred solution to community, report back on feedback obtained from public consultation process	
TBD	COLLABORATE	TAC/PAC 11	Review draft stage 1 and 2 Report	
TBD	COLLABORATE	TAC/PAC 12	Discuss and recommend Stage 1 and 2 final report	
		Staff	Advisory Committee - Review Stage 1 and 2 final report	
	DECISION	Sewage Commission	Approve Stage 1 and 2 final report	
TBD		Staff	Submit stage 1 and 2 final report and Environmental Impact Studies to Ministry of Environment for review.	