Comox Valley REGIONAL DISTRICT

Agenda

Notice of meeting of the

SEWER EXTENSION SOUTH LIQUID WASTE MANAGEMENT PLAN ADDENDUM JOINT TECHNICAL AND PUBLIC ADVISORY COMMITTTEES (TACPAC)

Monday, December 12, 2022
CVRD Civic Room, 770 Harmston Ave and Zoom
9:00am – 2:00pm

Join Zoom Meeting
https://us02web.zoom.us/j/85307633968?pwd=cHpPYlZONFk2dS9BbHlSbWgxL1dGUT09
Meeting ID: 853 0763 3968
Passcode: 239282
1 778 907 2071 Canada

Item, Time	Description	Owner
3.1 9:00 – 9:05	Call to Order and Territorial Acknowledgement	Facilitator
3.2 9:05 – 9:15	Welcome	CVRD
3.3 9:15 – 9:30	Meeting #2: Meeting minutes, follow up items	Facilitator/CVRD
3.4 9:30 – 10:00	Draft Environmental Impact Study	WSP / Current Environmental
3.5 10:00 – 10:15	Break	
3.6 10:15 – 11:00	CVRD updates • Committee process • Sewer service structure • Project costs	CVRD
3.7 11:00 – 12:00	Committee process / Questions	Facilitator
3.8 12:00 – 12:30	Lunch	
3.9 12:30 – 1:30	Committee Process / Questions cont'd	Facilitator
3.10 1:30 – 1:45	Meeting #4 Preview	Facilitator
3.11 1:45 – 2:00	Roundtable	Facilitator
3.12 2:00	Adjournment	Facilitator

Comox Valley REGIONAL DISTRICT

Minutes

Minutes of the meeting of the Sewer Extension South (SES) Liquid Waste Management Plan (LWMP) Addendum Joint Technical and Public Advisory Committee (TACPAC) held on November 23, 2022 in the CVRD Civic Room at 770 Harmston Avenue, Courtenay, and via Zoom conference commencing at 9:01 am

PRESENT:

A. Habkirk, Facilitator	Facilitator
R. Dyson, Chief Administrative Officer	CVRD
J. Warren, Deputy Chief Administrative Officer	CVRD
M. Rutten, General Manager of Engineering Services	CVRD
D. Monteith, Manager of Liquid Waste Planning	CVRD
V. Van Tongeren, Environmental Analyst	CVRD
A. Mullaly, General Manager of Planning and Development Services	CVRD
M. Briggs, Branch Assistant – Engineering Services	CVRD
I. Snyman	WSP
M. Levin	WSP
D. Wilson	Zinc Strategies
S. Ashfield, Town of Comox	TAC
E. Derby, Island Health (Alternate)	TAC
R. Beise, Island Health (Alternate)	TAC
T. O'Dell, Ministry of Agriculture and Food	TAC
M. Mamoser, Ministry of Environment and Climate Change Strategy	TAC
L. Johnson, Ministry of Health	TAC
D. Arbour, Electoral Area A Director	PAC
I. Munro, Electoral Area A Alternate Director	PAC
M. Hewson, Association for Denman Island Marine Stewards	PAC
N. Prins, BC Shellfish Growers Association	PAC
M. Cowen, BC Shellfish Growers Association	PAC
C. Pierzchalski, Comox Valley Conservation Partnership	PAC
A. Gower, Comox Valley Chamber of Commerce	PAC
I. Heselgrave, School District No.71	PAC
M. Atkins, Underwater Harvesters Association	PAC
N. Prince, Craigdarroch Resident Representative	PAC
R. Steinke, Craigdarroch Resident Representative	PAC
T. Donkers, Royston Resident Representative	PAC
K. Newman, Royston Resident Representative	PAC
J. Elliott, Union Bay Resident Representative	PAC
R. Lymburner, Union Bay Resident Representative	PAC

Item, Time	Description	Owner
2.1 9:01-9:04am	**Call to Order and Territorial Acknowledgement** The meeting was called to order at 9:01 am. The CVRD acknowledged that the committee is meeting on and the proposed Sewer Extension South Project will be constructed and operated on the traditional unceded territory of the K'ómoks First Nation. MOTION: Adopt the agenda – A. Gower SECONDED: R. Lymburner CARRIED UNANIMOUSLY	**A. Habkirk**
2.2 9:04-9:09am	**Welcome and Introductions** The committee members introduced themselves to the committee.	**A. Habkirk**
2.3 9:09-9:13am	**TACPAC Meeting #1: Minutes, follow-up items** D. Monteith addressed a question from TACPAC meeting #1: can we set water quality requirements within the area after the LWMP is adopted? Water quality criteria and restriction of discharges to sensitive water bodies can be included in scope of the LWMP addendum for those areas proposed to be serviced by project. Process could include bringing forward technical memo outlining considerations and then developing a policy. M. Mamoser explained that the TACPAC can develop a policy as part of the LWMP addendum, but would need to be approved by the Minister and include evidence that stakeholders were consulted. Would not affect current applications until LWMP is approved, and then would impact any future applications or amendments to ongoing applications, since they cannot conflict with the LWMP. Comment: This process is for future development, since it would only apply to systems that have a discharge of 22,700L/day as governed by the Municipal Wastewater Regulation. MOTION: Adopt the minutes of the September 21, 2022 SES LWMP Addendum Joint TACPAC meeting – I. Munro SECONDED: R. Lymburner CARRIED UNANIMOUSLY	**A. Habkirk & D. Monteith**
2.4 9:13-9:32am	**Recap: Project overview, purpose and objectives** A. Habkirk introduced the topics to be discussed and set the goals for the day. D. Monteith gave a recap of the previous TACPAC meeting and summarized the history of wastewater planning in Electoral Area A. Provided an overview of the LWMP process, which includes the Sewer Extension South LWMP serving as addendum to the Comox Valley Sewer System (CVSS) LWMP, ending in a combined Stage 3	**A. Habkirk & D. Monteith**

	LWMP. Reviewed overall project concept, which includes a 13km forcemain from Union Bay to Courtenay, local collection systems and pump stations. Q: Was a crossing from Gartley Point to Goose Spit considered? A: Not considered in most recent technical analysis but was looked at during South Sewer Project. Concerns about raw wastewater crossing the estuary. Q: Doesn't it already have to cross somewhere? A: Currently crosses at Courtenay River siphon, which has capacity for south flows and is a much shorter crossing. A. Habkirk acknowledged that the project is heavily focused on connection to CVSS due to other options having been removed due to previous studies or referendums, and requested that the committee share any concerns with this focus. Past analyses can be provided if requested. Q: Do we have information on how the boundaries were determined that the committee can share? A: Planning process based on past work, so boundaries are historic boundaries. Based on residential lot density and cost impacts. Q: Noted that Cameron Estates not included. Wouldn't it be more cost effective to include as many properties as possible, especially the more concentrated areas? A: The committee can consider recommending specific neighbourhoods be added to the service area if there is interest. Would need to consider system age, lot size and costs for connection in the analysis. Staff can provide additional information on boundaries. Q: Has age been considered for included properties? Old or new systems will have to connect. Need to communicate how those who have installed new systems will be accommodated or compensated. A: Generally looking at cumulative impact of septic systems. Will present later during meeting on this topic. Q: Would the conveyance line have capacity for future flow volume not included in initial phase? A: Planning includes entire proposed service area. Comment: Union Bay residents are concerned about communication. There haven't been letters since TACPAC formed, so follow-up letters would be appreciated.	
2.5.1 9:32-10:20am	**CVRD Updates** **Septic system records (Island Health)** R. Beise provided a high-level overview on septic systems. Septic systems provide an environmentally friendly and economical solution	**R. Beise**

	when no domestic wastewater treatment system exists, but failing systems may pose significant risk to environment. Typical lifespan is 15-40 years depending on type. Type 1 system requires less maintenance but is designed to slowly fail and be replaced at end of life. Type 2 and 3 systems require more maintenance and involve engineered treatment. Q: Are all three types of systems permitted now or did the regulation change at one point? A: All included in Sewerage System Regulation (SSR). Complexity of system depends on property constraints (setbacks, property lines, water bodies, onsite soil conditions, lot size, etc.). Island Health (IH) recommends minimum lot size of 1Ha for properties with well water and 0.2Ha for properties with municipal water. Explained how treatment in septic system works. Wastewater treated in septic tank and then effluent is moved to distribution system and dispersed to ground. Responsibility for maintenance placed on owner. Must be done by Authorized Person (AP), which includes Registered Onsite Wastewater Practitioners (ROWP) and Professional Engineers (P.Eng.), or under supervision of AP. Q: Is P.Eng. required for Type 1-3 systems with over 9,100L/day or just Type 3 system no matter the flow? A: P.Eng. can approve all systems, but P.Eng. is required for Type 3. Shared example of Capital Regional District (CRD) septic system bylaw requirements. Type 1 must pump out tank every 5 years. Type 2 and 3 must have AP provide maintenance plan and complete annual maintenance. Estimated costs for septic system replacement were shared: $10k-20k for Type 1, $20k-30k for Type 2, and $30k-50 for Type 3. These estimates are likely low. Q: Is there any CVRD bylaw for septic systems? A: No bylaw at moment, but will speak to this later. Q: Septic regulation bylaws are a moot point if no enforcement. How can these be enforced? A: CRD has compliance threshold. Does not often resort to hard enforcement but may send warning letters. Q: Are there any provincial guidelines?	

	A: Requirement for maintenance is included in SSR, which covers systems under 22,700L/day. Some measures for enforcement included, but delegated to local health authorities. For health authority to enforce, they need to issue order under Public Health Act, but this requires active health hazard. Comment: Only ever seen enforcement in response to a complaint. Response: IH is keeper of septic documents and permits, and addresses complaints. Q: If IH's role is to ensure all buildings with plumbing have system in compliance and IH is not ensuring compliance, are they then not carrying out their mandate? A: Regulatory change in 2005 saw shift of obligation to AP and removed direct role of IH from ensuring correct installation and maintenance of septic systems. IH may investigate instances where non-AP installing or maintaining systems, as well as following up on complaints. Comment: Local government also involved in septic systems because local government won't approve building permits unless evidence shown that property will have sewer servicing. Comment: CRD sets policy for septic systems, so CVRD could follow a similar method. Staff clarified that the Ministry of Transportation and Infrastructure is the approving authority for rural areas. Ultimately comes back to AP and reliance on their approval of a system. Statistics on septic systems were shared with the committee, which included the total number of lots in Union Bay, Craigdarroch and Royston with septic systems that are below the 0.2Ha IH recommendation for minimum lot size and without any septic records. Also included age of systems and system types. Noted that 30 per cent of all lots had no septic records, indicating they were likely built before requirement of records (pre-1970s) or installed without a permit. Q: Is it fair to assume that the 30 per cent of lots with no records are likely older septic systems? A: Yes, systems would most likely predate 1970s. Q: Did the breakdown of system type assume that the systems without records were Type 1 or were those numbers not included? A: Excluded, since nothing can be interpreted from them without records.	

	Q: Did Type 2 and 3 systems exist pre-70s? Is it safe to assume most unknown systems are Type 1? A: Unsure if Type 2 and 3 existed, but legislation at time tended to push people to install Type 1. May have had alternative designs, which would have required approval of health authority to install. Likely that unknown systems are Type 1. Lot size and proximity to ocean likely will require more complex and expensive options when replacing failing systems. Without records of system, would require entire system to be dug up to verify what is there before repairs or upgrades, so replacing system may be cheaper option. Without regular maintenance, Type 1 has lifespan of 10-15 years. Estimated replacement and maintenance cost over 25 years: $25k for Type 1, $60k for Type 2, and $80k for Type 3. Q: When discussing need to replace system, this would be based on system failure rather than just age? Is it possible there may be older systems functioning properly? A: Yes, need to replace system is based on failure. Older systems may be functioning properly. Q: Without evidence of failure, how can we tell if older systems are prone to failure? How many complaints has IH responded to in the proposed service area over the last five years? A: Don't have numbers available, but there have been complaints in the area. Complaints is one way of telling when system is failing. System may be failing in area where not noticeable. CVRD staff noted that a groundwater study was conducted for the area showing evidence of failing systems. When following up on complaint and finding evidence of failure, IH follows up with health order. Usually greatest issue with ensuring compliance is lack of funds to replace system. Connection to municipal service can often be amortized through property tax, and frees up space where field was located. Q: Should include comparison of both capital and maintenance costs, as well as impact on property taxes, for septic systems and to connect to municipal system. Do we know incremental costs to connect to municipal sewer service? A: Will cover per property and annual costs at next meeting. Comment: Would appreciate cost comparison showing cost to homeowners rather than just overall costs.	

	Comment: May see changes to groundwater flow and nutrients when taking all these properties off septic. May see trees drying up and thus leading to change in water use, such as additional irrigation. Should consider potential impacts and plan accordingly.	
2.6 10:20-10:32am	**Break** The committee broke for recess at 10:20 am and reconvened at 10:32 am.	
2.5.2 10:32-10:43am	**CVRD Updates (continued)** **Septic system regulatory options** V. Van Tongeren gave an overview of septic system regulatory options. CVRD launched septic education workshops in 2018, and a maintenance program options study was completed in 2020 that determined Royston and Union Bay as priority areas for septic failure. Maintenance program options include mandatory pump-out, mandatory inspection, and mandatory inspection and maintenance, with estimated costs ranging from $330k to 1.8 million. Maintenance program can have limited effect in resolving septic issues in areas with high density, poor soil quality, and high winter water table. Q: Are program costs for regulatory efforts, not mandatory pump ups? A: Costs presented include administrative and enforcement costs and mandatory pump outs. Mandatory pump outs could be paid by owner to reduce program property tax impacts. Option of using zoning bylaw as means of regulating septic systems. Current zoning bylaw allows secondary dwelling, but could revise to restrict secondary dwellings until sewer servicing in place. Comment: Seems unfair to penalize those willing to install septic systems properly. Q: Is it practical to inspect Type 1 systems if they're designed to fail? Sounds like you can't tell they're failing until they fail, so would enforcement even be effective? A: Pump out isn't necessarily all the maintenance that is required. Q: Inspection can spot other issues? A: Can spot issues with condition of tank or field. **Value planning workshop** V. Van Tongeren gave an overview of the value planning workshop held for the Sewer Extension South Project. Third-party review by a team of experts to consider project function vs resources lens.	**V. Van Tongeren**
2.7	**Discussion Paper #1: Forcemain design, costs, phasing considerations**	**I. Snyman**

10:43-11:59am	Ian Snyman provided an overview of Discussion Paper #1. Utilized population projections for service area from 2020 to 2070. Shared map of proposed pump station catchment areas, as well as expected flows (peaking factor, dry & wet weather flows, I&I, etc.) for 2025 and 2070. Large variance of flows, so need to design system accordingly. Need minimum of 0.75m/s velocity, which will limit what size pipe and wet well can be use based on expected flows. Q: Calculations used provincial standards. Will final projections be based on actual water usage? I&I may be less for new system, which may lead to oversizing system. A: Values are conservative. Don't have actual data for some values, so have to go off provincial standards. The longer sewage stands still in the system, the more likely it will become anaerobic and cause odour. Needs to be in motion at all times. Q: What is the overall system design window in terms of years? A: Based on 2070 figures. Q: Do we have the water to support that population base? Has this been planned for? A: Union Bay Water Master Plan recently completed, so good understanding of water capacity. Agreement in place to supply water from Comox Valley Water System to K'ómoks southlands, which covers bulk of supply for water in area. Q: What is the analysis for full build-out for area? What will happen beyond 2070? Development of treaty lands could be size of Town of Comox at full build-out. A: Medium growth scenario used, looking at low, medium, and high growth projections for each area, with projections from UBE used for their development. Expect minimal new development on existing lots. Looking beyond 2070 is difficult due to many unknowns. Not sure when K'ómoks will proceed with development, but designed to be easily scaled. Q: So design or analysis was looked at for full build-out but scaled down? Understand can't design for full build-out without issues with stagnancy and flows due to oversizing. How has the CVRD planned out for future development? Is the density that's used from the Regional Growth Strategy (RGS)? A: RGS plans for 20-year planning horizon. Difficult to plan out so far into future, with accuracy decreasing the further ahead you look. Important to keep both infrastructure and land-use planning in mind moving forward.	

	Comment: LWMP process is meant to be reviewed every five years, so can be revised as new issues arise. Comment: Regional growth proposes significant problem to infrastructure planning. May need to coordinate with land-use planning. CVRD staff noted that there is existing zoning and land-use policies in place. CVRD has also coordinated with K'ómoks for water and sewer. Treaty lands not subject to RGS and other CVRD policies, so collaboration with K'ómoks key to providing service. Q: How can zoning change for sewer for commercial lots? How will commercial properties affect flows? A: Commercial properties were considered, but data shown as population projection for simplicity. Q: Regarding extreme weather events, values show that wet weather events may have large impact on flows. To what extent can we model that? A: Sewage and stormwater should be separate. Shouldn't have to accommodate for it, and should be channeled away from system. New system should have less I&I. Infiltration will dilute system, but impact should be minimal compared to combined systems. I. Snyman detailed the phases of pump stations, with a series of pump stations from Union Bay to Royston required to maintain flows over such a long distance. Phase 1 is focused on Pump Station #6 (PS6) in Union Bay and Pump Station #1 (PS1) in Royston, with PS6 pumping 8km to PS1 and then PS1 pumping to the Courtenay River siphon. Phase 1B includes addition of Pump Station #3 (PS3) near Craigdarroch, connecting between PS6 and PS1. The long-term phasing includes a future regional pump station in Royston, with PS3 and PS1 feeding into it and then pumping on to siphon. Ultimate buildout includes several pump stations and future twinning of conveyance pipeline. Pipeline won't be twinned initially to avoid having to pay now for infrastructure that won't be used for 20-30 years. Better to design infrastructure to allow for easier future installation, with large culvert that adds space for twinned pipe. Q: Is ultimate build-out for beyond 2070? A: Proposed ultimate build-out is for 2070. Q: Has impact on Courtenay River siphon and infrastructure from siphon to treatment plant been considered? A: Provision for south flows being made within CVSS LWMP and CVWPCC site master plan. Sewer System Conveyance Project (SSCP) is for 2100 and proposed to accommodate south flows.	

Q: If this is to 2070 and SSCP is to 2100, the SSCP then is designed for full build-out?
A: Yes.

Q: Variation in pump station flows throughout phasing may lead to challenges to design. Will this considered when sizing wet wells and pump configuration?
A: Will be addressed in later presentation.

Q: Is Kilmarnock included with original pipeline or twinned line?
A: Will be included in original pipe. Pumps will be upgraded when line is twinned.

Maps of the proposed catchment areas were shared. South Royston Forcemain will be HDPE pipe and follow Highway 19A as much as possible, as most conservative proposal.

Q: Any consideration for K'ómoks southlands, especially those closer to Highway 19 (Inland Island Highway), connecting via different route or catchment?
A: Other options considered, such as pumping upland and then utilizing gravity main, but forcemain considered best option.

North Royston Forcemain runs through City of Courtenay. Route designed to avoid as many utilities as possible.

Class C cost estimate for forcemain currently at $31,590,000, including both contingency and engineering. Costs can be further refined as design proceeds, which is accounted for in the contingency.

Q: Do these costs exclude UBE and K'ómoks?
A: These are overall costs for the system. UBE and K'ómoks contributions may cover part of overall costs.
Q: Is $31,590,000 for the entire project?
A: Amount is just for the forcemain.

D. Monteith advised the committee that the project will need to be phased. First phase will include historic Royston and Union Bay core. Identified as area with most environmental impact. Initial phase is limited in scope to better improve chances of receiving grant funding and to minimize overall costs.

Q: So Phase 1 is for the forcemain to Union Bay and piping to individual lots?
A: Infrastructure will include forcemain from Union Bay to Courtenay, two pump stations in Royston and Union Bay, and collection system for Royston between Highway 19A and Marine Dr, as well as the core Union Bay area.

Q: Noticed Royston Elementary not included in Phase 1 despite concerns about septic system. Why is it not included?
A: Investigating options for connecting Royston Elementary sooner rather than later, and will be discussing further with SD71.

Q: Will costs for additional connections in later phases be different amounts depending on available grant funding?
A: Unsure what costs will be, but may be different. Later connections will be paying for their collection system rather than previous infrastructure.
Q: How is that fair? Need to consider that people may want to connect during earlier phase if they think it will be cheaper. Should be able to communicate that those connecting to same sewer system will pay same amount.
A: Two main high-cost aspects of project: the collection systems, and the forcemain and pump stations. Can't guarantee what future costs will be, but will be aiming to keep them as close as possible. Limited by amount of available grant funding. Will be investigating other funding options when looking at installation of later collection systems.

Comment: Royston Elementary is currently 50 per cent over capacity. Septic system is tested annually, and only allows for 315 students. Prefer to be added to earlier phase, and recognize that as larger user would bear greater costs.

Comment: Existing residents make up about 20 per cent of proposed service area, with 80 per cent for future development. Ideally future development should be paying for bulk of costs. Grants ultimately come from taxpayers, so should not rely solely on grants.
Response: Will be looking more in-depth at numbers next meeting. Not intended for residents to pay for future developments.

Comment: Should show that funds from partners will go to shared infrastructure such as forcemain and pump stations.

Comment: Some neighbourhoods will cost more to service, so argument could be made that it's unfair for residents with cheaper connection to pay as much as more expensive connections. Have to balance costs across system and be able to explain these costs.
Response: Phase 1 will service high density areas first because it will be cheaper.

Q: Will we see different costs for different phases and be able to share them?
A: Challenge with knowing when next phase will be developed. Difficult to estimate inflation as well.

	Q: Understood that residents wouldn't have choice to opt out, but earlier stated that neighbourhood can choose to join in later phases. Will it be opt-in/opt-out? A: If neighbourhood costing for an area isn't included in LWMP, an amendment would be required later as areas are added. Could also resort to referendum or Alternate Approval Process. Should be outlined in LWMP how new phases will be added. Must amend LWMP if costs have changed significantly, which requires public consultation and approval by the Minister. Q: Will costs be on property taxes or separate entity? There are many people that defer property taxes, but can't defer certain things. Would especially impact seniors. Would there be option to pay full amount up-front? A: Will discuss these topics at next meeting.	
2.8 11:59am-12:02pm	**Committee Process: Forcemain alignment, project phasing** D. Monteith explained the committee process and what the TACPAC should prepare to discuss for next meeting. Looking for the committee to make decisions on initial phasing and criteria for future phasing. Comment: Documents roughly cover what costs will be per meter, so can deduce from that what people will be paying. Response: Property connection costs shared are for costs of connecting from house to property line. There will be additional costs for community collection and conveyance infrastructure.	**D. Monteith**
2.11 12:02-12:35pm	**Lunch** The committee broke for lunch at 12:02 pm and reconvened at 12:35 pm.	
2.9 12:35-1:10pm	**Discussion Paper #2: Collection system options, cost comparison** M. Levin gave an overview of Discussion Paper #2. Seven collection system alternatives considered: Gravity Sewer (GS) System, Low Pressure Sewer (LPS) System, Vacuum Sewer (VS) System, Septic Tank Effluent Gravity/Pump (STEG/STEP), and combinations of the first three. Gravity requires less maintenance and is preferred where possible, but limited by topography. STEP uses septic tank to treat solids and then effluent is distributed to system. LPS with grinder pumps is similar but utilizes grinder pump to break up solids and distributes all waste to system. VS utilizes centralized vacuum station to pull wastewater towards itself, and works well in flat areas. GS/VS is cheapest option, but VS rarely used in Canada and requires specialists for maintenance and monitoring. GS/LPS hybrid was highest rated system. GS is ideal where usable. Could be impacted by high water table like in Union Bay. LPS has small holding tank on property, meaning sewage is sitting for less time. Less impacted by topography due to pumping.	**M. Levin**

Comment: With LPS the homeowner owns the pump and the local government only owns from main to the service box. Places additional burden on homeowner.
Response: Yes, pump is owned by homeowner. Needs to be properly maintained or may cause blockages in main. May be concerns with pump not working without power, with tank usually having 24-hour storage.

Hybrid GS/LPS allows for flexibility and to utilize benefits of both systems.

Q: Is the system shown on the Low Pressure Sewer System slide a GS/LPS system? Mentions gravity sewer from house.
A: Gravity flow from home to LPS tank. Main is still pressurized. Could have some properties pumping via LPS tank into gravity system, but most neighbourhoods investigated will be either GS or LPS.

Short-term conceptual design includes 18 highway crossings, review of GS foreshore installation to replace with LPS, and phased approach to buildout.

Q: Which catchment areas are LPS and which are GS?
A: Considering LPS for waterfront properties in Union Bay. Most other catchment areas will be gravity.

Cost estimate for PS1 catchment area (Royston) is $11,099,000, which includes engineering and contingency. Cost estimate for PS6 (Union Bay) is $10,615,000.

Q: Will septic system tanks be connected to system?
A: No.
Q: Does LPS use old septic tank?
A: Will need new tank since smaller size is required, but there is possibility of reusing old infrastructure.
Q: With properties where septic tank is not on street side, will the new tank need to be installed in new location?
A: Depends on where it makes most sense to have tank.

Q: Is there noticeable difference in maintenance costs for the CVRD with LPS with residents maintaining their own tanks? Imagine if resident is paying to maintain own grinder that they will be more careful with what they flush.
A: Maintenance costs could be lower for CVRD.

Comment: Recommend that pump stations be referred to by location rather than number to make them more recognizable.

	Q: What is the usability of the two options? With GS can residents be less careful with what we flush into the system since there's no pump to go through? A: Additional material still needs to be screened out, just at treatment plant instead of at tank. Q: So those with LPS will have more to worry about than GS? A: Yes, since they have infrastructure on property. Q: How would we address power outages for LPS? Would a VS work instead with a generator for the vacuum? A: Power failures are a concern. Would have roughly 24 hours of storage in tank. Many communities have LPS systems, so there are examples to look to for dealing with power outages. VS would limit power concerns to one station, but system cannot be used effectively over long distances and requires special training to maintain and monitor. Also risk of blockages impacting suction and causing sewage to sit in the line until vacuum is restored. Comment: Vacuum system would have greater cost overall for residents in comparison to LPS. Q: Can we put the pump chamber in the septic tank? If there is a reason to remove tank, need good explanation for why. A: Agree, but will be on case-to-case basis depending on condition of tank. Using the septic tank for storage may cause odour issues. Comment: Recommend putting pump chamber in septic tank, not using tank as pump chamber. Q: Will certain setbacks be required for tanks? A: Likely yes, but with less conditions. Most setbacks are tied to the dispersal field, which will be eliminated with using the pump. Q: Would location of existing septic system be factor if being used to store pump? A: Location, condition of tank, and costs of keeping in same location but with longer service line that would be considered. Q: Would footprint be less than with septic tank? A: Yes, since no dispersal field and smaller pump chamber. Comment: LPS are often maintenance nightmares. Should resort to gravity wherever possible. Q: Understanding from previous South Sewer Project that it would be deep trench gravity-fed system. What has changed? What would be cost difference between using GS vs LPS for those being considered for LPS? A: System will be primarily gravity-fed. LPS will be for those along foreshore to avoid installing pipe on foreshore.	

	Q: Understood that foreshore properties were originally going to be gravity-fed but changed to deep trenching beneath the road. What are the cost difference between these options and why might this no longer be feasible? A: Deep trench installations have very high up-front capital costs and difficult to justify to owners. Q: Not at discretion of owner what type of system will be used, so will it be moot point from perspective of owner? Residents aren't going to be given an option. A: May be circumstances where LPS is ideal for some properties, in which case the option may be given to the property owner. Q: Can we get a map of those fed by gravity and those with LPS? A: Will be shared later. Q: Will installation of LPS pump chamber be included in project costs and maintenance covered by owner? A: Yes, project will cover costs of pump installation. Infrastructure would become homeowner's responsibility afterwards. Q: Will project pay for gravity connection from house to property line? A: No. Project will only cover pumps and chambers but not connections – same for both LPS and GS.	
2.10 1:10pm- 1:15pm	**Committee Process: Collection system options** D. Monteith advised the committee on what input is being sought for next meeting. Seeking decision on proposed configuration and if broader application of LPS vs GS would be preferred. A. Habkirk noted the need to allow time to discuss these options and ask questions at the next meeting. May need additional meeting in new year. Q: Are we voting on this at next meeting? A: Yes, will seek consensus at next meeting after providing more information. If additional meeting is added decisions can be deferred to that meeting. Comment: Archaeology on list but we haven't discussed. Response: Will be bringing forward Environmental Impact Study to next meeting. Comment: Might be worth connecting with Town of View Royal regarding offsets and setbacks since they utilize LPS.	**D. Monteith**
2.12 1:15- 1:48pm	**Discussion Paper #3: Pump station design options, cost comparison**	**CVRD**

	Ian Snyman gave an overview of Discussion Paper #3. Provided two options for PS1 (Royston) and PS6 (Union Bay), Option A being the building design and Option B being the kiosk design. PS1 expect low flows at system initiation, so need to mitigate potential odour impacts. Don't want to have constrained access. Option for public washrooms with Option A. Option B has less visual impact. Q: Have you looked at above ground valve chambers? A: Did not include because wanted to minimize visual impact and will have less space constraints. PS6 will start with two pumps, one duty and one standby. Room will be left for additional pumps to address future flows. In future will have a duty pump, assist pump, and standby pump. As with PS1, Option B will have less visual impact. Option A (building) has the advantage of opportunity for public washrooms, but has higher construction costs and greater visual impact. Option B has less visual impact and costs, but does not provide public facilities and is at risk of being vandalized or producing more noise when generator in operation. Comment: For PS1 (Royston), the public washrooms would be considered a disadvantage by neighbours. Proposed locations for PS1 is along Marine Dr near Royston Rd. Chosen due to low-lying area and property within Ministry of Transportation and Infrastructure road right of way. Provided visual comparison of Option A and B for two locations. Q: Will this be a fenced compound? A: Will be up to CVRD and residents. Does not need to be fenced. Q: How high up will this facility need to be to meet post-disaster standards? A: Will just be smaller pump station, with options to move controls across road. Location was originally indicated by 2016 study. It is at risk to future coastal flooding that is a consideration going forward. Comment: May want fencing for security, but could also landscape property. There are examples of pump stations landscaped so you can't tell they're even there. Something to consider when we start looking at designs. Response: Examples of unfenced kiosks in Comox Valley exist, and lack of fencing does significantly reduce visual impact. Comment: Two-story building would avoid flooding risks.	

	Response: Would be expensive to build two-story building and greater visual impact on waterfront. Q: Are we at the level of detail where we are comparing site locations? Royston location may see pushback if not treated sensitively since it's a popular recreational area. A: Locations are presented to committee to discuss and put forward recommendations to Steering Committee. Comment: Very easy to make pump station not look like pump station. Q: Is odour control for the building? A: Odour control takes odour out of the sewage. Q: Is it only included with the building option? A: Will be in both. PS6 (Union Bay) locations proposed on UBE property. Previous LWMP recommended parking lot opposite Highwayman Pub. Future Regional Pump Station will be constructed when additional capacity required, and convey wastewater from all pump stations to Courtenay River siphon. Should be located close to forcemain. Option A (building) estimated to cost $4,640,000 for all pump stations and Option B (kiosk) estimated to cost $3,784,000, including engineering and contingency. Operation and maintenance costs for PS1 and PS6 over 50 years are estimated to be $15,177,689 and $13,988,260 respectively for Option A and $10,538,323 and $9,712,446 for Option B. Q: What does odour control do? Is it down to no smell or minimal smell? A: Goal is to treat all odour. Q: When will we talk about other pump station siting? A: So far just focused on Phase 1 pump stations, but can look at others if TACPAC interested. Q: Will we be reaching a consensus at a later meeting about building type and location? A: Will be considering at a later meeting and putting forward recommendation. Can book an additional meeting if more time is needed for discussion. Comment: Need to lay out what decision points are before each meeting.	

	Comment: Campbell River built a number of pump stations along waterfront with washrooms. Should be considered for areas along walking paths.	
2.13	**Committee Process: Pump station design options** This agenda item was skipped due to time constraints.	
2.14 1:47-1:51pm	**TACPAC Meeting #3 Preview** D. Monteith gave an overview of the next meeting, which will be more focused on discussion than providing information. Staff will be bringing forward a draft Stage 1 Environmental Impact Study, briefing note on sewer service structure, high-level resident costs, and a discussion on committee decisions.	**D. Monteith**
2.15 1:51-1:53pm	**Roundtable** A. Habkirk asked the committee if there were any questions, concerns, or comments about the process for the next meeting. Comment: Communication about project and TACPAC work is important. Should share on social media. Response: Public open houses are scheduled for spring 2023, with one in Union Bay, one in Royston, and one held virtually. Will send out project update with invitation to open houses.	**A. Habkirk**
2.16 1:53pm	**Adjournment** The meeting adjourned at 1:53 pm.	**A. Habkirk**

GENERAL:
The next SES LWMP Addendum Joint PACTAC meeting will be held on December 12, 2022 commencing at 9:00 am in the CVRD Civic Room at 770 Harmston Avenue, Courtenay, and via Zoom conference.

TERMINATION:
The meeting terminated at 1:53 pm.

ENVIRONMENTAL IMPACT STUDY

SOUTH REGION ROYSTON UNION BAY SEWER EXTENSION

COMOX VALLEY REGIONAL DISTRICT

November 21, 2022
Revision 1 – November 30, 2022
Revision 2 – December 5, 2022

Prepared for:

WSP Canada Inc.
210 Harbourside Drive
North Vancouver, BC V7P 3S1

Prepared by:

H. Sungaila, R.P.Bio., D. Silvester, R.P.Bio. & R. Wong, R.P.Bio

current ENVIRONMENTAL
558 England Ave
Courtenay, BC V9N 2N3
p: 250.871.1944
w: currentenvironmental.ca

EXECUTIVE SUMMARY

At the request of WSP Canada Inc. (WSP), Current Environmental Ltd. (CEL) completed an Environmental Impact Study (EIS) to support preliminary design efforts for the construction and operation of the South Region Royston - Union Bay Sewer Extension (hereafter referred to as the "Sewer Extension South" (SES) or the "Project"). The Project aims to address failing septic systems in the Comox Valley Regional District (CVRD) South Region or Electoral Area "A" through the construction of a new wastewater forcemain, local collection systems, and pump stations to connect to existing Comox Valley Sewer Service (CVSS) infrastructure.

The objectives of this EIS are to:

- Describe existing Valued Components (VCs) along the proposed forcemain alignment and in proximity to pump station locations.
    - VCs are elements having environmental, social, cultural, economic, historical, archaeological or aesthetic importance.
    - VCs of environmental importance are further defined as Environmentally Sensitive Areas (ESAs).
- Summarize cultural resources associated with the Project, including potential areas of conflict with known archaeological sites.
- Complete a Screening-Level Contaminated Sites Assessment to identify potential areas of environmental concern.
- Identify potential adverse impacts from construction and operation of the Project on the surrounding environment and community and assess the significance of those impacts.
- Recommend mitigation strategies to reduce potential adverse impacts.
- Complete a cumulative effects assessment, which considers adverse effects to VCs that may occur as a result of the interaction of the Project with other past, present, and future projects and activities in the area.

The screening-level review of known or potential sources of contamination along the project alignment was completed using a combination of site-level investigation and desktop review of existing databases including custom Environmental Risk Information Services (ERIS) reporting. Of the 60 results within 100 m of the Project alignment, 9 APECs warranted a "High" risk rating. Project planning and execution near High-risk APECs will require a well prepared, measured, and safety-oriented approach to any activities that will disturb soils/groundwater in these areas. For linear components, mostly located in road rights-of-way (predominantly Cliffe Ave/Highway 19A), the risk of ERIS results affecting these construction elements are generally low. However, three of the "High" risk ERIS results, two adjacent to pump station locations (i.e., large sites with complex contamination) and one adjacent to the linear portion, may intersect with the Project working limits. To mitigate risks at these locations: soil, water, and/or vapour testing can be completed to ensure that no contamination will be encountered, and if contamination is present in these areas, that the owner may make informed decisions to adjust plans and avoid these areas or prepare to define, treat and/or dispose of contaminated materials appropriately. It is recommended that the results of this screening-level review of potential sources of contamination be considered in the context of final/confirmed project elements and decisions be made as to whether a Phase II ESA type sampling program be initiated for the characterization of materials likely to be disturbed during the project.

Background information on Environmentally Sensitive Areas (ESAs) was identified via desktop review of online mapping inventories and databases. ESAs located within 30 m of the proposed forcemain alignment and within 100 m of the proposed pump station locations, designated as the "working limits," were considered to possibly intersect or be at risk of direct disturbance from construction and operation of the SES. Following desktop analysis, site visits were conducted in October 2022, during which time the entire alignment was reviewed. Streams and ditches, sensitive habitats and ecosystems, as well as occurrences of species at risk within the working limits, as identified by the background review, were the focus of field surveys. Four habitats identified by the Sensitive Ecosystem Inventory intersect the working limits. A BC red-listed seashore saltgrass community is located in the foreshore of Comox Harbour, directly adjacent to the proposed location of PS#1 which will require application of mitigation measures during construction to prevent encroachment into or impacts from construction on the intertidal habitats. Any unavoidable disturbance to this red-listed plant community will need to be suitably offset to ensure no net negative effects. Numerous species at risk have the potential to occur within the Project footprint and surrounding area including bird, mammal, amphibian, reptile, insect, and plant species. Five recently active Bald Eagle nests are present within the Project area that will require heightened mitigation measures to minimize disturbance should the nests be in use during the breeding season coinciding with timelines of Project construction. Although Great Blue Heron colonies (blue-listed SAR) within the Project area are listed as "inactive" according to online databases, foraging habitat in the vicinity is plentiful, and it is possible that herons will return to use these historical nesting sites. In this case, heightened mitigation measures similar to those in place for Bald Eagle nests may be required. Fifteen streams or ditches either cross or flow directly adjacent to the proposed SES forcemain alignment, with nine having confirmed fish presence. Care must be taken to install forcemain lines either above or below the road-crossing culverts or suspended along bridge crossings to avoid any interaction with watercourses. Appropriate erosion and sediment control measures will also be important to avoid release of deleterious substances into streams and ditches during construction, and possible post-construction rehabilitation should any impacts occur.

Residual and cumulative effects assessments were completed as part of this EIS, which identified mobility and viewscapes to be the only VCs at risk of incurring residual effects. Both residual and cumulative effects to these two components were found to be less than significant. With over 99% of the Project footprint located subsurface and within existing road prisms, overall impacts of construction, and operation of the SES are expected to be minimal. The application of general mitigation measures recommended in this report and a project-specific Environmental Management Plan produced prior to construction will further reduce risk to social, cultural, and environmental VCs.

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1 INTRODUCTION

Current Environmental Ltd. (CEL) completed this Environmental Impact Study (EIS) at the request of WSP Canada Inc. (WSP), to support preliminary design efforts for the construction and operation of the South Region Royston Union Bay Sewer Extension (hereafter referred to as the "Sewer Extension South" (SES) or the "Project"). The Project aims to address failing septic systems in the Comox Valley Regional District (CVRD) South Region through the construction of a new wastewater forcemain system, local collection systems, and pump stations to connect to existing Comox Valley Sewer Service (CVSS) infrastructure. The proposed expansion of the CVSS into the South Region would bring a centralized sewage collection system to the communities of Royston, Gartley, Kilmarnock, and Union Bay. In addition to servicing these existing developed areas, sewage systems will be phased in for future developments in the area including the Union Bay Estates and K'ómoks First Nation (KFN) development lands.[1]

A phased approach is proposed for the SES with short, medium, long term, and ultimate build out scenarios. Phase 1A (short term) includes the construction of Pump Stations 1 and 6 (PS#1 and PS#6), and two forcemains, conveying wastewater from PS#6 to PS#1 and from PS#1 to the Courtenay River Siphon (Figure 1). This initial phase will service sub catchment areas for PS#1 and PS#6 existing developed areas of Royston and Union Bay as well as new development areas. Phase 1B (medium term) is included in preliminary designs at the current stage and proposes construction of a third pump station (PS#3) between PS#6 and PS#1. Future and ultimate build out phases, subject to master planning and funding availability, propose the construction of five additional pump stations and associated forcemain and local collection infrastructure. Phase 1B and future phases include pump stations that have yet to be confirmed and are therefore outside of the scope of this EIS.

An EIS is required by the BC Ministry of Environment and Climate Change Strategy as part of the registration of the Project under the Municipal Wastewater Regulation (MWR). This EIS fulfills that requirement and pertains only to Phase 1A: the construction and operation of PS#1, PS#6, and two associated forcemains. This document was drafted in accordance with the *Environmental Impact Study Guideline – A Companion Document to the Municipal Sewage Regulation.*[2]

The objectives of this EIS are as follows:

- Describe existing Valued Components (VCs) along the proposed forcemain alignment and in proximity to pump station locations.
    - VCs are elements having environmental, social, cultural, economic, historical, archaeological or aesthetic importance.
    - VCs of environmental importance are further defined as Environmentally Sensitive Areas (ESAs).
- Summarize cultural resources associated with the Project, including potential areas of conflict with known archaeological sites. The Archaeological Assessment will be completed by others and summarized in the EIS.
- Complete a Screening Level Contaminated Sites Assessment to identify potential areas of concern.

[1] WSP Canada Inc (2022). CVRD LWMP CCO#15 – South Region Royston Union Bay Sewer Extension –Basis of Design Draft R1.0.

[2] https://www2.gov.bc.ca/assets/gov/environment/waste-management/sewage/eisguidelinedec2000.pdf

- Identify potential adverse impacts from construction and operation of the Project on the surrounding environment and community (including residual adverse effects) and assess the significance of those impacts.
- Recommend mitigation strategies to reduce potential adverse impacts.
- Complete a cumulative effects assessment, which considered adverse effects to VCs that may occur as a result of the interaction of the Project with other projects and activities in the area.

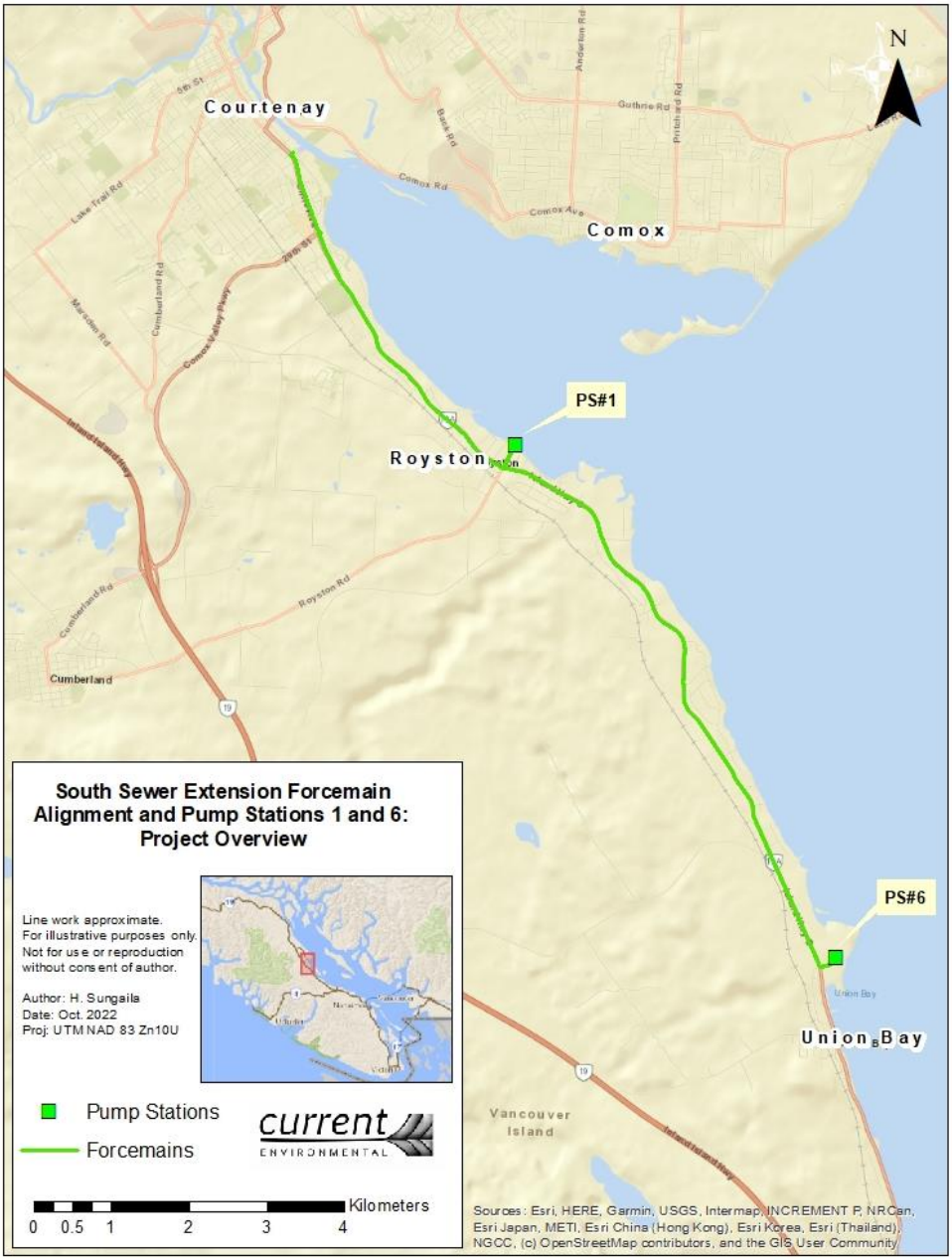

Figure 1. Map of proposed SES route from Union Bay to Courtenay.

1.1 BACKGROUND

The CVSS transports and treats more than 14,000 m^3 of wastewater per day from the communities of Courtenay, Comox, CVRD, and KFN.[3] The current Project, involving an extension of sewer services into the CVRD South Region, is part of a broader Liquid Waste Management Plan (LWMP) process that has been ongoing since 2018 and involves all levels of government as well as public consultation. The purpose of the LWMP is to facilitate safe operation and expansion of the CVSS as the Comox Valley population continues to grow.

The following assessments to date have been carried out by WSP to explore options for the CVRD South Region sewage collection and conveyance system:

- South Region Service Area Impacts on CVSS Conveyance and Wastewater Infrastructure, 2019
- CVRD LWMP – South Region Forcemain Cost Estimate, 2020
- Royston/Union Bay Local Collection System Options & Design Updates, 2021
- CVRD LWMP CCO#13 – South Region Conveyance Options, 2021
- CVRD LWMP CCO#14 – South Region Collection & Conveyance Options, 2022
- CVRD LWMP CCO#15 – South Region Royston Union Bay Sewer Extension –Basis of Design Draft R1.0, 2022

This EIS will build on these studies and investigate potential environmental and social impacts of the Project and potential avoidance and/or mitigation strategies.

1.2 PROJECT IDENTIFICATION

1.2.1 Applicant

Comox Valley Regional District

1.2.2 Name of Project

South Region Royston Union Bay Sewer Extension (“Sewer Extension South” (SES))

1.3 PROJECT CONTACTS

1.3.1 Project Manager/Engineer

Sinead McNally, Design Specialist – Conveyance, WSP

1.3.2 Environmental Assessment Contact & Project Biologist

Rupert Wong, R.P. Bio, Current Environmental

[3] https://www.comoxvalleyrd.ca/LWMP

1.3.3 Project Administrator

Darry Monteith, Manager of Liquid Waste Planning, CVRD

1.4 NEED FOR THE PROJECT AND ROUTE JUSTIFICATION

The CVRD South Region currently relies on private, on-site septic systems for wastewater management. A history of failures and aging infrastructure with septic systems in the area has raised concerns over environmental impacts and potential public health issues. Extending infrastructure south to connect the South Region to the existing CVSS system would alleviate these possible impacts within existing developed areas as well as prepare for anticipated population increase in the region.

Several previous studies, assessments and design iterations have been completed for the Project (see Section 1.1). The proposed sewer alignment, as described in this EIS, represents the most direct route for the forcemains to connect Union Bay (southern extent of the SES) with the Courtenay River siphon. The proposed SES alignment follows Highway 19A for its entire length, and by locating the forcemains within the road prism, this route likely presents the lowest risk of environmental and social impacts (Section 8).

1.5 PROJECT DESCRIPTION

Phase 1A of the SES, addressed in this EIS, involves the construction of two pump stations (PS#1 and PS#6), and two forcemains, achieving wastewater conveyance from Union Bay to the Courtenay River Siphon (Figure 1). Wastewater from the PS#6 sub catchment of Union Bay servicing existing and future development areas will be conveyed in a northwesterly direction approximately 8.6 km to PS#1 near Royston through a 250 mm HDPE forcemain. From PS#1 wastewater will be conveyed through another 250 mm HDPE forcemain approximately 400 m to Highway 19A, at which point the forcemain will increase to a 300 mm HDPE for the remaining 5 km to the siphon near the City of Courtenay. The increase in pipe size is to allow for integration of future phases of the SES in which a future regional pump station will be constructed. With the exception of spur connections to and from pump station locations, the main forcemain line will run entirely along Highway 19A.

The CVRD recognizes the importance of preserving the region's natural environment, and sustainability has been a key consideration in planning and design since the Project's inception. In addressing the potential environmental impacts, Project planners have followed the mitigation hierarchy of avoidance, minimization, restoration, and offsetting.[4] The following general mitigation measures were considered during Project design and planning:

1) **Avoid**

   The proposed Project footprint is located almost entirely within existing road prisms or otherwise previously disturbed sites to avoid negatively impacting natural habitats.

[4] Government of BC (2014). Procedures for Mitigating Impacts on Environmental Values. Accessed from < https://www2.gov.bc.ca/assets/gov/environment/natural-resource-policy-legislation/environmental-mitigation-policy/em_procedures_may27_2014.pdf>.

2) Minimize

Proposed locations for PS#1 and PS#6 are located in previously disturbed areas where environmental impacts will be minimized. To ensure protection of environmental features, it is recommended that an Environmental Management Plan (EMP)/Construction Environmental Management Plan (CEMP) or similar environmental management document be written pertaining to planned construction works. With appropriate mitigation measures in place, environmental impacts can be minimized.

3) Restore

Restoration is expected to be minimal as most of the Project footprint will be within existing road prisms. Any areas where vegetation is incidentally impacted will be re-planted with an appropriate assemblage of native species.

4) Offset

It is not anticipated that any offsetting will be required as a result of Project activities. Efforts to avoid sensitive habitat and reduce construction impacts should be sufficient to reduce overall net negative impact on biodiversity as a result of the Project.

2 FIRST NATIONS CONSULTATION

The CVSS is located within the traditional unceded territory of K'ómoks First Nation (KFN), Nanwakolas Council, Qualicum First Nation, Tla'amin First Nation, We Wai Kai First Nation, Wei Wai Kum First Nation, and Xwemalhkwu First Nation. With CVSS infrastructure spanning KFN reserve lands, KFN and the CVRD's Sewage Commission signed a Community Benefit Agreement in December 2020 (ratified in February 2021), committing the two governments to work collaboratively towards solutions for upgrading and expanding the regional sewer system. Official consultation will be ongoing with KFN Chief and Council throughout the preliminary design process, and KFN will remain an active partner in all stages of project design and implementation for the SES Project.

3 PUBLIC/GOVERNMENT DEPARTMENT CONSULTATIONS & APPLICABLE LEGISLATION

In addition to consulting with First Nations, the CVRD will consult and engage with all levels of government, stakeholders with the potential to be affected, and the public throughout the development of the Project. The Project is subject to review by the Joint Technical and Public Advisory Committees, with meetings scheduled for December 2022 and September 2023.

The following table (Table 1) summarizes the permits, licences and authorizations pertaining to the environment that will be required for implementing the Project, and the respective federal, provincial, or local government department or agency associated with these regulations.

Table 1. Regulations and government agencies applicable to construction of the Sewer Extension South Project.

Level of Government	Legislation	Agency	Directive	Implications for the Project
Federal	*Migratory Bird Convention Act*	Environment and Climate Change Canada	Prohibits the killing, capturing, injuring, taking or disturbing migratory birds or their nests.	-Vegetation clearing required during the nesting bird window (Mar.15 – Aug. 15[5]) should be preceded by a nesting survey by a Qualified Environmental Professional (QEP).
Federal	*Fisheries Act*	Fisheries and Oceans Canada	Prohibits activities that result in harmful alteration, disruption, or destruction (HADD) of fish habitat and/or pollution of water frequented by fish.	-Project Biologist must complete a self-assessment of Project activities and submit a Request for Review if necessary. -In-stream work must respect reduced risk timing window.[6] -Obtain a permit for salvage of salmon species during Project construction.
Federal	*Species at Risk Act*	Environment and Climate Change Canada	Prohibits the killing, harm, harassment, or take of an extirpated, endangered or threatened species and protects critical habitat.	-Species and habitats at risk must be avoided. In areas where Species at Risk are known to occur near the route a survey by a QEP and heightened mitigation measures may be required.
Provincial	*Wildlife Act*	Ministry of Forests	Prohibits the killing, harassment or capture of wildlife, except where allowed by a permit.	-Obtain a permit for any fish (under provincial jurisdiction) or amphibian salvage required during Project construction.
Provincial	*Municipal Wastewater Regulation*	Ministry of Environment and Climate Change Strategy	Requires that notice from a Director be obtained prior to discharging municipal effluent to the environment Conduct an Environmental Impact Study that includes provisions for controlling environmental impacts during construction and operation of the wastewater facility	-Obtain notice from a Director confirming that all requirements have been met prior to beginning Project construction. -QEP must provide an Environmental Impact Study prior to beginning construction.
Provincial	*Contaminated Sites Regulation*	Ministry of Environment and Climate Change Strategy	Sets standards for acceptable levels of contaminants in soil and groundwater.	-Identify sites with potential contamination and follow proper protocol for testing and disposal of contaminated soil or groundwater.

[5] https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods/nesting-periods.html#ZoneA
[6] https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/terms_conditions_van_island.pdf

Provincial	*Water Sustainability Act*	Ministry of Forests	Requires that the Ministry of Forests be notified of any proposed changes in and about a stream for work below the highwater mark.	-Apply for a Section 11 Notification for changes of a minor nature, while more extensive changes require a Change Approval.
Provincial	*Weed Control Act*	Ministry of Environment and Climate Change Strategy	Control noxious weeds growing on land or premises.	-Identify locations of noxious weeds and provide a mitigation plan for controlling their spread.
Provincial	*Riparian Areas Protection Regulation (RAPR)*	Ministry of Land, Water and Resource Stewardship	Provincial regulation that is enforced by local government. Requires that any development proposed within 30 m of a stream or wetland (connected via surface flow to fish-bearing habitat) be assessed by a QEP who then determines setbacks from the feature(s).	-Project activities regulated under provincial Water Sustainability Act and federal Fisheries Act are exempt from municipal bylaw triggering the RAPR process.
Provincial	*Heritage Conservation Act*	Archaeology Branch, Ministry of Forests	As per Section 12 of the HCA an individual (or corporation) must not damage, excavate, alter or remove any heritage object from a heritage site, except in accordance with a permit issued by the Minister.	- Section 12 Site Alteration Permits and Section 14 Heritage Inspection Permits anticipated - Archaeological monitor anticipated for all earthworks
Municipal	*Tree Protection and Management Bylaw*	City of Courtenay (CoC)	Prohibits the cutting, removal, and damage of protected trees without a permit.	-If trees will be removed within the City of Courtenay as part of proposed SES works, a Tree Cutting Permit may be required.
Municipal	*Official Community Plan Bylaw* – Development Permit Areas	CVRD and CoC	Prohibits development in respective CVRD and CoC Development Permit Areas unless superseded by provincial or federal legislation.	-Project activities regulated under provincial Water Sustainability Act and federal Fisheries Act are exempt from municipal bylaw.
Municipal	*Prevention of Public Nuisances Bylaw* *Noise Control Regulation Bylaw*	CoC CVRD	Prohibits the making of excessive noise.	-Construction activities exempt from bylaw: 7 am – 10 pm, Mon-Sat. and 8 am – 10 pm Sun. Construction activities exempt from bylaw: 7 am – 9 pm, Mon-Sat. and 9 am – 9 pm Sun.

4 PROJECT DESCRIPTION

The following sections describe existing conditions along the proposed SES route.

4.1 COMMUNITY STRUCTURE, LAND USE & ZONING

The proposed SES alignment commences in the south within CVRD boundaries and travels north into the City of Courtenay (CoC). Community structure, land use and zoning vary throughout the Project footprint: From south to north, the SES forcemain passes adjacent to undeveloped, forested land and rural residential properties (Photo 1). Higher density residential areas are present in existing developed areas of Union Bay, Kilmarnock, Gartley, and Royston.

The SES crosses into the CoC between Monaltrie Drive and Chinook Road. Land use remains predominantly rural residential and light industrial until north of Millard Nature Park, where the area transitions to a mix of multi-dwelling residential and large and small commercial developments (Photo 2).

As the Project is almost entirely located in road rights-of-way, specific zoning and land use were not significant considerations in planning.

4.2 EXISTING INFRASTRUCTURE & TRAFFIC

Construction of the forcemains will occur entirely within road allowances, with the main length of the alignment located along Highway 19A, and short spur connections to and from pump stations located on side streets. There are many residential and business driveways along the route, and concentrated commercial businesses north of Millard Nature Park. Highway 19A experiences moderate to heavy traffic within the Project area, particularly towards the north end of the SES in the CoC and especially during peak commuting hours.

There are numerous underground utilities along the Project route, which will need to be confirmed prior to construction. Careful coordination with the appropriate utilities, municipalities, and other departments within the CVRD and CoC will be required. There is also overhead hydro infrastructure located along the length of Highway 19A that will need to be considered during construction.

4.3 PROPOSED DEVELOPMENT

The following subsections describe details of the proposed development.

4.3.1 Physical Description

The two forcemains making up the SES will be approximately 14 km in total length spanning from Union Bay in the south to the Courtenay River siphon in the north and be composed of 250/300 mm diameter HDPE pipe. The proposed location of PS#6, at the southern extent of the SES, is just east of Highway 19A at Jones Street in Union Bay (Photo 3). PS#1 is proposed to be sited in an undeveloped lot at Royston Road and Marine Drive, in the town of Royston (Photo 4). Both pump stations are planned for previously cleared sites.

Pump stations will include the following mechanical components:

- Duty standby pumps.
- Non-return valves.
- Isolation valves.
- Flow meters.
- Odour control units.

Additional features proposed for Pump Stations 1 (option A) and 6 include control buildings that house:

- Backup generators.
- Onboard fuel tanks.
- Electrical room containing electrical equipment and the computer control system known as Supervisory Control and Data Acquisition (SCADA).
- Odour control room.
- Public washrooms.

Pump Station 1 Option B proposes having the generator, motor control centre, electrical kiosk, and odour control in individual units as opposed to being consolidated within a building.

4.3.2 Construction Details

The Project is in the preliminary design stage; therefore, detailed construction methods are currently unavailable. The following are typical methods used in sewer forcemain construction. In general, sewer forcemain construction uses traditional open-trench construction in which the trench is excavated to a depth sufficient to provide the pipe with an appropriate depth of cover. The pipe is typically situated along the trench bottom on a bed of engineered fill and the trench is then backfilled with compacted engineered fill. In areas where shallow bedrock is present, blasting is usually required to prepare the trench. Hydrostatic testing of the pipe is often undertaken at regular designated intervals.

At stream or ditch culvert crossings, the forcemain pipe will either be installed above the existing culverts where the fill above the culvert is of sufficient thickness or below the existing culvert where the fill above the culvert is of insufficient thickness, both methods avoiding the need for any impacts to the stream or ditch. For the two bridge crossings over Hart/Washer Creek and the Trent River, suspended crossings will be required.

4.3.3 Operational and Maintenance Details

The Project is in the preliminary design stage; therefore, details on operational and maintenance protocols are currently unavailable.

4.3.4 Decommissioning Plans

At present there are no plans to decommission Project works as they will be an integral part of wastewater treatment for the CVRD South Region for the long term. Should the decision be made to decommission the SES in the future, a detailed plan will be required for the safe and effective decommissioning of the forcemains, pump stations and associated facilities and infrastructure. This plan will be developed at such a time when the decision is made to decommission Project works.

4.4 PROJECT DEVELOPMENT SCHEDULE

The Project is currently in the preliminary design stage and requires several rounds of consultation with KFN and the Joint Technical and Public Advisory Committees before a development schedule can be proposed.

5 CONTAMINATED SITE HISTORY

The following section details the purpose and results of the screening level contaminated sites assessment, conducted by CEL as part of the EIS.

5.1 SCOPE AND OBJECTIVES

The purpose of the screening level review of existing contaminated sites information is to inform the CVRD of potential issues that may arise with exposure/handling of soils or groundwater during construction. Unforeseen costs and delays associated with characterization (sampling, analysis, and reporting) and handling (removal, trucking, disposal) can result from encounters with uncharacterized suspect materials. These risks can be mitigated by determining the likelihood of encountering Areas of Potential Environmental Concern (APEC) and undertaking additional study to characterize these areas, if warranted, prior to initiating physical works. This screening-level report does not constitute a Phase 1 ESA; however, accessing databases for historical/existing information on the probability of encountering contamination are common characteristics shared with this study.

This screening level review of known or potential sources of contamination along the project alignment has been completed using a combination of site-level investigation and desktop review of existing databases including custom Environmental Risk Information Services (ERIS) reporting associated with the preferred project alignment within a specified buffer area. ERIS reporting provides records from a wide variety of historical and contemporary databases associated with contaminated sites within a defined radius of project components. Within this EIS report, ERIS records have been condensed and summarized with those of particular relevance or risk factors associated with Areas of Potential Environmental Concern (APEC) that could have broader implications for the execution of the CVRD SES. Results of this analysis are provided in Section 5.2 with additional discussion in Section 5.3. The entire ERIS report is located in Appendix B.

The conclusions and recommendations made in this report are based on the best available knowledge and information at the time of the assessment. Should additional information become available, or site conditions change, the conclusions and recommendations of this report may also be subject to change. Events occurring after the date of the site assessment within the Project area or in an instance where the Project alignment or pump station locations have been changed are beyond the scope of work for this report.

5.2 RESULTS

Custom desktop ERIS records are based on presence within a 100 m buffer applied to the proposed alignment supplied by WSP Inc. on October 5, 2022. Note that it is anticipated all physical disturbances associated with project activities will be limited to a buffer area of approximately 30 m (see Section 6) while 100 m was selected for the assessment of APECs to capture any adjacent sites with records of contamination or other sources of concern that could conceivably migrate towards the Project area. Offsite migration is a known risk factor associated with some

types of contamination. The existence of a record within the 100 m assessment area is not considered an APEC by default and discussion of the particulars of each record including likelihood of risk to the project are provided in Appendix A.

Encountering contaminated materials during the process of work may trigger worker health and safety protocols (e.g., dangerous soil vapours or physical materials handling), and/or a determination of whether suspect materials can be re-used for backfill or must be contained, characterized, and transported off-site for disposal at an approved facility. If analysis is required and concentrations of the analyte are determined to be "Hazardous Waste", specific documentation and handling requirements will be triggered under the BC *Hazardous Waste Regulation*.

The custom ERIS report includes searches within 58 governmental and non-governmental databases. A summary of 60 ERIS records is provided in Appendix A that include all records within 100 m of the project alignment including recorded history, ownership, address, and risk to the project. Moderate to high risk levels have been highlighted in order to emphasize those areas with the greatest likelihood of contamination that could intersect project components and that could trigger additional handling/disposal requirements pending detailed analysis. Risk levels attributed to ERIS records are:

- Very low. The record is not related to a known type of environmental contaminant.
  E.g., may be a record of a past report request or business selling controlled substances such as commercial pesticides.
- Low. May involve environmental discharge of a substance that is biologically active and does not include persistent contaminants.
  E.g., septic system discharge or permitted process effluent.
- Moderate. Intermittent production or remediation of hazardous materials requiring offsite disposal with record of "non-high risk" site classification by the Ministry.
  E.g., clean-up compliance confirmed by the Ministry but unknown offsite migration potential. Service station presence in proximity to project components without specific records of known contamination.
- High. Complex site with confirmed history of remediation with implications for offsite migration to adjacent properties. May have history of hydrocarbon or other hazardous materials spills or remediation. May have limited records of remediation or some likelihood of remaining uncharacterized soils that could affect nearby project components.
  E.g., Past record of "high-risk" site classification by the Ministry, record of adjacent properties implicated in risk, or recent incomplete remediation.

High risk sites with potential intersection with project components include (see Appendix A for more detail and Figures in Section 11 for locations/proximity to Project components):

1) ERIS ID 43: Imperial Oil Ltd., 2650 Cliffe Ave.
2) ERIS ID 52: Mohawk Lubricants Ltd., 2350 Cliffe Ave.
3) ERIS ID 10: Shell Canada Products Ltd., 3927 Marine Drv.
4) ERIS ID 12: Portions of Royston Road and Marine Drv.
5) ERIS ID 13: 3910 Royston Road and adjacent Crown Land
6) ERIS ID 14: 3943 Marine Drive
7) ERIS ID 46 & 49: 2400 Cliffe Ave.
8) ERIS ID 54: 7-Eleven Gas Bar, 2295 Cliffe Ave.
9) ERIS ID 56: Kensington Union Bay Properties Ltd., Highway 19A, Union Bay

The application of a "High" risk rating does not constitute confirmed presence of contamination that will affect the project. Instead, it is an indication of where an APEC exists that should trigger application of a well prepared, measured, and safety-oriented approach to planning for and completing work during any activities that will disturb soils/groundwater in these areas. Special attention must be paid to maintain worker safety, presence of crews and qualified professionals prepared to identify and respond to suspect materials, and records of established procedures and worker training protocols for encounters with suspect materials or hazardous substances -prepared in advance of an encounter occurring.

Records described in Appendix A of 60 known ERIS results can be summarized according to the following database entries:

- 4 Authorization Management System (AMS) result: permits issued under the *Environmental Management Act* for discharge of waste.
- 6 Compliance and Enforcement Summary (CONV) result: summary of tickets and convictions issued by the Ministry of Environment.
- 10 ERIS Historical Searches (EHS) result: past search history of the ERIS database.
- 8 Environmental Monitoring Locations (EM) results: environmental monitoring areas maintained by the Ministry of Environment.
- 12 Waste Generators Summary (GEN) result: Any site, equipment and/or operation involved in the production, collection, handling, and/or storage of regulated wastes.
- 8 Generators – Special Waste Information System SWIS (GEN2) result: generation and transport of hazardous waste under the BC Hazardous Waste Regulation.
- 1 National Environmental Emergencies System (NEES) result: includes reports of spills of hazardous substances.
- 7 Pesticide Register (PES) result: includes list of applicants for licences (service or vendor) for use of registered pesticides.
- 1 Waste Receivers Summary (REC) result: registration of a waste receiving facility associated with the disposal of regulated waste under the Special Waste Regulation.
- 12 Retail Fuel Storage Tanks (RST) result: inventory of retail fuel outlet locations.
- 2 Scott's Manufacturing (SCT) result: voluntary database of manufacturing facilities.
- 20 Site Registry (SREG) result: sites investigated and requiring remediation that may or may not be contaminated. Information collected by the Ministry of Environment.
- 3 Water Well Information System (WWIS) results: database of groundwater wells.

5.3 DISCUSSION

While the ERIS custom report returned 60 distinct locations, many of the results are not indicative of contamination or potentially contaminated soils. Of the 60 results within 100 m of the Project alignment, 9 warranted a "High" risk rating. There is a broad range of timeframes and recorded details associated with sites classified as being potentially High-risk in this EIS -some of which have been subject to past remediation efforts, received past site registry "high-risk" classifications, and/or records of offsite migration. Because the nature of sub-surface hydrocarbon contamination can be dynamic and effective over long-timescales, adjacent properties, including the project alignment, may still be subject to the effects of contaminant migration in soils and groundwater even if not directly implicated in past spills or other releases of hazardous materials (Photo 4).

Overall, given the location of the indicative project alignment, mostly within road rights-of-way for linear components -the risk of ERIS results affecting these construction elements are generally low. However, where pump station construction within specific parcels is planned (i.e., PS #1 & #6), there may be intersections with high-risk

ERIS results (See Appendix A: ERIS ID #10, 12-14 for PS#1 and ERIS ID #56 for PS#6). To mitigate these risks: soil, water, and/or vapour testing can be completed to ensure that no contamination will be encountered, and if contamination is present in these areas, that the owner may make informed decisions to adjust plans and avoid these areas or prepare to define, treat and/or dispose of them appropriately. It is recommended that the results of this screening-level review of potential sources of contamination be considered in the context of final/confirmed project elements and decisions be made as to whether a Phase II ESA type sampling programme be initiated for the characterization of materials likely to be disturbed during the project.

6 DESCRIPTION OF THE ENVIRONMENT

Located in the Coastal Western Hemlock very dry maritime Eastern biogeoclimatic subzone (CWHxm1), the Comox Valley region climate is characterized by warm, dry summers and mild, wet winters.[7] Mean annual precipitation in the CWHxm subzone is 1505 mm, with the warmest month averaging 17.0 °C and the coldest month averaging 1.8 °C (Figure 2).[8]

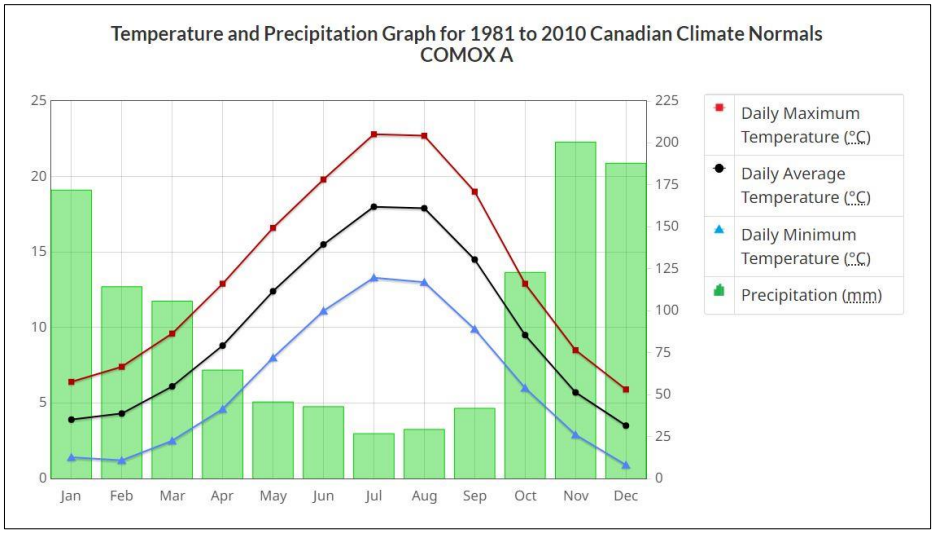

Figure 2. Climate normals from 1981 – 2010, Comox A station.[9]

[7] Ministry of Forests and Range (1994). A Field Guide for Site Identification and Interpretation for the Vancouver Forest Region. Land Management Handbook Number 28. Pp 63.
[8] BC Ministry of Forests. (1991) Ecosystems of British Columbia. Accessed from <https://www.for.gov.bc.ca/hfd/pubs/Docs/Srs/Srs06.pdf>.
[9] Government of Canada. Climate Normals & Averages. Accessed from <https://climate.weather.gc.ca/climate_normals/results_1981_2010_e.html?searchType=stnProx&txtRadius=25&selCity=&selPark=&txtCentralLatDeg=&txtCentralLatMin=0&txtCentralLatSec=0&txtCentralLongDeg=&txtCentralLongMin=0&txtCentralLongSec=0&optProxType=decimal&txtLatDecDeg=49.64&txtLongDecDeg=-124.93&stnID=155&dispBack=0>.

The following subsections describe existing VCs, which are defined for the purposes of this report as elements having environmental, social, cultural, economic, historical, archaeological or aesthetic importance. VCs of environmental importance are further defined as Environmentally Sensitive Areas (ESAs). For the purposes of this assessment, "Project footprint" refers to the area of land permanently occupied by the sewer forcemain and pump stations. "Working limits" refers to those areas that could reasonably incur direct disturbance from construction and operation of these utilities. For the purposes of this report, a 30 m buffer on either side of the proposed sewer alignment and a 100 m buffer surrounding pump stations was used as an estimate of working limits.

Several online mapping inventories and databases were used during desktop analysis to determine whether there are known occurrences of Species at Risk (SAR) and/or known sensitive habitat features within the Project area. Databases used in this query included:

1) Comox Valley Regional District (CVRD) iMap;[10]
2) BC Conservation Data Center (CDC) *Species and Ecosystem Explorer;*[11]
3) Federal Species at Risk Public Registry;[12]
4) Fisheries Information Database Query (FIDQ) database,[13] and the BC Habitat Wizard;[14]
5) Sensitive Habitat Inventory Mapping (SHIM);[15]
6) Sensitive Ecosystem Inventory (SEI);
7) Wildlife Tree Stewardship Atlas (WiTS);[16]
8) Great Blue Heron (GBHE) Management Team Atlas;[17]

Following desktop analysis, site visits were conducted by a CEL biologist October 21 – 28, 2022, during which the entire alignment was reviewed. Watercourses, sensitive habitats and ecosystems, as well as occurrences of species at risk within or intersecting the working limits, as identified by the background review, were the focus of field surveys. The overall objective was to assess vegetation, terrestrial, and aquatic habitat within the working limits, which included:

- Evaluation of watercourses either crossing or flowing directly adjacent to the alignment.
- Evaluation of terrestrial and aquatic habitats surrounding the pump station locations.
- Assessment of identified SEI sensitive habitats identified within the working limits.
- Assessment of native vegetation communities within the working limits.
- Identification of invasive plant species present within the working limits.

[10] Comox Valley Regional District (2020). CVRD iMap 2.2. Accessed from <http://imap2.comoxvalleyrd.ca/imapviewer/>
[11] B.C. Conservation Data Centre: CDC iMap (2022). Ministry of Environment, Victoria, B.C. Accessed from < http://maps.gov.bc.ca/ess/hm/cdc/>
[12] Government of Canada (2022). *Species at Risk Public Registry*. <https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html>
[13] https://a100.gov.bc.ca/pub/fidq/welcome.do
[14] https://maps.gov.bc.ca/ess/hm/habwiz/
[15] Sensitive Habitat Inventory Mapping (SHIM) Atlas (2022). The Community Mapping Network. Accessed from <http:// www.cmnmaps.ca/SHIM/>
[16] Wildlife Tree Stewardship (WiTS) Atlas (2022). Community Mapping Network. Accessed from <http://www.cmnmaps.ca/wits/>
[17] Great Blue Heron (GBHE) Management Team (2022). The Community Mapping Network. Accessed from <http://cmnmaps.ca/GBHE/>

6.1 SURFACE AND GROUNDWATER

The BC interactive iMap identifies aquifers 0411 and 951 below the site.[18] Aquifer 0411 is a fractured sedimentary rock aquifer, of unknown productivity and low vulnerability. It covers an area of 731.9 km^2 extending from Courtenay to Campbell River. Aquifer 951 is an unconfined sand and gravel aquifer (late glacial outwash), of unknown productivity and moderate vulnerability. This aquifer covers an area of 34.2 km^2 extending from Courtenay in the north to Royston in the south and Cumberland in the west. Bedrock geology in the area is identified as the upper cretaceous Nanaimo group characterized by sedimentary rocks of boulder, cobble and pebble conglomerate, coarse to fine sandstone, siltstone, shale and coal.[19] Many residences and farms within the South Region obtain their drinking water from wells; however, there are only three registered groundwater wells in the vicinity of the Project (see Section 5.2 and Section 11), which are at low risk of being impacted by the Project.

Surface drainage patterns along the Project route have been historically altered by development in the region. The majority of land within the Project footprint that will be affected by construction consists of impervious surfaces (i.e., pavement or compacted gravel), with the exception of the pump station footprints.

The proposed SES route includes a total of 13 stream or ditch crossings, ranging from minor drainage ditches to important fish-bearing streams. A 14th and 15th watercourse within the working limits runs parallel to Highway 19A approximately 2 m from the edge of pavement. See Section 6.2.7 for more details on aquatic habitat.

6.2 AQUATIC AND TERRESTRIAL BIOTA

The Project route falls within the Coastal Western Hemlock very dry maritime Eastern subzone (CWHxm1), a biogeoclimatic zone home to a diverse range of habitats. Within this subzone, 39 ecological communities are recognized, 14 of which are red-listed and nine of which are blue-listed.[20]

The proposed sewer extension route follows a major arterial road in the CoC, Highway 19A/Cliffe Avenue, and along Highway 19A in its southern extent. The route falls largely within heavily modified anthropogenic environments, although there are some less disturbed areas adjacent to the alignment, including forest and wetland habitat. There are a number of federally and provincially listed species known to occur in the vicinity of the Project. The proposed sewer route intersects with several streams and their associated riparian zones (See Section 6.2.7).

Maps of ESAs found within the working limits can be found in Section 11. The following subsections describe the ecosystems, birds, mammals, amphibians, reptiles, vegetation, invertebrates, fish, and aquatic habitats.

6.2.1 Ecosystems

Based on species composition and forest types observed on-site, a total of 13 CDC-listed ecological communities were identified as potentially occurring within the CWHxm1 BGC zone of the Project area (Table 2). There are also four habitats identified by the Sensitive Ecosystem Inventory (SEI) within or intersecting the working limits (Table 3). SEI habitats are defined as either rare or threatened ecosystems or have significant biodiversity and/or wildlife

[18] https://apps.nrs.gov.bc.ca/gwells/aquifers
[19] iMap BC (2022). Accessed from <https://maps.gov.bc.ca/ess/hm/imap4m/>.
[20] BC Species & Ecosystem Explorer. Accessed from <https://a100.gov.bc.ca/pub/eswp/search.do>.

values. The seashore saltgrass / Pacific swampfire ecological community, corresponding to ECO-4 (Table 3), was observed in the foreshore adjacent to PS#1 proposed locations during site visits.

Table 2. At-risk ecological communities with the potential to occur along the Project route. Source: BC Conservation Data Centre.

English Name	Scientific Name	Status			Ecosystem Group
		Global Status	Prov Status	BC List	
Sitka spruce / salmonberry Very Dry Maritime	*Picea sitchensis / Rubus spectabilis*	G3	S2	Red	Terrestrial – Flood: Flood (Highbench); Terrestrial – Forest: Mixed – moist/wet
Douglas-fir / dull Oregon-grape	*Pseudotsuga menziesii / Mahonia nervosa*	G2	S2	Red	Terrestrial – Forest: Coniferous – mesic
Douglas-fir / sword fern	*Pseudotsuga menziesii / Polystichum munitum*	G2G4	S2S3	Blue	Terrestrial – Forest: Coniferous – dry
Douglas-fir – western hemlock / salal Dry Maritime	*Pseudotsuga menziesii – Tsuga heterophylla / Gaultheria shallon*	G3G4	S2S3	Blue	Terrestrial – Forest: Coniferous – dry
seashore saltgrass / Pacific swampfire	*Distichlis spicata / Sarcocornia pacifica*	GNR	S1S2	Red	Estuarine Realm: Estuarine Marsh Class
western redcedar / slough sedge	*Thuja plicata / Carex obnupta*	GNR	S2S3	Blue	Terrestrial – Forest: Coniferous – moist/wet; Wetland – Mineral: Wetland Swamp
western redcedar / black twinberry	*Thuja plicata / Lonicera involucrata*	GNR	S1	Red	Terrestrial – Forest: Coniferous – moist/wet
western redcedar – Sitka spruce / skunk cabbage	*Thuja plicata – Picea sitchensis / Lysichiton americanus*	G3	S3	Blue	Terrestrial – Forest: Coniferous – moist/wet; Wetland – Mineral: Wetland Swamp
western redcedar / sword fern – skunk cabbage	*Thuja plicata / Polystichum munitum – Lysichiton americanus*	GNR	S3?	Blue	Terrestrial – Forest: Coniferous – moist/wet; Wetland – Mineral: Wetland Swamp
western redcedar / sword fern Very Dry Maritime	*Thuja plicata / Polystichum munitum*	GNR	S2S3	Blue	Terrestrial – Forest: Coniferous – mesic
western redcedar / salmonberry	*Thuja plicata / Rubus spectabilis*	GNR	S1S2	Red	Terrestrial – Forest: Coniferous – moist/wet
western hemlock – Douglas-fir / Oregon beaked-moss	*Tsuga heterophylla – Pseudotsuga menziesii / Eurhynchium oreganum*	G3G4	S2	Red	Terrestrial – Forest: Coniferous – mesic
western hemlock – western redcedar / deer fern	*Tsuga heterophylla – Thuja plicata / Blechnum spicant*	G2G3	S2	Red	Terrestrial – Forest: Coniferous – moist/wet

Table 3. Sensitive ecosystems overlapping with the Project's working limits. Map ID and Map # correspond to ESA maps in Section 11.

Map ID	Map #	Primary Ecosystem Type	Ecosystem Description	Secondary Ecosystem Type	Ecosystem Description	Location
ECO-1	3	Older Second Growth Forest	Large forested stands 60 – 100 years old	Older Forest	Forests older than 100 years.	South of the Trent River estuary, east side of HWY19A.

ECO-2	3/4	Riparian	Vegetated floodplains, stream and lake shores and gullies.			Right bank of the Trent River on the upstream side of the Hwy19A bridge, extending south.
ECO-3	3/4	Riparian	Vegetated floodplains, stream and lake shores and gullies.	Wetland	Marshes, fens, bogs, swamps, shallow water and wet meadows.	Trent River Estuary, downstream of the HWY19A bridge.
ECO-4	3/4	Wetland	Marshes, fens, bogs, swamps, shallow water and wet meadows.	Sparsely Vegetated	Dunes, spits and inland cliffs.	Along the foreshore at proposed PS#1 locations.

6.2.2 Birds

More than 70 different bird species have the potential to occur along the SES route, including 13 listed species (Table 4). Shrubs, grasses, and forested area along the alignment likely provide nesting and foraging habitat for a variety of avian species. The mature mixed coniferous/deciduous forest surrounding the southern half of the Project footprint provides potential habitat for cavity nesting species in large snags or veteran trees. Dense shrub thickets and tall grasses are also present along the forested section of the proposed alignment as well as extending into the denser residential and commercial areas towards the north end of the alignment, which would be suitable for several nesting passerine species. Because the proposed pump stations and forcemain route is located within lightly to heavily disturbed areas, it is likely that birds found along the route are habituated to disturbance such as noise from traffic, pedestrians, and dogs.

Table 4. Avian Species at Risk with the potential to occur along the Project alignment. Source: BC Conservation Data Centre.

English Name	Scientific Name	Status			Probability of Occurrence	Key Habitat
		COSEWIC*	SARA*	BC Status		
Band-tailed Pigeon	*Patagioenas fasciata*	SC	S1-SC	Blue	Moderate	Variety of forest types, especially pine-oak, spruce, fir, Douglas-fir, redwood, cedar, hemlock, and alder.
Barn Owl	*Tyto alba*	T	S1-T	Blue	Low	Nest in cavities in trees, buildings or cliffs. Hunts prey in open pastures.
Barn Swallow	*Hirundo rustica*	T	N	Blue	Moderate	Open habitat frequently near water. Nest in barns or other buildings, under bridges, in caves of cliffs crevices.
Common Nighthawk	*Chordeiles minor*	T	S1-T	Yellow	Moderate	Mountains and plains in open and semi-open areas, often in the vicinity of cities and towns. Nesting occurs on the ground on a bare site or flat roof in an open area.
Great Blue Heron, *fannini* subspecies	*Ardea herodias fannini*	SC	S1-SC	Blue	Moderate	Nests colonially in tall Sitka spruce, western red cedar, western hemlock, pine, red alder and black cottonwood, away from human disturbance. Forages in shallow water such as marine intertidal areas, estuaries, riparian areas, wetlands, freshwater lakes, and muskegs.

Green Heron	*Butorides virescens*	N	N	Blue	Moderate (Summer breeding)	Sloughs, rivers, lakes, wetlands, estuaries and beaches; slow moving or shallow water for foraging.
Marbled Murrelet	*Brachyramphus marmoratus*	T	S1-T	Blue	Low	Coastal areas, usually with 2 km of the shore. Nest in old-growth coastal coniferous forests.
Northern Goshawk, *laingi* subspecies	*Accipiter gentilis laingi*	T	S1-T	Red	Low	All forest types, from coniferous and mixed forests to pure deciduous forests; often associated with mature or old growth stands when they are available, primarily during the breeding season. Nests in dense canopy closure, and hunts near permanent sources of water, edges of clearings, roads, or forest openings.
Northern Pygmy-Owl, *swarthi* subspecies	*Glaucidium gnoma swarthi*	N	N	Blue	Moderate	Secondary cavity nester, dependent upon woodpecker or natural cavities. Hunts prey in forest openings and riparian corridors
Olive-sided Flycatcher	*Contopus cooperi*	T	S1-T	Blue	Moderate	Open areas (forest clearings or forest edges near natural openings like rivers and swamps) containing tall live trees or snags for perching, mixed coniferous forests and along the forested edge of streams. Nest in conifers.
Purple Martin	*Progne subis*	N	N	Blue	Moderate (Summer breeding)	Nests in tree cavities, buildings, rock crevices and, increasingly, bird houses, often in small colonies. Forages in open habitats, often near water and human settlements.
Short-eared Owl	*Asio flammeus*	SC	S1-SC	Blue	Low	Open habitats including marshlands, estuaries, and grasslands; absent from heavily forested areas. Nests on the ground under low shrubs, reeds or grasses, usually near water.
Western Screech Owl, *kennicotti* subspecies	*Megascops kennicottii kennicottii*	T	S1-T	Blue	High (several recorded occurrences in close proximity to the Project)	Semi-open woodlands to treed suburban areas, sometimes in lower elevation forests close to water. Nests in cavities within large, old trees and is strongly associated with riparian areas.

* E=Endangered, T=Threatened, SC=Special Concern, S1=SARA Schedule 1.

According to data from the Wildlife Tree Stewardship Atlas database, there are five Bald Eagle nests near the proposed sewer alignment that have observed breeding activity within the last ten years (Table 5). The CVRD eagle nest assessment area guidelines were used for this study to assess proximity to the project footprint and therefore determine which nests may incur disturbance.[21] A nest was considered to be at risk of possible disturbance from construction works if it was located:

- 200 metres from the Project footprint if the nest tree is located on a lot equal to or greater than five hectares in area.

[21] CVRD (2014). Rural Comox Valley Official Community Plan Bylaw No. 337. Development permit guidelines. <https://www.comoxvalleyrd.ca/sites/default/files/uploads/bylaws/337_rural_cv_ocp_consolidated_2018_0.pdf>

- 100 metres from the Project footprint if the nest tree is located on a lot that is one hectare or greater but less than five hectares in area.
- 60 metres from the Project footprint if the nest tree is located on a lot that is less than one hectare in area.

Nest locations, conditions and breeding activity were not assessed during field surveys in October 2022 as this is outside of the nest selection and active breeding window for Bald Eagles. Additionally, Bald Eagles often rotate between two or more nest sites within their territory; therefore, it is recommended that field surveys to assess nest usage be conducted during the breeding season coinciding with planned construction works to most accurately assess possible disturbances and establish appropriate mitigation measures. Additionally, prior to construction, the WiTS database should be referenced in the event that a new nest or one that becomes newly active again is within proximity to the Project that was not identified in this report. Heightened mitigation measures to minimize disturbance will be required if nests in close proximity to the Project footprint are in use during Project construction that should be detailed in project EMP/CEMP.

Table 5. Bald Eagle nest locations in close proximity to the proposed Project footprint. Map ID and Map # correspond to ESA maps in Section 11.

Map ID	Map #	Bald Eagle Nest	Location	Proximity to alignment	Comments
BE-1	1	BAEA-106-093a	Approximately 150 m northwest of the end of Washer Rd.	150 m	New as of 2021, located 15 m away from BAEA-106-093.
BE-2	1	BAEA-106-715	Glover Park.	95 m	Active in 2022 breeding season.
BE-3	3/4	BAEA-106-161	Approximately 260 m east of the Highway 19A bridge over the Trent River.	135 m	Last observed active in 2012, but tree is still standing, and nest is present as of 2021. This nest is thought to be in the same nesting territory as BAEA-106-355.
BE-4	3/4	BAEA-106-355	Approximately 100 m east of the Highway 19A bridge over the Trent River.	80 m	Last observed Active in 2021 breeding season.
BE-5	5/6	BAEA-106-274	Millard Creek Nature Park	80 m	Last observed active in 2013.

The CMN Great Blue Heron (GBHE) Atlas shows no heron colonies within 300 m of the proposed project footprint with observed activity within the last ten years. To assess heron colony proximity to the project footprint and potential disturbance, the CVRD heron colony assessment area guidelines were used for this study.[18] A colony was considered to be at risk of possible disturbance from construction works if it was located:

- 300 metres from the Project footprint if the nest tree is located on a lot equal to or greater than five hectares in area.
- 200 metres from the Project footprint if the nest tree is located on a lot that is one hectare or greater but less than five hectares in area.
- 60 metres from the Project footprint if the nest tree is located on a lot that is less than one hectare in area.

Although Great Blue Heron colonies within the Project area are listed as "inactive" according to online databases, foraging habitat in the vicinity is plentiful, and it is possible that herons will return to use these historical nesting sites. In this case, heightened mitigation measures similar to those in place for Bald Eagle nests may be required.

6.2.3 Mammals

The proposed sewer alignment intersects a wide range of terrestrial and aquatic habitat types, with varying levels of development, which have the potential to support a variety of mammals species. Mammals likely to occur within the vicinity of the Project include large carnivore, ungulate, mustelid, rodent, and bat species. Six at-risk mammal species have the potential to occur within the Project area (Table 6).

It is anticipated that terrestrial mammals will largely avoid the working limits during active construction. Bats are likely to forage or roost within the Project area, particularly along riparian corridors. Roosting sites include buildings, caves and trees (especially trees with loose bark or cavity features), none of which will be disturbed during construction.

There are no anticipated impacts to mammal species or their habitat as a result of the Project. The forcemain lines are restricted to the existing road prisms, and no tree clearing for pump station construction is expected.

Table 6. Mammal Species at Risk with the potential to occur along the Project alignment. Source: BC Conservation Data Centre.

English Name	Scientific Name	Status			Probability of Occurrence	Key Habitat
		COSEWIC	SARA	BC Status		
Little Brown Myotis	*Myotis lucifugus*	E	S1-E	Blue	Moderate	Roost in human-made structures, caves and hollow trees. Forage over water, along the margins of lakes and streams, or in woodlands near water.
Roosevelt Elk	*Cervus elaphus roosevelti*	N	N	Blue	Low	Forage in valley bottoms and riparian areas and use older forests for cover against predators. Bed down along forest edges. Use mature and old-growth forests during winter when snow is deep. Seasonal movements can be highly individualistic, influenced by various factors including local vegetation, snow conditions, predators and past experience.
Short-tailed Weasel, *anguinae* subspecies	*Mustela richardsonii anguinae*	N	N	Blue	Moderate	Wooded areas with thick understory near watercourses. Dens in hollow log or under log, stump, roots, brush piles, or rocks.
Townsend's Big-eared Bat	*Corynorhinus townsendii*	N	N	Blue	Moderate	Woodland, immature and mature forests. Require extremely dark daytime roosting and are known to use tree cavities.
Western Water Shrew, *brooksi* subspecies	*Sorex navigator brooksi*	N	N	Red	Low	Swift-flowing mountain streams with abundant boulder and cobble substrate, other stream habitats with complex overhanging riparian vegetation, coarse woody debris and undercut banks.
Yuma Myotis	*Myotis yumanensis*	N	N	Blue	Moderate	Closely associated with water. Upland and lowland habitats, including riparian, desert

						scrub, moist woodlands, and forests, usually near open water. Forages over water or in open spaces over land. Roosts in caves, cliff crevices, human structures, cavities and nooks in large live trees near water.

6.2.4 Amphibians and Reptiles

Nine species of amphibian and five reptile species are known to occur within the vicinity of the Project. Four of these are provincially and federally listed species (Table 7). There are also four invasive amphibian and reptile species known to occur in the region: green frog (*Lithobates clamitans*), American bullfrog (*Lithobates catesbeianus*), red-eared slider (*Trachemys scripta*), and common wall lizard (*Podarcis muralis*).

Table 7. Amphibian and reptile Species at Risk with the potential to occur along the Project alignment. Source: BC Conservation Data Centre.

English Name	Scientific Name	Status			Probability of Occurrence	Key Habitat
		COSEWIC	SARA	BC Status		
Northern Red-legged frog	*Rana aurora*	SC	S1-SC	Blue	Moderate	Near permanent waters of stream pools, marshes, ponds, and other quiet waterbodies or damp woods and meadows during wet weather. Breeds in permanent water.
Painted turtle, Pacific coast population	*Chrysemys picta* pop.1	T	S1-T	Red	Moderate	Slow-moving aquatic habitat (streams, marshes, swamps, ponds, lakes, and reservoirs), with shallow waters with soft bottoms, basking sites, and aquatic vegetation.
Wandering Salamander	*Aneides vagrans*	SC	S1-SC	Blue	Moderate	Moist coniferous forests, along forest edge, forest clearings, talus, and burned over areas, under bark, in rotten logs, or in rock crevices.
Western Toad	*Anaxyrus boreas*	SC	S1-SC	Yellow	Moderate	Variety of aquatic and terrestrial habitats, particularly riparian areas. Breed in shallow, littoral zones of lakes, temporary and permanent pools, wetlands bogs, and fens.

6.2.5 Invertebrates

There are hundreds of invertebrate species that potentially occur within the Project footprint, including more than 60 at-risk species; however, there is limited information on their occurrences due to a lack of data. No critical or preferred habitat of invertebrate species is expected to be impacted by the Project. Should an invertebrate species-at-risk be identified during the progress of work appropriate management practices will be initiated according to measures described in the anticipated Project EMP/CEMP.

6.2.6 Vegetation

Where the proposed SES alignment passes through less developed areas, vegetation surrounding Highway 19A is characteristic of a coastal CWHxm1 mixed coniferous-deciduous forest in various stages of regrowth. Dominant tree species include Douglas-fir (*Pseudotsuga menziesii*), Sitka spruce (*Picea sitchensis*), Western redcedar (*Thuja plicata*), bigleaf maple (*Acer macrophyllum*), black cottonwood (*Populus trichocarpa*), red alder (*Alnus rubra*), and Pacific crabapple (*Malus fusca*). Understory vegetation is composed of dominant species such as thimbleberry (*Rubus parviflorus*), salmonberry (*Rubus spectabilis*), common snowberry (*Symphoricarpos albus*), hardhack (*Spiraea*

douglasii), Nootka rose (*Rosa nutkana*), red-osier dogwood (*Cornus sericea*), sword fern (*Polystichum munitum*), and bracken fern (*Pteridium aquilinum*).

The lot proposed for the placement of PS#6 is largely cleared, with a perimeter of mature forest composed of the species listed above. Two locations are proposed for PS#1, both in manicured lawn areas in the backshore adjacent to the Royston Seaside Trail. The intertidal zone bordering proposed locations for PS#1 supports a salt marsh habitat abundant with seashore saltgrass (*Distichlis spicata* var. *spicata*), a provincially red-listed species (Table 8). Consistent with disturbed sites, there is also a high proportion of invasive species in both proposed pump station locations (See section 6.2.6.1 below).

Nine at-risk species have the potential to occur in the Project area, while one (seashore saltgrass) has confirmed presence within the working limits (Table 8). No incursions into the marine environment where the seashore saltgrass community is located nor vegetation clearing is expected to occur during Project works; therefore, risk of impacts to plant species is anticipated to be very low.

Table 8. Plant Species at Risk with the potential to occur along the Project alignment. Source: BC Conservation Data Centre.

English Name	Scientific Name	Status			Probability of Occurrence	Key Habitat
		COSEWIC	SARA	BC Status		
seashore saltgrass	*Distichlis spicata* var. *spicata*	N	N	Red	High (Saltgrass is abundant in the intertidal zone directly adjacent to PS#1 proposed locations (approx. 20 m away)	Intertidal zone of protected shorelines, abundant in shallow lagoons or bays enclosed by spits or other protective features which create low-energy environments for sediment accretion.
Henderson's checker-mallow	*Sidalcea hendersonii*	N	N	Blue	Moderate	Coastal estuaries, wet meadows and mudflats.
snow bramble	*Rubus nivalis*	N	N	Blue	Low	Moist forests at low to mid elevations.
flowering quillwort	*Lilaea scilloides*	N	N	Blue	Moderate	Mudflats and in shallow ponds, marshes and lakeshores at low elevations.
Nuttall's quillwort	*Isoetes nuttallii*	N	N	Blue	Low	Seasonally wet sites, typically vernal pools, ephemeral stream beds and winter seepage sites, at low elevations.
pointed rush	*Juncus oxymeris*	N	N	Blue	Low	Wet meadows and river banks at low elevations.
yellow montane violet	*Viola praemorsa praemorsa*	E	S1-E	Red	Low	Steep rocky slopes under Garry oak trees and on open grasslands.
Western wahoo	*Euonymus occidentalis var. occidentalis*	N	N	Red	Low	Mesic forests and thickets in the lowland and montane zones. Locally only found near the Tsolum River, 12km northwest of Courtenay.
Vancouver Island beggarticks	*Bidens amplissima*	SC	S1-SC	Blue	Moderate	Variety of wetland habitats including ditches, willow wetlands, old riverbeds, pond margins, streamsides, and tidal or non-tidal river edges.

6.2.6.1 Invasive Plant Species

Invasive plants are present along most of the forcemain alignment, although occuring sparsely for much of the route. A higher proportion of invasive species were observed surrounding proposed pump station locations, and particularly PS#1. Species identified during site visits include Scotch broom (*Cytisus scoparius*), Himalayan blackberry (*Rubus armeniacus*), Canada thistle (*Cirsium arvense*), and reed canary grass (*Phalaris arundinacea*). Careful management of invasive species will be required during work according to measures described in the future Project EMP/CEMP.

6.2.7 Aquatic Habitat

The proposed sewer forcemain alignment route crosses 13 streams or ditches and runs directly adjacent to two additional watercourses. Streams and ditches within 30 m of the Project footprint are summarized below (Table 9) and nine, which are fish-bearing, are further detailed in the following sections.

Table 9. Watercourses within the working limits, including those crossing the proposed sewer forcemain alignment, confirmed during October 2022 site visits. Map ID and Map # correspond to ESA maps in Section 11.

Map ID	Map #	Name	Type	Fish-bearing Status	Existing Crossing Type	Flow Regime
WC1	1	Hart/Washer Creek	Stream	Fish-bearing	bridge	Seasonal
WC2	1	Unnamed	Stream	unknown	900 mm corrugated steel pipe (CSP)	Seasonal
WC3	1	Unnamed	Stream	unknown	Crosses HWY19A twice (WC3a and WC3b): 600 mm CSP, 900 mm CSP	Seasonal
WC4	1	Spence Creek	Stream	Fish-bearing	1550 mm round concrete culvert	Year-round
WC5	2	Argyle Creek	Stream	Fish-bearing	950 mm CSP	Year-round
WC6	2	Ditch	Ditch	unknown	500 mm CSP	Seasonal
WC7	2	Beacon Creek	Stream	unknown	Quad CSPs (900 mm, 900 mm, 600 mm, 900 mm)	Seasonal
WC8	3	Copeman Creek	Stream	Fish-bearing	1200 mm CSP	Year-round
WC9	3	Klein Creek	Stream	Fish-bearing	Runs parallel to alignment, does not cross	Seasonal
WC10	3/4	Trent River	Stream	Fish-bearing	bridge	Year-round
WC11	4	Roy Creek	Stream	Fish-bearing	Approx. 3000 mm wide x 2100 mm tall CSP arch with concrete bottom	Year-round
WC12	4	Unnamed	Ditch	unknown	Does not cross	Seasonal
WC13	4/5	Unnamed	Stream	Fish-bearing	Twin CSPs (600 mm, 800 mm)	Year-round
WC14	5	Unnamed	Ditch	unknown	900 mm CSP, 750 mm HDPE pipe	Year-round
WC15	5/6	Millard Creek	Stream	Fish-bearing	Triple round concrete culverts (1700 mm)	Year-round

6.2.7.1 Hart/Washer Creek (WC1)

Hart Creek, also known locally as Washer Creek, originates west of Highway 19 (Inland Island Highway), flowing northeast for approximately 5.4 km before entering Baynes Sound in Union Bay, just north of the proposed PS#6 location. According to the FIDQ database, the creek is known to support coho (*Oncorhynchus kisutch*) and chum (*O. keta*) salmon, coastal cutthroat trout (*O. clarkii clarkii*) and steelhead trout (*O. mykiss*), and threespine stickleback (*Gasterosteus aculeatus*). Based on aerial photographs, the creek's riparian area appears to be largely intact with mature forest along much of its length. The section of creek spanning Highway 19A is characterized by small to large cobble substrate and established riparian vegetation consisting of a thick shrub layer and a mixed coniferous/deciduous canopy. Hart/Washer Creek is known to dry seasonally near the Highway 19A crossing.

6.2.7.2 Spence Creek (WC4)

Spence Creek flows southeast for approximately 2 km and enters Baynes Sound in the Kilmarnock area between Union Bay and Royston. According to the CVRD iMap, the creek is confirmed fish-bearing, although no information on which species are present is available. Spence Creek runs almost entirely through undeveloped areas, characterized by mature forest. Downstream of Highway 19A, the creek appears to provide good fish habitat, with cobble substrate and abundant overhanging riparian vegetation. The highway culvert is perched approximately 50 cm above stream bed grade and likely acts as a barrier precluding juvenile salmonids and some resident fish species from upstream reaches.

6.2.7.3 Argyle Creek (WC5)

Argyle Creek originates in a wetland about 700 m west of Highway 19A that according to CVRD mapping also feeds Spence Creek. Argyle Creek flows for approximately 1.3 km before reaching Baynes Sound in the Kilmarnock area. According to the CVRD iMap, fish presence is confirmed in the creek, although species information is unavailable. Downstream of Highway 19A, the creek appears to provide adequate fish habitat, with cobble substrate and overhanging riparian vegetation in some areas, although these lower reaches of the creek run through residential neighbourhoods. The Highway 19A culvert outlet is perched approximately 40 cm above stream bed grade and likely acts as a barrier precluding juvenile salmonids and some resident fish species from upstream reaches.

6.2.7.4 Copeman Creek (WC8)

Copeman Creek flows for approximately 670 m in an easterly direction and enters Baynes Sound between the Kilmarnock area and Royston. According to the FIDQ database, the creek is known to support coho salmon and coastal cutthroat trout. In the area surrounding Highway 19A, Copeman Creek is characterized by large gravel to small cobble substrate and dense overhanging shrub cover, which appear to provide good quality fish habitat.

6.2.7.5 Klein Creek (WC9)

Klein Creek is a tributary of the Trent River that flows north approximately 950 m along the west side of Highway 19A before joining the Trent River. Fish habitat value in the tributary is low overall as most of its length runs through

a vegetated roadside ditch; however, the lower reach of Klein Creek meanders through the established riparian area of the Trent River and provides known rearing habitat for juvenile coho.

6.2.7.6 Trent River (WC10)

The Trent River originates over 10 km to the southwest, with numerous tributaries and wetlands contributing to river flows (Photo 5). Upper tributaries and reaches of the river meander through logging cutblocks, while the mid-section of the river winds through mature forest before being bordered by residential development for the last approximately 500 m towards the estuary. According to the FIDQ database, the Trent River and its tributaries support fish populations of coho, pink (*O. gorbuscha*) and chum salmon, as well as steelhead, rainbow (*O. mykiss*) and coastal cutthroat trout. In the section of river around the Highway 19A crossing, fish habitat quality is good. The riverbanks provide ample overhanging riparian vegetation, large woody debris and undercut banks. These features provide shade, insect drop and refugia from high flows and predators. Downstream of the bridge, the left bank is characterized by rip rap and little to no vegetation, providing poor fish habitat. Substrate in the assessed section is characterized by a mix of gravels and cobbles with large cobbles and boulders present along each bank, with some patches of suitable salmonid spawning substrate present. The presence of some bank complexity and overhanging riparian vegetation likely provides good rearing habitat for juvenile fishes.

6.2.7.7 Roy Creek (WC11)

The Roy Creek drainage includes rural properties between Cumberland and Royston east of Highway 19 (Inland Island Highway). Roy Creek flows through the town of Royston just north of the Trent River before entering Comox Harbour. Fish species observed in Roy Creek include coho, Chinook (*O. tshawytscha*), and chum salmon, and cutthroat trout. While there is a single observational record of Chinook salmon in 1993 in the FIDQ database, Roy Creek is not known to support an appreciable Chinook population. In its lower reaches surrounding Highway 19A, Roy Creek is characterized by large cobble and boulder substrate forming riffle pool sequences and mature shrub and tree cover in the riparian zone, which contribute quality habitat values for fishes.

6.2.7.8 Unnamed Creek (WC13)

This unnamed creek was added to the CVRD Sensitive Habitat Atlas mapping database after a survey conducted by CEL in 2021 confirmed the creek's location and observed fish presence. There is an approximately 110 cm drop just downstream of the Highway 19A crossing that likely acts as a barrier to some species and life stages of fish. Fish habitat in the assessed portion of the creek appears adequate, with some riparian cover but limited suitable substrate to support spawning and rearing.

6.2.7.9 Millard Creek (WC15)

The Millard Creek watershed, including Piercy Creek, drains much of south Courtenay and enters Comox Harbour at Millard Nature Park (Photo 6). Millard Creek supports populations of coho, chum, and pink salmon, and cutthroat trout. According to the FIDQ database, occurrences of steelhead trout (*O. mykiss*) and Chinook salmon have also been reported, while a single observation of lamprey (*Lampetra* sp.) in Millard Creek was recorded. Fish habitat in

the lower reaches is excellent, with ample large woody debris, riffle-pool sequences, and mature mixed coniferous-deciduous riparian vegetation.

6.3 FIRST NATIONS LANDS AND ARCHAEOLOGICAL SITES

An Archaeological Overview Assessment (AOA) and Preliminary Field Reconnaissance (PFR) was conducted in 2015 by Baseline Archaeological Services Ltd. (Baseline).[22] The AOA identified seven archaeological sites in conflict with the proposed project alignment. The PFR included revisits to the majority of the sites, including DjSf-11, DjSf-21, DjSf-23/39, DjSf-26 and DjSf-27. A brief description of the archaeological sites in direct conflict with the Project alignment, as well as a brief summary of known sites within 250 m of the Project alignment, is provided in the Baseline (2015) report and summarized in Table 10 and Figure 10. In correspondence with WSP in October 2022, Baseline confirmed that the only relevant update from the 2015 report is that site DjSf-36 (Union Bay) was moved inland and assigned legacy status and therefore no longer requires permitting.

Table 10. Summary of known archaeological sites, potential conflict with the project and recommendations (adapted from Baseline, 2015).

Site	Location	Description	Potential Conflict	Recommendation
DjSf-11	Central Royston / Marine Dr.	Shell midden, human remains, faunal remains, artifacts	Low. Substantially within previously disturbed road matrix	SAP, HIP, CHIP, Monitoring
DjSf-21	Central Royston / Marine Dr.	Shell midden	Low. Substantially within previously disturbed road matrix	SAP, HIP, CHIP, Monitoring
DjSf-23/DjSf-39	Kilmarnock Dr.	Shell midden	Possible. Requires AIA	SAP, HIP, CHIP, Monitoring
DjSf-25	Union Bay / Kensington	Shell midden, human remains, faunal remains, artifacts	PS#6	Avoidance / SAP, HIP, CHIP, Monitoring
DjSf-26	Union Bay / Island Highway	Shell midden, human remains, faunal remains, artifacts	Low. Substantially within previously disturbed road matrix	SAP, HIP, CHIP, Monitoring
DjSf-27	Union Bay (south)	Shell midden	Low. Substantially within previously disturbed road matrix	SAP, HIP, CHIP, Monitoring

[22] Baseline (2015). Archaeological Overview Assessment and Preliminary Field Reconnaissance of the Proposed South Sewer Project. Prepared for CVRD. 26 pp.

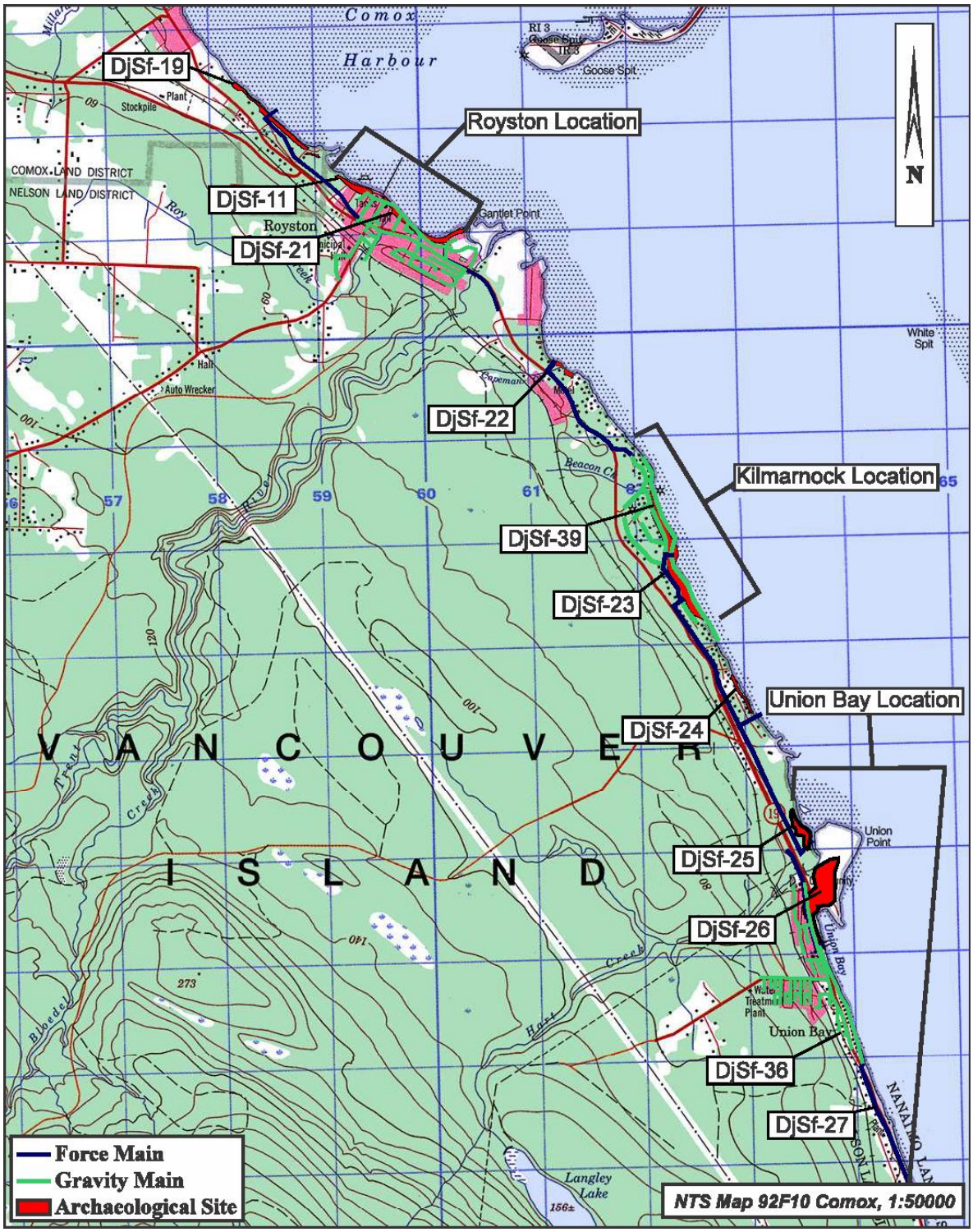

Figure 10. Summary of 7 known archaeological sites that are expected to trigger HCA permitting and due diligence (adapted from Baseline, 2015). Note: DjSF-36 in Union Bay was moved inland and assigned Legacy Status, so no longer requires permitting.

There is potential for impacts to recorded archaeological materials as well as potential for impacts to unrecorded archaeological materials and features along the proposed alignment during both site preparation and construction activities. The *Heritage Conservation Act* (*HCA*) provides automatic protection for recorded and unrecorded pre-1846 archaeological sites located on public and private land. Protected sites may not be altered without permits issued under the *HCA*. Section 12 Site Alteration Permits (SAP) and Section 14 Heritage Inspection Permits (HIP) are required for all works with the potential for ground disturbance within registered archaeological sites. The K'ómoks First Nation Cultural Heritage Policy[23] provides additional protection for areas that have high archaeological potential, defined as 200 m surrounding registered archaeological sites and within 200 m of all major waterways (rivers, lakes, ocean, large creeks). A Cultural Heritage Investigation Permit (CHIP) is required by KFN for all ground disturbing activities within registered archaeological sites as well as for any ground disturbance larger than 10 m^2 in areas of high archaeological potential.

As the Project is substantially located within a previously disturbed road prism, Baseline concludes that an Archaeological Impact Assessment (AIA) would be of limited value. Archaeological due diligence in these areas can be serviced with a KFN CHIP and concurrent *HCA* SAP and HIP. Archaeological monitoring will also be required for the Project. Additionally, an AIA may be required for the Project footprint along Kilmarnock Drive where the proposed alignment is located along the shoreline.

Proposed mitigative procedures for work conducted within an archaeological site (whether recorded or unrecorded), within areas of high archaeological potential, and within a 20 m buffer extending beyond archaeological site boundaries can be found in Appendix C. Specific mitigative strategies for the alignment along Kilmarnock Dr will be provided upon the completion of the AIA for this segment.

7 POTENTIAL ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION MEASURES

Potential impacts from Project construction have been differentiated from those of the operation phase. Potential impacts to VCs from construction and operation and their proposed mitigation measures are outlined in further detail in the following sections and summarized in Table 11.

[23] K'ómoks First Nation (2020). K'ómoks First Nation Cultural Heritage Policy. Accessed from <https://komoks.ca/department/lands-program/>.

Table 11. Summary of potential environmental impacts and proposed mitigation measure for Project construction and operation.

Valued Component	Potential Impacts During Construction	Proposed Construction Mitigation Measures*	Potential Impacts During Operation	Proposed Operation Mitigation Measures*
Air quality	▪ Generation of dust and emissions during construction activities	▪ General measures include dust control, equipment emissions control, and reduction of idling times. ▪ Air Quality Management Plan to be included in the EMP/CEMP	▪ Release of gases from pump stations and air release points on the forcemains ▪ Emissions from the operation of backup generators	▪ Carbon canisters are proposed for all air release points to filter waste air and reduce odours.
Ambient noise and vibration	▪ Increased noise and vibration from blasting, excavations, and equipment operations	▪ General measures include restricting hours of work in accordance with municipal bylaws ▪ Noise and Vibration Management Plan to be included in the EMP/CEMP	▪ Increased noise and vibration from testing and operation of backup generators	▪ Generators should be equipped with noise-reducing enclosures.
Surface and groundwater quality	▪ Generation of sediment-laden runoff ▪ Leaks of fuel, hydraulic fluid, or other chemicals to ground or water ▪ Release of particulate waste to water	▪ General mitigation measures include use of appropriate erosion and sediment control methods and supplies, and provisions for handling fuel and hazardous materials ▪ Spill Response, Erosion and Sediment Control, and Wastewater Management plans to be included in the EMP/CEMP	▪ Leaks of deleterious substance to ground or water	▪ Operational Spill Response Plan (example in Appendix D)
Soils	▪ Leaks of fuel, hydraulic fluid, or other chemicals to ground or water	▪ General mitigation measures include provisions for handling fuel and hazardous materials ▪ Spill Response Plan to be included in the EMP/CEMP	▪ Leaks of deleterious substance to ground	▪ Operational Spill Response Plan (example in Appendix D)
Vegetation and terrestrial biota	▪ Vegetation clearing in pump station footprints (likely none or very minimal) ▪ Physical/mechanical damage to trees and vegetation along the forcemain alignment ▪ Destruction or disturbance of migratory birds or their nests ▪ Local fire on site ▪ Waste generation and containment adversely affecting the environment	▪ General mitigation measures include protocols for methods of clearing/grubbing vegetation, delineation of vegetation to be retained, and pre-clearing nest surveys conducted by a QEP if vegetation is to be cleared within the nesting bird window (Mar.15 – Aug. 15) ▪ Waste Management and Wildlife Management plans to be included in the EMP/CEMP	▪ None anticipated	▪ n/a
Aquatic biota	▪ Generation of sediment-laden runoff ▪ Leaks of fuel, hydraulic fluid, or other chemicals to aquatic habitats	▪ General mitigation measures include delineation of stream/ditch crossings and those running parallel to the alignment within the Working limits,	▪ Leaks of deleterious substance to ground or water ▪ Increase in impervious surface due to pump	▪ Operational Spill Response Plan (example in Appendix D)

▪ Release of particulate waste to water ▪ Vibration from blasting	provisions for handling fuel and hazardous materials, and use of appropriate erosion and sediment control methods and supplies and working within the reduced risk work window (general window for Van. Isl. is June 15-September 15[24]) ▪ Spill Response, Erosion and Sediment Control, and Wastewater Management, and Noise and Vibration Management plans to be included in the EMP/CEMP	▪ Pump stations should be designed to achieve no net increase in stormwater runoff. See Stormwater Management – Section 7.2.1.3.

*NOTE: Proposed mitigation measures outlined in Table 12 are general measures that can be implemented to reduce potential impacts to VCs. Once SES forcemain alignment and pump station locations are confirmed, and construction methods and timing are established, project-specific construction and operation mitigation measures will be developed and detailed in an EMP.

[24] https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/terms_conditions_van_island.pdf

7.1 CONSTRUCTION

Potential impacts associated with construction activities of this Project include but are not limited to:

1. Erosion of exposed soil and deposition of sediment into streams or ditches, leading to impacts on aquatic species and habitats.
2. Fuel and hydraulic fluid leaks or spills to terrestrial or aquatic environments.
3. Release of particulate waste to aquatic habitat.
4. Physical/mechanical damage to riparian trees and vegetation.
5. Destruction or disturbance of migratory birds or their nests due to vegetation clearing and/or hazard tree abatement.
6. Destruction or disturbance of terrestrial mammals, amphibians, and reptiles.
7. Local fire on site.
8. Waste generation and containment adversely affecting the environment.
9. The operation of heavy machinery and smaller vehicles during dry periods can lead to reduced air quality that causes disturbance of wildlife and can become a factor for health and safety of workers and the public.
10. Impacts to cultural resources during excavations.
11. Changes to groundwater hydrology leading to impacts on nearby wells.
12. Disturbance to wildlife and the public as a result of blasting and construction noise and vibrations.
13. Disruptions to vehicle, pedestrian, and bicycle traffic as a result of construction activities.

The following sub-sections detail potential environmental impacts and proposed mitigation measures for the construction phase of the Project.

7.1.1 Site and Project Preparation

Prior to active construction, the following Project preparation is recommended.

7.1.1.1 Environmental Management Plan

Once project details are finalized, an EMP should be created by the design team to outline ESAs, regulatory requirements, and Project-specific mitigation measures to be implemented during construction. Furthermore, the contractor hired to construct the project works may also be required to provide a Construction Environmental Management Plan (CEMP) for the project to supplement the EMP and general BMPs and measures outlined in this EIS document.

7.1.1.2 Delineation of ESAs

Sensitive habitats and species adjacent to the proposed route have the potential to be impacted by construction activities. In order to mitigate this impact, sensitive habitats adjacent to the Project (i.e., riparian areas, wetlands, listed ecosystems) should be carefully delineated prior to construction and no work will occur in these areas without prior approval of an Environmental Monitor (EM). Laydown areas and access points should be restricted to existing disturbed areas and no equipment or materials should be stored in the rooting zones of trees.

Any vegetation clearing required prior to construction will require an avian nest survey conducted by a Qualified Environmental Professional (QEP) if occurring within the increased risk avian breeding window from March 1 – August 31.

7.1.2 Active Construction

The following subsections detail potential environmental impacts during active construction and suggested mitigation measures.

7.1.2.1 Environmental Monitoring

The contractor will be required to hire an Environmental Monitor (EM) to oversee Project works. The EM must be a QEP or work under the supervision of a QEP with experience in environmental monitoring of pipe infrastructure construction projects. The EM will be required to be on site for a pre-construction meeting, during works around ESAs, and to respond to any environmental incidents that occur on site.

7.1.2.2 Air Quality Management

Degradation of air quality related to the Project can lead to the disturbance of wildlife and the public and can become a factor for worker safety and the safety of the public. To mitigate this impact, an Air Quality Management Plan should be included in the EMP/CEMP, including such measures as controlling dust and emissions, minimizing vehicle and equipment idling, and maintaining and inspecting equipment engines.

7.1.2.3 Noise and Vibration Management

Construction activities will cause a temporary increase in noise and vibrations within the immediate and surrounding area and could disturb wildlife and the public. All construction activities will be required to abide by local noise bylaws for construction activities. Blasting of bedrock along the SES corridor during construction activities has the potential to impact fish bearing streams or ditches, structures, groundwater wells and human health. To mitigate this impact, a Blasting Management Plan (BMP) will be required from the Contractor prior to construction.

7.1.2.4 Erosion and Sediment Control

Erosion of exposed soils and generation of sediment-laden runoff are a potential impact during construction activities. Over sustained periods, sediment-laden runoff can harm aquatic species and degrade aquatic habitats. To mitigate this impact, an Erosion and Sediment Control Plan (ESCP) should be developed either separately or integrated into the EMP/CEMP. The ESCP should outline performance standards and recommended mitigation measures to be followed by the Contractor. The ESCP will include measures such as covering stockpiles of exposed soil, installation of silt fencing, and settling and filtering of sediment-laden runoff generated as a result of construction.

7.1.2.5 Hydrostatic Testing

Hydrostatic testing of the installed pipe is anticipated to ensure the integrity of the pipe to carry the sewage without leakage. Used testing water should be discharged to the municipal sanitary system where available or to the rural ditch system. All discharged water will be in accordance with standards outlined in the BC Water Quality Guidelines.

7.1.2.6 Spill and Accident Prevention

During construction, oil and fuel used by machines and other chemicals have the potential to spill into terrestrial and aquatic habitats, harming aquatic biota. The EMP/CEMP will include provisions for handling fuels and hazardous materials as well as a detailed Emergency Spill Response Plan that outlines procedures for spill prevention and clean-up. To further reduce risk, machines being operated adjacent to streams, ditches and wetlands should contain biodegradable hydraulic fluids only. An example Spill Response Plan is provided in Appendix D.

7.1.2.7 Wildlife and Terrestrial Habitat Protection

Occurrences of birds, mammals, amphibians, and reptiles within the working limits are expected to be low as the Project footprint is located almost entirely within established roadways. In addition, there are no significant wetland areas within or near the working limits that may otherwise encourage amphibian and/or turtle migration through the area. To mitigate potential impacts to wildlife, a Wildlife and Terrestrial Habitat Protection Plan should be included in the EMP/CEMP.

Should any raptor or Great Blue Heron nests be encountered during construction, the EM will apply an appropriate buffer around the nest as per guidelines specified in *Develop with Care – Environmental Guidelines for Urban and Rural Land Development in British Columbia*.[25] If construction activities must proceed within the established buffer, heightened mitigation measures must be implemented to minimize disturbance to the nesting birds.

7.1.2.8 Waste Management

Waste generated during construction can cause harm to terrestrial and aquatic species and habitats. Construction waste will be handled appropriately in an environmentally conscious manner. A detailed Waste Management Plan will be included in the EMP/CEMP.

7.1.2.9 Invasive Species Management

Construction activities can lead to the spread of invasive species through movement of contaminated equipment, organic waste, or fill. Because the Project footprint is located largely within existing road prisms, the likelihood of disturbing invasive vegetation is low. Should invasive species be encountered during construction activities,

[25] BC Ministry of Forests, Lands, and Natural Resource Operations. (2014). *Develop With Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia.* <https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/best-management-practices/develop-with-care>.

measures for preventing their spread include thorough inspection and cleaning of equipment, inspection of fill, and appropriate removal and disposal. The EMP/CEMP will include a detailed Invasive Species Management Plan.

7.1.2.10 Soil Management

A Soil Management Plan must be developed by the Contractor for excavations occurring in known contaminated sites, when a new contaminated site is discovered, or when soil is exported from the site. Excavations occurring in areas not known to be contaminated will follow Chance Find Protocols, detailed in contract documents. If contaminated soil is discovered during Project activities, work must be stopped, and the EM and appropriate authorities contacted. Before exporting soil and importing fill, it must be verified that the material meets the appropriate CCME Soil Quality Guidelines (Residential/Parkland, Commercial or Industrial).

7.1.3 Post-Construction Restoration

Pump station construction will minimally impact terrestrial vegetation, potentially including shrubs and trees, although unlikely. Some temporary disturbance of vegetated areas along the forcemain alignment is also anticipated during construction. Disturbed areas will be revegetated with an appropriate assemblage of native species upon completion of Project works, and protected trees will be replaced as per municipal bylaws. Any impacts to native vegetation outside of the working limits will also be restored to as near pre-disturbance conditions as possible.

7.2 OPERATION

Potential environmental impacts associated with operation of the SES include but are not limited to:

- Reduced air quality.
- Increased ambient noise and vibration.
- Increased stormwater runoff.
- Spills or leakage of sewage to terrestrial or aquatic environments.

7.2.1 Routine Operation

Environmental impacts from routine operation have been differentiated from potential impacts as a result of accidents and malfunctions (Section 7.3). Routine operation includes maintenance activities detailed in Section 4.3.3. Impacts from routine operations are expected to be minimal and are described in further detail along with proposed mitigation measures below.

7.2.1.1 Air Quality Management

Air quality and odour management will be an ongoing challenge at pump station locations due to organic and inorganic compounds contained in the wastewater being degraded by anaerobic, anoxic, and aerobic biological treatment processes. Preliminary pump station designs propose the use of active carbon adsorption columns for odour control.

7.2.1.2 Noise and Vibration Management

Temporary impacts on ambient noise and vibration are anticipated from the operation of backup generators at pump stations. Generators should be equipped with sound-attenuated enclosures in order to mitigate this impact and comply with municipal noise bylaws.

7.2.1.3 Stormwater Management

Pump station footprints will increase impervious surfaces, leading to an increase in stormwater runoff. To compensate, pump station designs should include drainage features such as bioswales or raingardens and settling chambers.

7.3 ACCIDENTS AND MALFUNCTION

Potential environmental impacts associated with accidents and malfunction of the SES include but are not limited to:

- Spills or leakage of sewage into waterbodies, leading to impacts on aquatic and terrestrial species and habitats.
- Spills or leakage of sewage into the ground, leading to contamination of groundwater resources.

The following subsections outline design features that should be considered during subsequent design stages to reduce the probability of a spill, and a spill response plan in the event that a spill should occur.

7.3.1 Spill Prevention

To mitigate the effects of accidents and malfunction, the SES forcemains and pump stations should be equipped with safety features that typically include:

- Isolation valves.
- Air release valves.
- Combination and air/vacuum valves.
- Pig launching and retrieval assemblies to monitor the integrity of the pipeline.

Additionally, pipe joints should be situated well away from waterbodies so that in the event of a leakage from a joint there would not be a direct discharge into a waterbody. The pipeline and connecting joints should be tested hydrostatically with water to ensure that the integrity of the pipeline is fulsome before allowing wastewater materials to be conveyed through the forcemains.

These safety components and design features can significantly reduce the likelihood of an inadvertent release and the amount of material spilled in the event of an accident or malfunction.

7.3.2 Spill Response

Accidental spillage of fuels, lubricants or hydraulic fluid will be immediately contained, removed, and disposed of in accordance with the Spill Response Plan developed for the project (example in Appendix D), as well as guidelines stipulated by the Environmental Protection Branch of the Federal Department of the Environment (DOE/EP) and the provincial Ministry of Environment and Climate Change Strategy. Significant spills (exceeding 100 L) to ground or spills of any quantity to water must be reported promptly to the Emergency Management BC (EMBC) line at 1-800-663-3456. In accordance with Section 36(3) and Sections 38 (4 thru 7) of the Federal *Fisheries Act*, the Contractor will also have a duty to mitigate, notify and report any deleterious substance spill (any volume) to water to the Fisheries and Oceans Canada (DFO) line at 1-800-465-4336.

8 EFFECTS ASSESSMENT

The following descriptions of potential effects of Project construction and operation on VCs are based on existing conditions in the Local (lands within 30 m of the forcemain alignment and 100 m of the pump stations) and Regional Area (CVRD and CoC municipalities) and impacts that can be reasonably anticipated as a result of Project construction and operation.

The Project has been routed almost entirely along existing road prisms to reduce environmental impacts and risk to VCs. The only component proposed for outside of a road prism are the pump stations, which are planned for previously disturbed sites. Historic and current commercial, industrial, and residential development has already resulted in adverse impacts to ecological integrity and function of the area. Air quality, ambient noise and vibration, traffic patterns and viewscapes have been impacted by historic and current developments.

Potential interactions between VCs and the various components of Project construction and operation are assessed in Table 12. In this assessment, VCs likely to experience a residual harmful effect despite mitigation measures are identified. Those VCs identified as being likely to experience a residual harmful effect are given detailed consideration in the Residual Effects Assessment (Section 8.1) and Cumulative Effects Assessment (Section 8.2).

Table 12. Potential interactions between Valued Components and Project construction and operation works.

	Valued Component (VC)							
Project Component	Air quality	Ambient noise and vibration	Surface and groundwater quality	Soils	Vegetation and terrestrial biota	Aquatic biota	Mobility	Viewscape
Construction								
Vegetation Clearing (if occurring, will be minimal)	X	X	X	X	X	X	X	X
Blasting	X	X	X	X	X	X	X	X
Forcemain construction outside of riparian areas	X	X	X	X	X	X	X	X
Forcemain construction within riparian areas	X	X	X	X	X	X	X	X
Pump station construction	X	X	X	X	X	X	X	X
Vehicle/Machinery Operation	X	X	X	X	X	X	X	X
Operation								
Forcemain operation	X	X	X	X	X	X	X	X
Pump station operation	X	X	X	X	X	X	X	X
Unlikely	With mitigation measures in place it is unlikely that project components will interact with VCs. No additional consideration required.							
Possible	With mitigation measures in place it is possible that project components may interact with VCs. Appropriate mitigation should result in no residual harmful effect. Further consideration recommended.							
Likely	With mitigation measures in place it is still likely that project components will interact with VCs that could result in some residual harmful effect. Detailed consideration required (see Tables 13 & 14 and sections 8.1 & 8.2).							

8.1 RESIDUAL EFFECTS

For the purposes of this report, residual effects are those effects to VCs anticipated to remain after the application of mitigation measures recommended in this report. Project components identified in Table 12 as being likely to result in a residual harmful effect were those examined in the residual effects assessment (Table 14). The following criteria, based on a 2014 EIS by Tera Environmental,[26] were used in assessing environmental effects of the Project (Table 13).

Table 13. Criteria used in assessing Project effects.

Assessment Criteria		Definition
Spatial Context of Effect		
Project footprint		Land area permanently occupied by the forcemain lines and pump stations.
Temporary Workspace		Areas temporarily used during construction, including equipment and material storage or vehicle access.
Local Area		Lands within 30 m of the forcemain alignment and 100 m of the pump stations (working limits).
Regional Area		The surrounding area in CVRD and CoC municipalities.
Temporal Context of Effect		
Duration (length of time a residual effect will last)	Short-term	Event duration is less than or equal to one year.
	Medium-term	Event duration is longer than one year, but less than or equal to five years.
	Long-term	Event duration extends longer than five years.
Frequency (How often event causing residual effect will occur)	Occasional	Event occurs intermittently.
	Periodic	Event occurs intermittently, but repeatedly over the construction and operations period.
	Continuous	Event occurs continually over the assessment period.
Reversibility (Will identified effects cease to be a concern?)	Yes	The potential effect can be reversed.
	No	The potential effect cannot be reversed, despite mitigation efforts.
Magnitude of the Effect		
Negligible	Potential effect is barely detectable.	

[26] Tera Environmental Consultants. (2014). *Environmental Impact Study of Core Area Wastewater Treatment Program Facilities: Terrestrial Environment - Volume III.*

Low	Potential effect is detectable but below established or derived environmental standards or thresholds.
Moderate	Potential effect is detectable but meets established or derived environmental standards or thresholds.
High	Potential effect exceeds established or derived environmental standards or thresholds.
Beneficial or Adverse effect	
Beneficial	The resource or topic under study would be improved as a result of the Project.
Adverse	The resource or topic under study would be worsened as a result of the Project.
Significance of the Effect	
Significant	The identified effect would have a combination of characteristics that render it unacceptable to the public, regulators, other interests, or that exceeds standards or contravenes legal requirements.
Less than significant	All other effects that are not considered significant.

Table 14. Residual effects assessment for VCs interacting with Project construction and/or operation.

Valued Component	Project Phase	Project Component	Spatial Context	Duration	Frequency	Reversibility	Magnitude	Significance of Residual Effect
Mobility	Construction	▪ Forcemain construction ▪ Pump station construction	Regional	Medium-term – Through construction of the Project	Continuous	Reversible – mobility will return to previous condition when Project construction is complete.	Moderate – road closures will be temporary and detour routes available where possible.	Less than significant
Viewscape	Construction and Operation	▪ Pump station construction ▪ Pump station operation	Local	▪ Medium-term – Through construction of the Project ▪ Long-term – During ongoing operation of the pump stations.	Continuous	Irreversible – Pump stations will permanently alter the viewscape in the Local Area.	Moderate – PS#1 proposed locations are in the backshore of a popular recreation trail and beach access point, within a residential neighbourhood.	Less than significant

8.1.1 Mobility

Construction activities will largely be moving operations as the sewer line is installed along the alignment; therefore, traffic disruptions in each area will be temporary. All Project activities will adhere to Ministry of Transportation and Infrastructure Traffic Management Manual for mitigating impacts to traffic during construction. Residual effects of Project construction on mobility are expected to be regional, medium-term, continuous, reversible, moderate, and **less than significant**. No residual effects on mobility from Project operation are expected.

8.1.2 Viewscape

Project construction will result in temporary disruptions to the viewscape of nearby residences and the general public. As described above, forcemain construction will be moving as the sewer is installed along the alignment; therefore, viewscape effects from this component will be momentary. Pump station construction will have the longest sustained impact on residential viewscapes, with construction likely to take several months to complete. Pump Station 6 is located in a previously cleared lot that has already significantly impacted the viewscape. Future residential construction is anticipated in the surrounding area. Additionally, the lot is located adjacent to Highway 19A and away from residential and recreational areas. The two proposed locations for PS# 1 are in the backshore of a popular recreation trail and beach access point, within a residential neighbourhood. Construction of PS#1 will have a substantially greater effect on local viewscapes compared to PS#6.

There is little that can be done to mitigate impacts to local viewscapes during construction. These impacts are an unavoidable part of construction projects; however, because these impacts are local and short-term, they are not considered to be significant. Residual effects of Project construction on viewscapes have been identified as local, medium-term, continuous, irreversible, moderate, and **less than significant**.

Residences near PS#1 will have their viewscapes permanently altered as a result of Project operations; however, pump stations can be designed with aesthetics in mind, such as being constructed to be low profile and planted with vegetative screening after construction to reduce impact on viewscapes. With design mitigation measures in place, impacts to viewscapes are expected to be local, long-term, continuous, irreversible, moderate, and **less than significant**.

8.2 CUMULATIVE EFFECTS

Cumulative effects for the purposes of this report refer to the effects that may result from the operation of the Project interacting with existing or foreseeable projects and activities within the Local and Regional Areas. The purpose of the cumulative effects assessment is to identify any potential effects to VCs that may result from these interactions. Only two VCs were identified as being likely to experience a residual effect from Project construction: Mobility and Viewscapes (Table 12). These were the only VCs included in the Cumulative Effects Assessment, summarized in Table 15.

The Comox Valley is currently experiencing moderate rates of growth, and commercial and residential development is expected to continue in the Local and Regional areas surrounding the Project. The largest development project currently underway in the area is at the Union Bay Estates (formerly known as Kensington Island Properties) development in Union Bay. This development area covers 309 hectares directly north of the lot proposed for the

PS#6 location and is anticipated to provide 2889 residential units (houses, secondary suites, townhouses, apartments, etc.) as well as commercial, institutional, and recreational components.[27]

In combination with SES construction, additional projects and activities in the area such as smaller residential and commercial developments, municipal infrastructure works, and local and commuter traffic will interact to impact VCs in the region, as assessed below in Table 15.

[27] https://www.comoxvalleyrd.ca/projects-initiatives/past-current-projects/union-bay-estates

Table 15. Cumulative Effects Assessment.

Interacting Project/Activity	SES Project Phase	VC Interaction	Likelihood of Interaction	Cumulative Effect	Significance of Cumulative Effect
Union Bay Estates (UBE)	Construction	▪ Mobility ▪ Viewscapes	High – UBE construction is ongoing and will likely overlap with SES Project construction.	▪ Traffic disruptions ▪ Disruption of viewscapes during construction works.	Less than significant
	Operation	▪ Viewscapes	High – UBE construction might still be underway during operation of the SES.	▪ Permanent alteration of viewscapes.	Less than significant
Commercial and Residential Development	Construction	▪ Mobility ▪ Viewscapes	High – The CVRD and CoC are experiencing moderate rates of development. It is probable that other construction projects will interact with SES construction.	▪ Traffic disruptions ▪ Disruption of viewscapes during construction works.	Less than significant
	Operation	▪ Viewscapes	High – Future residential development may occur in the area surrounding PS#1. It is likely that development additional to UBE currently underway will occur in the vicinity of PS#6.	▪ Permanent alteration of viewscapes.	Less than significant
Municipal Infrastructure Works	Construction	▪ Mobility ▪ Viewscapes	High- infrastructure works are likely to occur throughout the Local and Regional areas during the Project construction window.	▪ Traffic disruptions ▪ Disruption of viewscapes during construction works.	Less than significant
	Operation	No interaction	n/a	n/a	n/a
Commuter traffic	Construction	▪ Mobility	High – due to the Project's location almost entirely along Highway 19A, moderate to heavy vehicle traffic is expected.	▪ Traffic disruptions	Less than significant
	Operation	No interaction	n/a	n/a	n/a

8.2.1 Mobility

As the SES infrastructure is substantially located within existing road rights-of-way, the Project will have cumulative effects on mobility in the Local and Regional areas throughout the construction phase. With forcemain infrastructure being located entirely subsurface, there will be no cumulative effects or interactions with other projects and activities in the area during operational phases.

8.2.2 Viewscapes

More than 99% of the overall SES footprint is subsurface and located within existing road rights-of-way. As described in Section 8.1.2 the balance of the SES associated with pump stations will have less than significant residual effects on viewscapes with mitigation measures in place. Construction and operation of PS#6 will have greater cumulative effects on viewscapes compared to PS#1 due to interacting effects of the UBE development adjacent to PS#6.

8.3 DECOMMISSIONING

At present there are no plans to decommission the Project as it will be a key component of wastewater management for the CVRD South Region for the long term. Should the Project require decommissioning in the future, a detailed plan will be developed for the safe and effective decommissioning of the forcemains, pump stations and associated facilities and infrastructure. This plan will be developed at such a time when the decision is made to decommission Project works. Decommissioning will be in accordance with applicable legislation that is in effect at the time with no anticipated site alterations that will cause cumulative negative effects.

9 CONCLUSIONS

The proposed South Region Royston Union Bay Sewer Extension described in this report will form an integral component of the CVSS that will extend sewage services into the CVRD South Region and reduce reliance on aging septic infrastructure. Based on the current study, the construction and operation of the Project can be completed without significant environmental, social, or cultural effects.

According to the screening level contaminated sites assessment, nine APECs categorized as “High” risk are located within 100 m of the Project footprint, three of which have the potential to interact with the Project -two of which are located adjacent to proposed PS #1 & #6, and the third along the pipeline on Highway 19A in the City of Courtenay. To mitigate risks at these locations, soil, water, and/or vapour testing can be completed to ensure that no contamination will be encountered. The owner may be required to adjust design plans to avoid any areas of contamination or otherwise define, treat and/or dispose of contaminants appropriately. It is recommended that the results of this screening-level review of potential sources of contamination be considered in the context of final/confirmed Project elements. A Phase II ESA type sampling program may be necessary for the characterization of materials likely to be disturbed during the Project.

In general, risks to ESAs from Project construction and operation are low given the majority of the proposed route alignment follows existing road rights-of-way. Minor terrestrial incursions are expected for existing cleared areas proposed for Pump Stations 1 and 6, although no vegetation clearing is anticipated. The highest risk activities to ESAs

are likely to be aquatic habitat and culvert crossings. Risks to these ESAs can be managed by scheduling works to coincide with reduced risk work windows for fish, periods of low flow, and calm weather. Proper site and fish isolation with clean flows diverted around work areas as necessary will also reduce negative impacts to aquatic habitats. Protection of ESAs like species at risk and avian nests can be achieved by establishing suitable buffers that are clearly delineated. Additional mitigation measures should be detailed in project-wide and site-specific Environmental Management Plan developed prior to construction to address potential environmental impacts introduced in Section 7 and any others that may be identified through the process of detailed design, which will reduce risk to all ESAs if implemented correctly.

In assessing effects of Project construction and operation on VCs, it was determined that Project activities would interact with mobility and viewscape VCs. These two VCs were further investigated in regard to residual and cumulative effects. During Project construction, traffic delays and congestion are likely to occur and active construction will be visible, causing temporary negative impacts on mobility and viewscapes. Permanent changes to viewscapes in the areas surrounding pump station locations will result. While likely to occur, residual effects and cumulative effects, resulting from interactions between the SES and other projects and activities in the vicinity, were assessed to be “less than significant.”

With over 99% of the permanent Project footprint located subsurface and within existing road prisms, overall impact of the Project on the environment and community is anticipated to be minimal. Permanent alteration to the landscape will occur at two pump station locations; however, there is previously cleared areas within the proposed parcels that could accommodate pump station footprints without significant impacts to existing biota, and assuming these parcels can be cleared of potential interactions with contaminated materials, little to no environmental impacts are anticipated.

We trust this document meets the requirements for an Environmental Impact Study outlined under Section 19(1) of the *Municipal Wastewater Regulation* under the *BC Environmental Management Act*. Please contact the undersigned with any queries.

CURRENT ENVIRONMENTAL LTD.

Prepared by:

Hannah Sungaila, R.P.Bio

Reviewed by:

Dusty Silvester, R.P.Bio & Rupert Wong, R.P.Bio.

10 DISCLAIMER

This report was prepared exclusively for the WSP Canada Inc. and the Comox Valley Regional District by Current Environmental Ltd. The quality of information, conclusions and estimates contained herein is consistent with the level of effort expended and is based on: i) information available at the time of preparation; ii) data collected by the authors and/or supplied by outside sources; and iii) the assumptions, conditions and qualifications set forth in this report. This report is intended to be used by WSP Canada Inc., the Comox Valley Regional District, and the partners of this Project only, subject to the terms and conditions of its contract or understanding with Current Environmental Ltd. Other use or reliance on this report by any third party is at that party's sole risk.

11 FIGURES

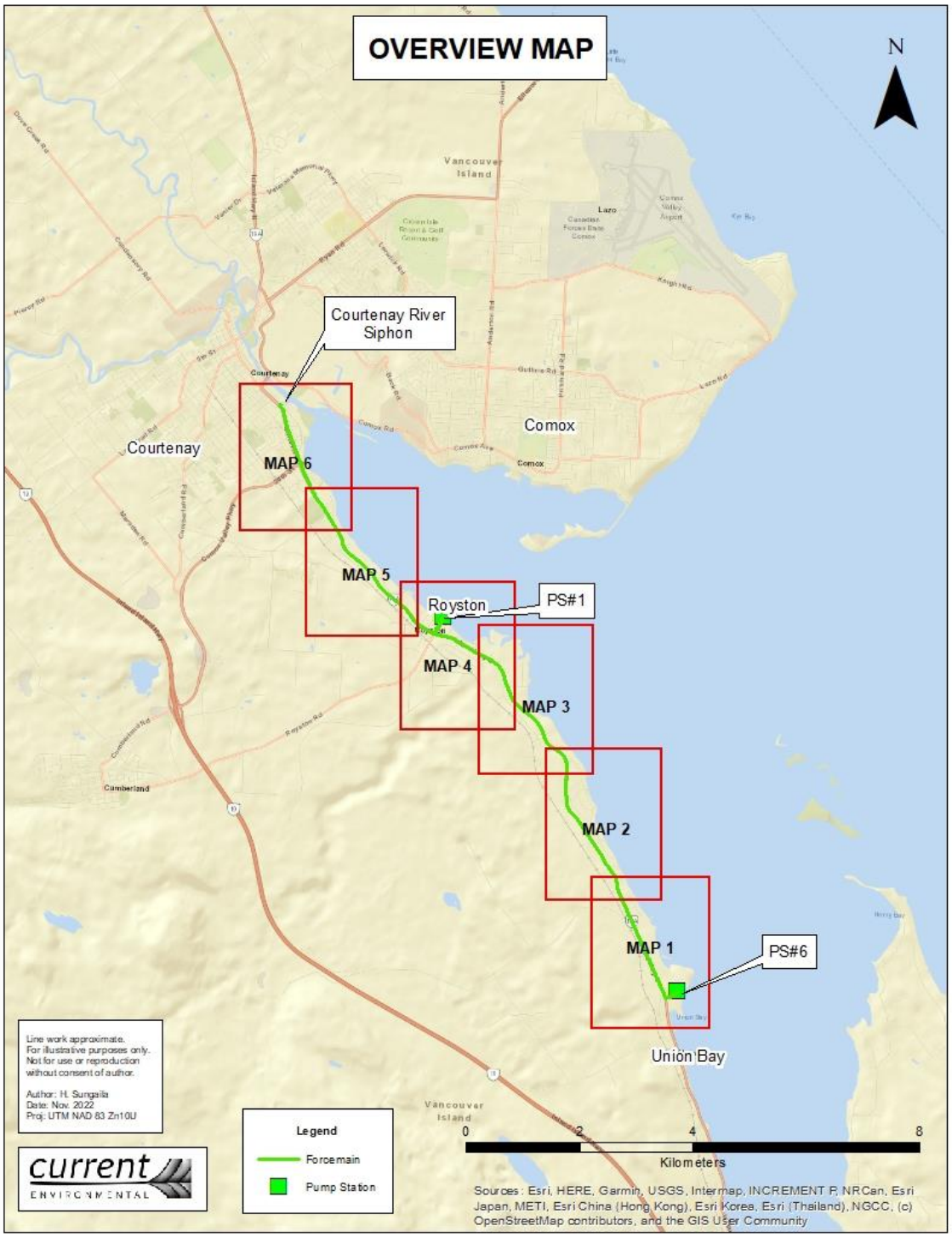

Figure 3. Locations of ESAs and ERIS records along the proposed Project alignment. Overview map.

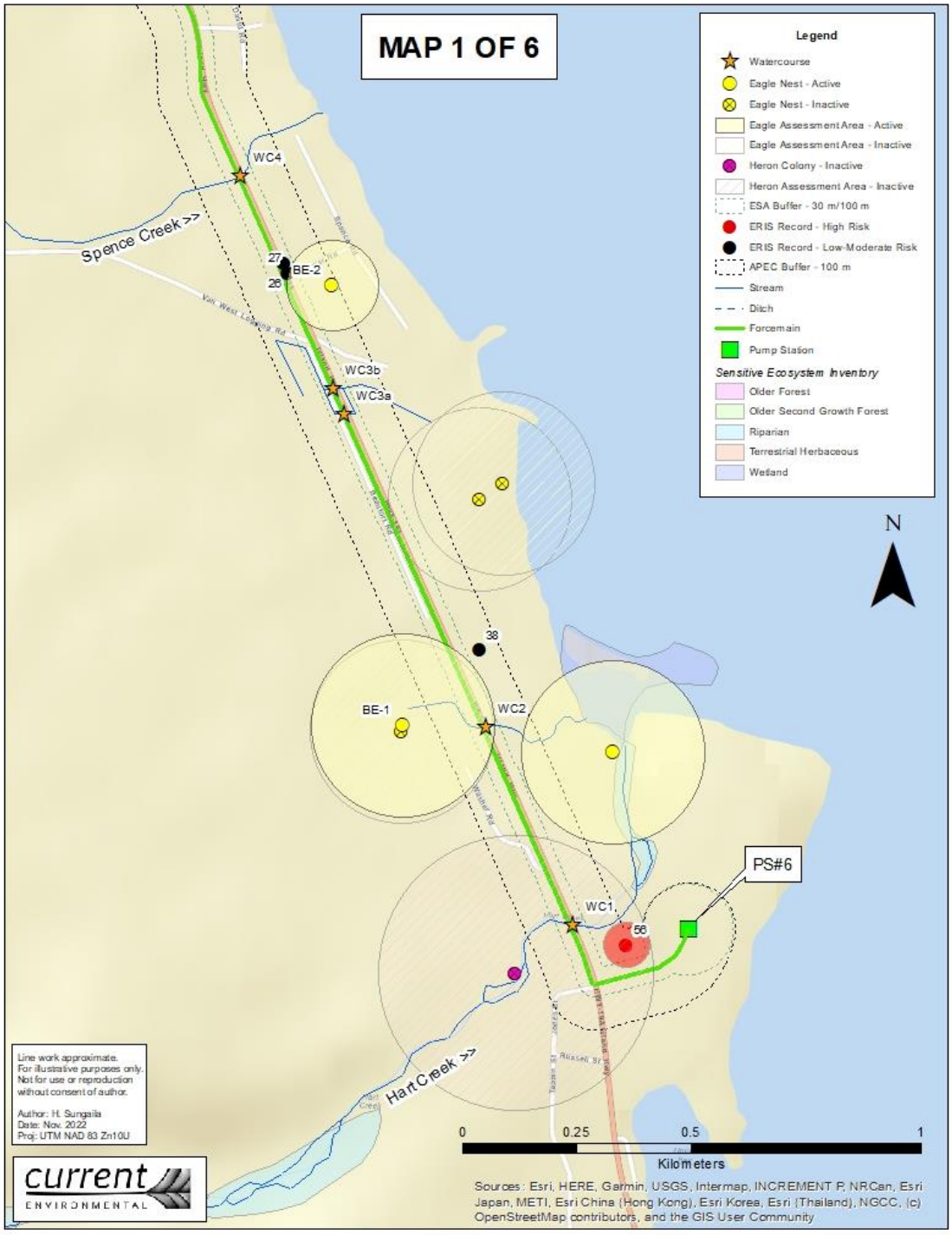

Figure 4. Locations of ESAs and ERIS records along the proposed Project alignment. Map 1 of 6.

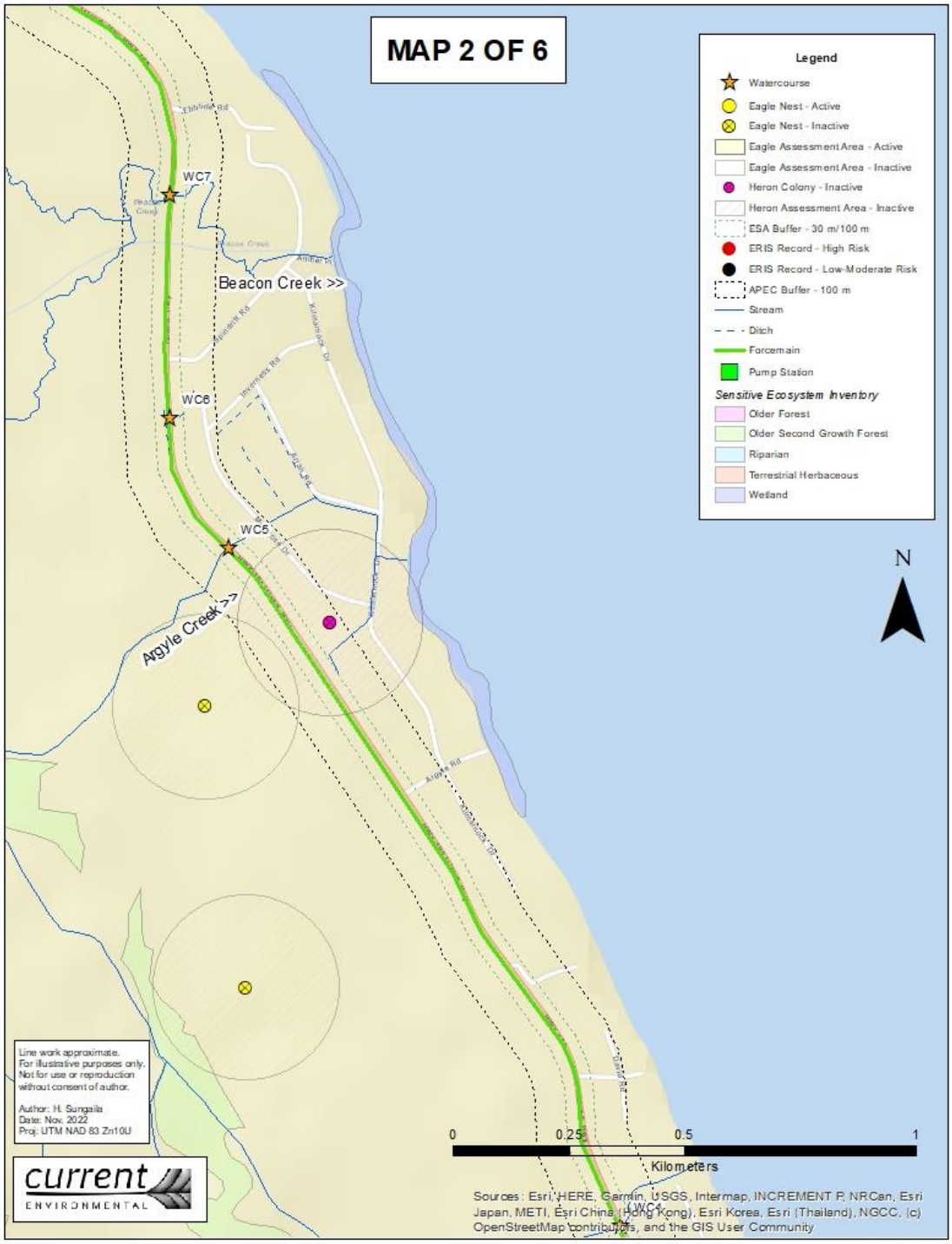

Figure 5. Locations of ESAs and ERIS records along the proposed Project alignment. Map 2 of 6.

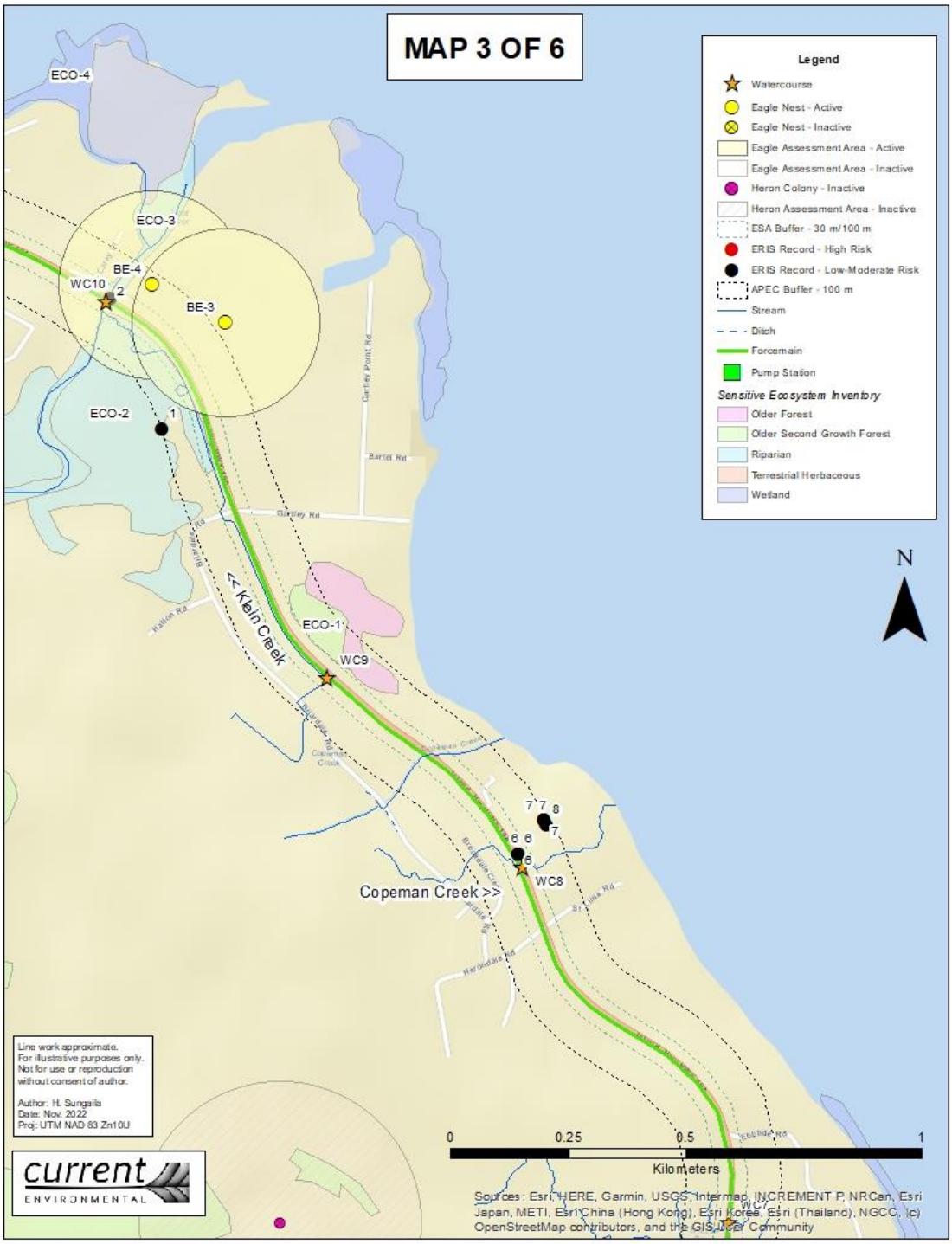

Figure 6. Locations of ESAs and ERIS records along the proposed Project alignment. Map 3 of 6.

Figure 7. Locations of ESAs and ERIS records along the proposed Project alignment. Map 4 of 6.

Figure 8. Locations of ESAs and ERIS records along the proposed Project alignment. Map 5 of 6.

Figure 9. Locations of ESAs and ERIS records along the proposed Project alignment. Map 6 of 6.

12 PHOTOS

Photo 1. Proposed forcemain alignment, view looking north on Highway 19A in the Royston area.

Photo 2. Proposed forcemain alignment, view looking north on Highway 19A/Cliffe Ave. in the City of Courtenay.

Photo 3. Proposed Pump Station 6 location in Union Bay, view looking southwest towards Highway 19A.

Photo 4. Proposed Pump Station 1 locations, second option located in foreground and preferred option located in back right of photo adjacent to parked cars. Fenced parcel in background was identified as a high-risk APEC with potential for contaminant migration to neighbouring sites. Records 10, 12-14 in Appendix A.

Photo 5. Trent River bridge, view looking south at Highway 19A crossing the river. The Trent River is the largest watercourse that crosses the proposed SES alignment.

Photo 6. Millard Creek, on the downstream end of the Highway19A crossing.

APPENDIX A. SUMMARY OF ERIS RESULTS AND ASSOCIATED RISK FACTORS THAT MAY IMPACT WORK FOR THE PROJECT ALIGNMENT (RED = HIGH RISK, YELLOW = MODERATE RISK).

ERIS ID (Map ID)	Map #	DATABASE *	ERIS RECORD SUMMARY	RISK	COMPANY NAME	ADDRESS
58	6	SCT	Jewelry and Silverware Manufacturing	Very low	Wayne Mackenzie Designer	105-1995 Cliffe Ave.
7	3	AMS	Sewage Treatment Permit	Low. Septic system managed on hotel property.	KINGFISHER OCEANSIDE RESORT & SPA LTD.	4330 Island Hwy S. Courtney BC V9N 9R9
17	5	AMS	Yoghurt Process Effluent Permit.	Very low	CANADIAN CULTURED DAIRY INC. TREE ISLAND YOGURT	3747 Island Highway, Courtenay BC V9N 9T4
42		AMS	Petroleum storage and distribution facilities authorization.	Moderate	IMPERIAL OIL LIMITED	99-088, VANANDA
53	6	AMS	No data (1998)	Unknown	COMOX TIMBER LTD.	211 - 2270 CLIFFE AVENUE
6	3	CONV	Compliance Warning - Allowable Wastewater Discharge Exceeded Exceeding Permit	Low. Septic system managed on hotel property.	Kingfisher Oceanside Resort and Spa Ltd.	4330 Island Hwy S., Courtney BC V9N 9R9
6	3	CONV	Compliance Warning - Allowable Wastewater Discharge Exceeding Permit	Low. Septic system managed on hotel property.	KINGFISHER OCEANSIDE RESORT AND SPA LTD.	4330 Island Highway South, Courtenay
6	3	CONV	Compliance Warning - Allowable Wastewater Discharge Exceeding Permit	Low. Septic system managed on hotel property.	Kingfisher Oceanside Resort and Spa Ltd.	4330 Island Hwy S. Courtney BC
7	3	CONV	Compliance Inspection with Regulatory Requirement	Low. Septic system managed on hotel property.	KINGFISHER OCEANSIDE RESORT AND SPA LTD.	4330 Island Highway South, Courtenay, BC, V9N 9R9, 49.634609, -124.915963
7	3	CONV	Effluent Discharge Permit	Low. Septic system managed on hotel property.	Kingfisher Oceanside Resort and Spa Ltd.	4330 Island Highway South, Courtenay, BC, V9N 9R9, 49.634609, -124.915963
17	5	CONV	Compliance Warning - Effluent discharge permit	Low	CANADIAN CULTURED DAIRY INC. doing business as TREE ISLAND YOGURT	3747 Island Highway, Courtenay BC V9N 9T4 Artisan Yogurt maker Facility
16	5	EHS	Previous ERIS report request	Very low.		3747 Island Highway South
16	5	EHS	Previous ERIS report request	Very low		3747 Island Highway South

23	5	EHS	Previous ERIS report request	Very low		3573 Island Highway 19 Campbell River BC
24	5	EHS	Previous ERIS report request	Very low		3573 Island Highway South
24	5	EHS	Previous ERIS report request	Very low		3573 Island Highway South
30	6	EHS	Previous ERIS report request	Very low		3210 Cliffe Avenue,
30	6	EHS	Previous ERIS report request	Very low		3210 Cliffe Avenue,
32	6	EHS	Previous ERIS report request	Very low		3170 Cliffe Avenue
41	6	EHS	Previous ERIS report request	Very low		Driftwood Mall
41	6	EHS	Previous ERIS report request	Very low		Driftwood Mall
1	3/4	EM	Hydrometric metering station	Very Low. Station does not pose environmental risk.	TRENT RIVER NEAR ROYSTON	
2	3/4	EM	River monitoring station	Very Low. Station does not pose environmental risk.	TRENT R U/S OF HIGHWAY BRIDGE	
5	4	EM	Marine Water Storm Sewer Discharge	Low. Storm sewer outfall.	NBS364	
18	5	EM	Non-permitted discharge from yoghurt facility with septic.	Low	TREE ISLAND GOURMET YOGURT	
19	5	EM	Permitted discharge conditions.	Low	TIY process water	
20	5	EM	Permitted tile field for effluent discharge.	Low	TREE ISLAND YOGOURT	
25	5	EM	Fish sampling fence in Millard Creek.	Very low	MILLARD CREEK AT FISH FENCE	
50	6	EM	Off-site bio cell approval to remove, store, and treat 200 m3 of special waste (HC and BTEX) (1997)	High. Additional SREG records at this address indicate possible offsite migration of HCs	MOHAWK OIL CO. LTD.	2350 Cliffe Ave.
9	4	GEN	Intermittent storage tank use.	Moderate. Unknown liquid storage. Address associated with Gas n Go service station.	Vancouver Island Ski Services	Royston 3922 Island Hwy
10	4	GEN	Shell Canada Gasoline/fuel/used oil tank storage.	High. See notations on Map Key 10 under SREG.	Shell Canada Products Limited	Royston 3927 Marine Dr Rr 1

22	5	GEN	One time generation and storage of pesticides (solid/liquid and toxic) (2007)	Low	Newalta Corporation	Courtenay 3663 South Island Highway
28	5	GEN	Asbestos generation and disposal (one time only).	Low	Veyron Properties Group Ltd.	Courtenay 3260 Cliffe Avenue
31	6	GEN	Asbestos generation and disposal (one time only).	Low	Veyron Properties Group Ltd.	Courtenay 3230 Cliffe Avenue
36	6	GEN	Asbestos generation and disposal (one time only).	Low	Pace Setter Construction Ltd	Courtenay 2900 Cliffe Ave
43	6	GEN	Intermittent production of flammable liquids and soil contaminated with hydrocarbons/oil BTEX (2009)	Moderate. Off-site migration unknown and no record of site remediation.	Imperial Oil Limited	Courtenay 2650 Cliffe Avenue
44	6	GEN	Generation and off-site management of oily water sludge/debris (2013)	Moderate. Known presence of hazardous materials kept on site including record of disposal. No known spills.	Imperial Oil Limited	Courtenay 2650 Cliff Ave
45	6	GEN	Generation and disposal of solid environmentally hazardous substances (2008)	Low	478008 BC Ltd.	Courtenay 2500 Cliffe Street
52	6	GEN	Contaminated soil with HC/oil BTEX. 110,000 kg transported for biological treatment. Contaminated soil with Xylene 1000000 kg. (1998-2003)	High. Additional SREG records at this address indicate possible offsite migration of HCs	Mohawk Lubricants Ltd.	Courtenay 2350 Cliffe Ave
54	6	GEN	Waste petroleum product generated for off site management (2018)	Moderate	7-Eleven Canada, Inc.	Courtenay 2295 Cliffe Ave
59	6	GEN	Biological treatment of 30,000 kg of environmentally hazardous solid substance. (2005)	Moderate	City Of Courtenay	Courtenay 1 110 20th Street
11	4	GEN2	Residential restoration solid waste transported to landfill.	Very low	ROCKSTEADY RESTORATIONS	3898 ROYSTON ROAD, ROYSTON, BC
33	6	GEN2	Waste manifest for recycling "oily water sludge/debris".	Low	WASTE MANAGEMENT OF CANADA CORP	2966 KILPATRICK STREET, COURTENAY, BC
35	6	GEN2	Storage and disposal of oily water sludge/debris (2013)	Low	GREAT CANADIAN OIL CHANGE	450-29TH ST, COURTNAY, BC
37	6	GEN2	Storage of flammable liquids, aerosols, leachable toxic waste, Li batteries, corrosive liquids, oxidizing substances, poisonous solids	Low	TARGET CANADA CO.	2801 CLIFFE AVENUE, COURTENAY, BC

43	6	GEN2	Storage/disposal of oily water sludge/debris (2013)	Moderate. Known presence of hazardous materials kept on site including record of disposal. No known spills.	QUANTUM MURRAY LP	2650 CLIFFE AVENUE, COURTNEY, BC
47	6	GEN2	Storage/disposal of oily water sludge/debris (2011)	Moderate. Known presence of hazardous materials kept on site including record of disposal. No known spills.	SHELL CANADA PRODUCTS LIMITED	2591 CLIFFE AVE, COURTNEY, BC
52	6	GEN2	Storage/disposal of oily water sludge/debris (2011)	Moderate. Known presence of hazardous materials kept on site including record of disposal. No known spills.	HUSKY OIL LIMITED	2350 CLIFFE AVE, COURTNEY, BC
55	6	GEN2	Storage/disposal of oily water sludge/debris (2013)	Moderate. Known presence of hazardous materials kept on site including record of disposal. No known spills.	BRIAN MCLEAN CHEVROLET	2145 CLIFFE AVE, COURTENAY, BC
34	6	NEES	40 Gal. discharge of unknown liquid in dumpster behind business	Low	Unknown	Dumpster behind Cloverdale Paint at 468 29th Street
21	5	PES	Application of pesticides to treat vegetation and noxious weeds (1991)	Low	COURTENAY CEMENT WORK AND PAVING LTD.	3631 PARK LN, COURTENAY, BC, CA
37	6	PES	Domestic pesticide vendor.	Low.	ZELLERS LTD #029	2801 CLIFFE AVE
37	6	PES	Domestic pesticide vendor.	Low	ZELLERS LTD #029	2801 CLIFFE AVE
37	6	PES	Domestic pesticide vendor.	Low	ZELLERS LTD #029	2801 CLIFFE AVE, COURTENAY, BC, CA V9N 2L8
37	6	PES	Domestic pesticide vendor.	Low	CANADIAN TIRE ASSOC STORE #350	2801 CLIFFE AVE, COURTENAY, BC, V9N2L8
48	6	PES	General pesticide (1992)	Low	MACLEODS HARDWARE/EDMO INVESTMENTS LTD.	2599 CLIFFE AVE, COURTENAY, BC, CA V9N 2L5
51	6	PES	Application of pesticides to treat vegetation and noxious weeds (1998)	Low	MOUNTAIN VALLEY PAVING	3-2401 CLIFFE AVE SUITE 159, COURTENAY, BC, CA V9N 2L5

52	6	REC	Gasoline petrol sales	Moderate. Service stations with underground fuel storage tanks can affect neighbouring properties with migration of hydrocarbon contamination.	MOHAWK LUBRICANTS LTD.	2350 CLIFFE AVE
3	4	RST	Service Stations - Gasoline, Oil, & Natural Gas	Moderate. Service stations with underground fuel storage tanks can affect neighbouring properties with migration of hydrocarbon contamination.	ROYSTON TEMPO AUTOMOTIVE SERVICE	3991 ISLAND HWY RR 1
3	4	RST	Service Stations - Gasoline, Oil, & Natural Gas	Moderate. Service stations with underground fuel storage tanks can affect neighbouring properties with migration of hydrocarbon contamination.	ROYSTON TEMPO AUTOMOTIVE SERVICE	3991S ISLAND HWY RR 1
9	4	RST	Service Stations - Gasoline, Oil, & Natural Gas	Moderate. Service stations with underground fuel storage tanks can affect neighbouring properties with migration of hydrocarbon contamination.	YOUR TURN RETAIL CO	3922 ISLAND HWY S
9	4	RST	Service Stations - Gasoline, Oil, & Natural Gas	Moderate. Service stations with underground fuel storage tanks can affect neighbouring properties with migration of hydrocarbon contamination.	ROYSTON ESSO	3922 ISLAND HWY S
43	6	RST	Fuel and Oils	Moderate. Service stations with underground fuel storage tanks can affect neighbouring properties with migration of hydrocarbon contamination.	ENEX FUELS LTD	2650 CLIFFE AVE

46	6	RST	Fuel and Oils	Moderate. Service stations with underground fuel storage tanks can affect neighbouring properties with migration of hydrocarbon contamination.	COLUMBIA FUELS INC	2440 CLIFFE AVE
46	6	RST	Fuel and Oils	Moderate. Service stations with underground fuel storage tanks can affect neighbouring properties with migration of hydrocarbon contamination.	COLUMBIA FUELS	2440 CLIFFE AVE
47	6	RST	Service Stations - Gasoline, Oil, & Natural Gas	Moderate. Service stations with underground fuel storage tanks can affect neighbouring properties with migration of hydrocarbon contamination.	COURTENAY SHELL	2591 CLIFFE AVE
47	6	RST	Service Stations - Gasoline, Oil, & Natural Gas	Moderate. Service stations with underground fuel storage tanks can affect neighbouring properties with migration of hydrocarbon contamination.	SHELL CANADA PRODUCTS	2591 CLIFFE AVE
47	6	RST	Service Stations - Gasoline, Oil, & Natural Gas	Moderate. Service stations with underground fuel storage tanks can affect neighbouring properties with migration of hydrocarbon contamination.	COURTENAY SHELL	2591 CLIFFE AVE
52	6	RST	Service Stations - Gasoline, Oil, & Natural Gas	High. Records of remediation and off-site migration of HCs including reports of "high-risk"	MOHAWK COURTENAY SERVICE	2350 CLIFFE AVE

52	6	RST	Service Stations - Gasoline, Oil, & Natural Gas	High. Records of remediation and off-site migration of HCs including reports of "high-risk"	COURTENAY HUSKY	2350 CLIFFE AVE
51	6	SCT	Professional lithographic printing	Very low	MINUTEMAN PRESS	9-2401 Cliffe Ave
10	4	SREG	Spill response at Shell Bulk Plant (1996). Site profile created and Notice of Independent Remediation (1997). Above ground fuel or chemical storage tanks present. Groundwater sampling (2002). Risk assessment and Recommendation to decommission nearby groundwater wells (2004). Adjacent lots implicated (PID): 005-438-519, 006-154-689, 007-359-489, 005-438-527.	High. Independent remediation occurred (1997); however, later risk assessment (2004) recommended that nearby groundwater wells be decommissioned. Adjacent properties implicated in risk. Some sub-surface contamination may remain present.	3927 Marine Drive, Royston	3927 MARINE DRIVE
12	4	SREG	Notification of Likely or actual substance migration from neighbouring site. Source parcel at 3910 Royston Road (ESSO/Imperial Oil). Site Classified "Non-high risk" and certificate of compliance received (2014).	High. Although compliance confirmed this site does intersect the road where project works may be planned and there is record of off-site migration.	Portions Of Royston Road and Marine Dr	PORTIONS OF ROYSTON ROAD AND MARINE DRIVE
13	4	SREG	Site Classified "Non-high risk" and certificate of compliance received (2014). Affected parcel is Crown Land adjacent to Seaside Park.	High. Although compliance confirmed this site does have records of off-site migration.	Former Royston Esso Bulk Plant	3910 ROYSTON ROAD
13	4	SREG	Site Classified "Non-high risk" and certificate of compliance received (2014). Affected parcel is Crown Land adjacent to Seaside Park.	High. Although compliance confirmed this site does have records of off-site migration.	Crown Land Adjacent To 3910 Royston Rd	CROWN LAND ADJACENT TO 3910 ROYSTON RD
14	4	SREG	Notice of independent remediation submitted (2000). Certificate of compliance issued (2004). Site profile stated there was a spill to the environment of "Petroleum, Solvent, or other polluting substance" of greater than 100 L and that the source was ESSO home heating oil from their storage site.	High. Known history of spill and remediation.	3943 Marine Drive, Royston	3943 MARINE DRIVE

15	4	SREG	Site Profile for Royston Wharf including land use for "Petroleum Product, Wholesale bulk storage or distribution" (1999).	Moderate. History of hazardous material storage, no record of spill or remediation.	Royston Wharf, Royston	ROYSTON WHARF
26	1	SREG	Notice of Independent Remediation Initiation and completion were submitted (2000). Site profile (2004) stated above ground fuel or chemical tanks had been present.	Moderate. Past remediation has occurred on a lot adjacent to Highway 19A.	5084 Island Highway, Union Bay	5084 SOUTH ISLAND HIGHWAY
27	1	SREG	Site Profile stated there are currently or had been previously above ground fuel or chemical storage tanks and fill materials. No record of remediation included.	Moderate. Private property fuel storage tank.	4988 South Island Highway, Union Bay	4988 SOUTH ISLAND HIGHWAY
29	6	SREG	Notice of Independent Remediation (2001).	Moderate. Private lot off Cliffe Ave. Does not intersect work area.	3220 Cliffe Ave	3220 CLIFFE AVE
36	6	SREG	Notice of Independent Remediation (2020). Suspected historical dumping of waste oil around perimeter of historic building site. Site classified as "non-high risk".	Low. Lot has been remediated and redeveloped.	2900 Cliffe Avenue, Courtenay	2900 CLIFFE AVENUE
39	6	SREG	Site investigation report (1997). Underground storage tank removal from North side of building where leased gas station used to operate.	Low. Location and timeframe not expected to intersect project.	Winter Garden Restaurant	2790 CLIFFE AVENUE
40	6	SREG	Site investigation report and remediation to commercial /industrial levels of Payless Gas station (1994). Contaminated fill transported to Pidgeon Lake landfill for disposal.	Moderate. Service stations with underground fuel storage tanks can affect neighbouring properties with migration of hydrocarbon contamination.	Payless Station #7	2740 CLIFFE AVENUE
45	6	SREG	Notice of independent remediation and site classified non-high risk (2015)	Moderate. Past remediation has occurred on a lot adjacent to Highway 19A.	2500 Cliffe Avenue, Courtenay	2500 CLIFFE AVENUE

46	6	SREG	Notice of independent remediation and likely or actual migration to neighbouring property (2010). Soil remediation and relocation agreement. (2010)	High. See record under SREG 46	2440f Cliffe Avenue, Courtenay	2440F CLIFFE AVENUE
49	6	SREG	Site Risk Classified "high risk". Source parcel 2350 Cliffe Ave. Hydrocarbons in soil vapour. Notification received about likely or actual substance migration from neighbouring site.	High. Unremediated record of offsite migration of hydrocarbons.	2400 Cliffe Avenue, Courtenay	2400 CLIFFE AVENUE
52	6	SREG	Remediation plan (1996) and Site Investigation Report (1994) submitted. Historical site notification issued (1997). Notice of independent remediation (2001). Site risk classified as "non-high risk". Bio cell created at Pidgeon Lake landfill for storage and treatment of 1180m3 of HC contaminated soil. Notification of likely or actual offsite migration to neighbouring site (2010). Site risk classified as "high risk" with neighbouring site at 2400 Cliffe HC soil vapor exceedances (2018).	High. History and recent record of contamination, remediation, and offsite migration affecting neighbouring lots.	Mohawk Courtenay Service	2350 CLIFFE AVENUE
54	6	SREG	Site investigation report (1988 & 1991). Historical site notification issued (1997). Notice of independent remediation initiation and completion (2007). Site disclosure statement and Notice of Independent Remediation (2021). Excavation of soil exceeding land use standards, disposed at Upland Landfill. Site risk classified "non-high risk" (2021)	High. History and recent record of contamination and remediation.	7-Eleven Gas Bar - Courtenay	2295 CLIFFE AVENUE

56	1	SREG	At Hart (Washer) Creek. Large site complex contamination. Waste coal pile, coal shipping wharf, coal washer, and coke ovens. Preliminary site investigation and Phase II assessment (1996). Site profile (1997 & 2018) and remediation plan submitted (2011 & 2019). Notice of independent remediation (2005 & 2006). Determination of contaminated site issue "not contaminated" (2005). Site profile (2007). Further investigation required by the Ministry (2007 & 2018). Release letter issued for subdivision (2018). Approval in principle issued required remediation and monitoring (2019). Site risk classified "high risk" (2019). Notice of independent remediation (2019 & 2020).		Kensington Union Bay Properties Ltd.	ISLAND HIGHWAY 19A
57	6	SREG	Site investigation report. Removal of excavated soil for disposal at landfill. (1994)	Moderate. Past remediation has occurred on a lot adjacent to Highway 19A.	Imperial Oil Cardlock	2050 CLIFFE STREET
60	6	SREG	Underground storage tank Notice of independent remediation initiation and completion (2000).	Moderate. Past remediation has occurred on a lot adjacent to Highway 19A.	1959 Cliffe Ave, Courtenay	1959 CLIFFE AVENUE
4	4	WWIS	Water Supply Well - Private	Very low		ISLAND HIGHWAY SOUTH
8	3	WWIS	Water Supply Well - Private	Very low		
38	1	WWIS	Water Supply Well - Private	Very low		
		GEN	Asbestos generation and disposal (one time only).	Low	Veyron Properties Group Ltd.	Courtenay 3250
		NEES	Overturned transport truck 25 t diesel spill. (2001)	Low	Unknown tractor trailer	29th Street and the Inland Island Hwy., Courtenay
		NEES	Residential Sewage discharge (2001)	Low	Individual	Across from Wal-Mart, Island Hwy, Comox
		NEES	Undetermined contaminant (2001)	Low	Unknown	On Island Hwy shoulder in Front of Glacier View Plaza

		NEES	Overturned transport truck 25 t diesel spill. (2001)	Low	Unknown tractor trailer	29th Street and the Inland Island Hwy., Courtenay
		NEES	Hydraulic oil spill from tank truck (1988)	Low	SHELL CANADA	Marine Drive, Royston
		PES	General pesticide (1998)	Low	MCCREA HARDWARE LTD	#8-468 29TH ST, COURTENAY, BC, CA V9N 7Z6

APPENDIX B. ENVIRONMENTAL RISK INFORMATION SERVICES (ERIS) REPORT

Document attached separately.

APPENDIX C. CHANCE ARCHAEOLOGICAL FIND GUIDELINES

These Chance Find Guidelines aim to assist the Contractor if unanticipated archaeological finds (Chance Finds) are encountered during construction. The Contractor is advised that Chance Finds can potentially occur throughout the project alignment. These guidelines are in-line with professional best practices, standards of the BC Association of Professional Archaeologists (BCPA) and BC Archaeological Impact Assessment Guidelines (BC Archaeological Branch 1998).

Guidelines for Chance Finds

1) STOP WORK. If suspected archaeological materials or features are encountered, stop work in the immediate vicinity of the find and secure the area. Do not undertake further work that could disturb the find, including moving any soil from the vicinity of the site or adjacent spoil material, and protect any artifacts in place;
2) The Contractor shall wait for further direction from CVRD in consultation with the Project Archaeologist before resuming work in the vicinity;
3) Record the following:

    a. Date (when the find was encountered)
    b. Observer name
    c. Location (GPS coordinates if possible)
    d. Type of find (e.g. shell midden, artifact, human remains)
    e. Description of disturbance (e.g. excavation, erosion, etc)
    f. Photos with scale

4) Retain potential archaeological sediments on site
5) Delineate substrate that may contain cultural materials (e.g. temporary fencing)
6) Be prepared to initiate work in another location while archaeological work is completed. Based on the nature of the Chance Find, it may be determined by the Archaeological Monitor that there are no further concerns and activities may continue, or further assessment or mitigation may be required.
7) Treat human remains, regardless of condition, with respect at all times. Depending on the location and nature of discovery, the project Archaeologist may need to follow up with the RCMP.

APPENDIX D. OPERATIONAL SPILL RESPONSE PLAN

Follow these procedures if a spill of fuels, chemicals, or other hazardous materials occurs

Contacts

Report major spills (>100 L) of Class 3 Flammable liquids to EMBC (1-800-663-3456)
For deleterious substance spills of any volume to water call DFO (1-800-465-4336)

9-1-1 FOR EMERGENCY SERVICES

Response

For spills of *any* volume follow these steps:

1) ENSURE HUMAN SAFETY
2) STOP THE FLOW (when possible)
3) SECURE THE AREA
4) CONTAIN THE SPILL
5) NOTIFY
6) CLEAN-UP
7) REPORT
8) DE-BRIEF

1) ENSURE HUMAN SAFETY

- Assess the situation. Never rush in.
- Warn other people in the immediate vicinity.
- Determine what product has been spilled.
- If the spilled product is flammable ensure there are no ignition sources nearby.
- Wear appropriate personal protective equipment.

2) STOP THE FLOW

- Act quickly.
- Stop the flow or spill at its source.
- Close valves, shut off pumps, or plug holes/leaks.

3) SECURE THE AREA

- Inform the Environmental Monitor and Construction Supervisor of the spill.
- Limit worker access to spill area.
- Prevent public entry to the site.

Continued next page…

4) CONTAIN THE SPILL

- Prevent spillage from entering drainages (watercourses, ditches, culverts, drains).
- Use ample spill sorbent material to contain the spill.
- As necessary, use a dyke, pumping into containment structures, or other method to prevent discharge from the site.
- Make every effort to minimize contamination.

5) NOTIFY

- When necessary (spills of flammable materials >100L) the first external call should be made to: Emergency Management BC (EMBC) 1-800-663-3456 (24 hour)
- For deleterious substance spills of any volume to water call DFO 1-800-465-4336
- Provide necessary spill details to other external agencies.
- See Spill Reporting Notification Chart and Table of Reportable Levels of Certain Substances provided below.

6) CLEAN-UP

- The Environmental Monitor will be responsible to ensure that clean-up methods comply with Ministry of Environment requirements including the *Environmental Management Act* and Regulations, or relevant regulation.
- All material and equipment used in clean-up (e.g. used spill containment material, and sorbent pads) are to be disposed of appropriately.
- Soils or other materials contaminated by the spill will be treated as special wastes and be disposed of as required on a site-specific basis. Residue sampling may be required in association with soil contamination to ensure complete removal and/or treatment.

7) REPORT

- Complete an Environmental Incident Report (EIR).
- The EIR will be submitted to MoT/MoE/DFO as required (or any other pertinent regulatory agencies), and copies will be retained by the EM and Construction Supervisor.

8) DE-BRIEF

- Following the clean-up of a spill the Construction Supervisor will call a meeting with all personnel to discuss the following as a means to inform future prevention and spill management techniques:
  - Identify the source of the spill and whether it could have been avoided.
  - Review the sequence of events used to handle the spill, including what was done right/wrong.
  - Determine whether the equipment used to handle the spill was available when needed and in sufficient quantity.
  - Discuss how the spill response procedure could be improved.

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Spill Reporting Notification Chart

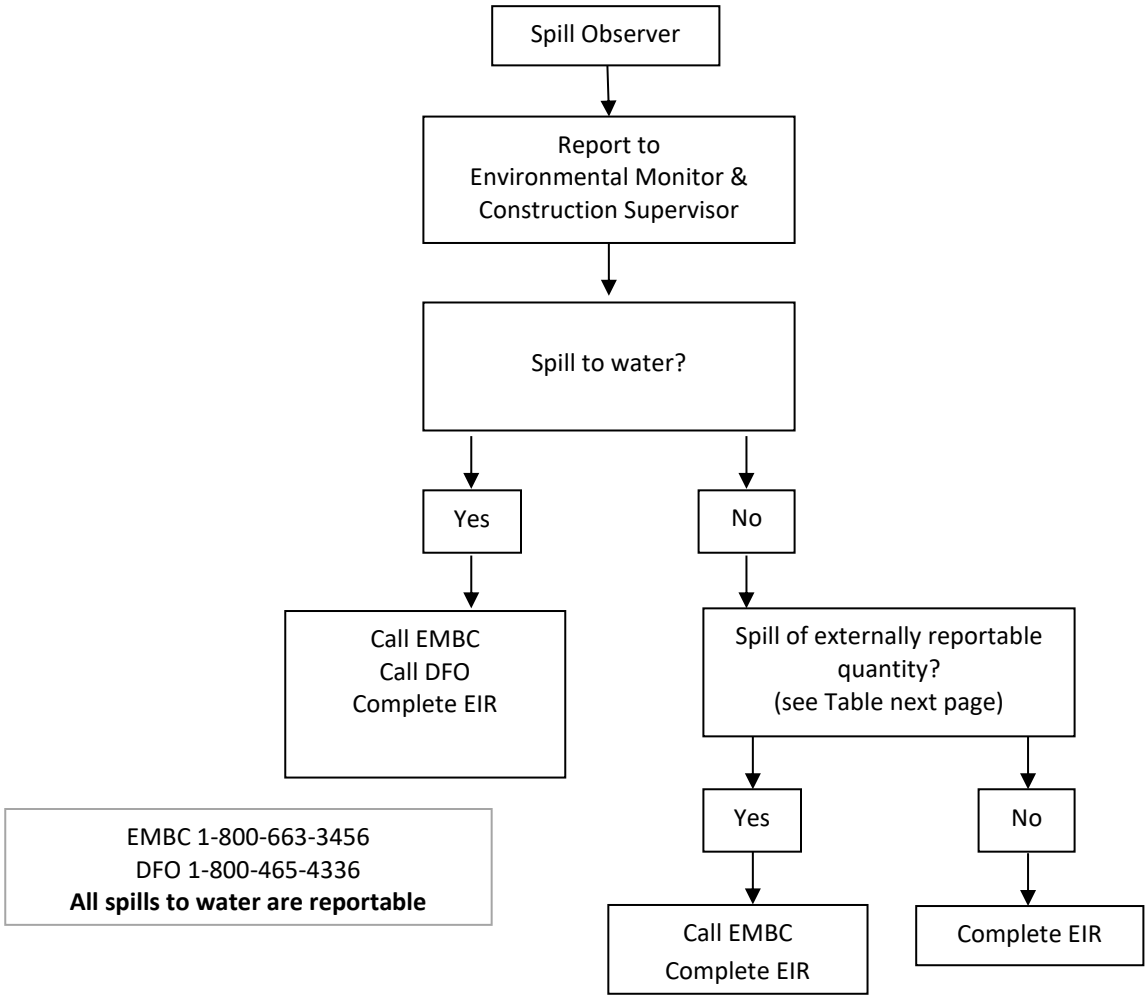

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Table of Reportable Levels of Certain Substances

(Adapted from *Environmental Management Act* – Spill Reporting Regulation)

Item	Column 1 Substance spilled	Column 2 Specified amount
1	Explosives of Class 1 as defined in section 3.9 of the Federal Regulations	any
2	Flammable gases, other than natural gas, of Division 1 of Class 2 as defined in section 3.11 (a) of the Federal Regulations	10 kg, if the spill results from equipment failure, error or deliberate action or inaction
3	Non-flammable gases of Division 2 of Class 2 as defined in section 3.11 (d) of the Federal Regulations	10 kg, where spill results from equipment failure, error or deliberate action or inaction
4	Poisonous gases of Division 3 of Class 2 as defined in section 3.11 (b) of the Federal Regulations	5 kg, where spill results from equipment failure, error or deliberate action or inaction
5	Corrosive gases of Division 4 of Class 2 as defined in section 3.11 (c) of the Federal Regulations	5 kg, where spill results from equipment failure, error or deliberate action or inaction
6	Flammable liquids of Class 3 as defined in section 3.12 of the Federal Regulations	100 L
7	Flammable solids of Class 4 as defined in section 3.15 of the Federal Regulations	25 kg
8	Products or substances that are oxidizing substances of Division 1 of Class 5 as defined in section 3.17 (a) and 3.18 (a) of the Federal Regulations	50 kg
9	Products or substances that are organic compounds that contain the bivalent "-0-0-" structure of Division 2 of Class 5 as defined in sections 3.17 (b) and 3.18 (b) of the Federal Regulations	1 kg
10	Products or substances that are poisons of Division 1 of Class 6 as defined in section 3.19 (a) to (e) and 3.20 (a) of the Federal Regulations	5 kg
11	Organisms that are infectious or that are reasonably believed to be infectious and the toxins of these organisms as defined in sections 3.19 (f) and 3.20 (b) of the Federal Regulations	any
12	Radioactive materials of Class 7 as defined by section 3.24 of the Federal Regulations	All discharges or a radiation level exceeding 10 mSv/h at the package surface and 200 µSv/h at 1 m from the package surface
13	Products or substances of Class 8 as defined by section 3.25 of the Federal Regulations	5 kg
14	Miscellaneous products or substances of Division 1 of Class 9 as defined by section 3.27 (1) and (2) (a) of the Federal Regulations	50 kg
15	Miscellaneous products or substances of Division 2 of Class 9 as defined in section 3.27 (1) and (2) (b) of the Federal Regulations	1 kg
16	Miscellaneous products or substances of Division 3 of Class 9 as defined in section 3.27 (1) and (2) (c) of the Federal Regulations	5 kg
17	Waste asbestos as defined in section 1 of the Hazardous Waste Regulation	50 kg
18	Waste oil as defined in section 1 of the Hazardous Waste Regulation	100 l
19	Waste containing a pest control product as defined in section 1 of the Hazardous Waste Regulation	5 kg
20	A substance not covered by items 1 to 19 that can cause pollution	200 kg
21	Natural gas	10 kg, if there is a breakage in a pipeline or fitting operated above 100 psi that results in a sudden and uncontrolled release of natural gas
*Refer to *Transportation of Dangerous Goods Regulation under the Transportation of Dangerous Goods Act* for substance definitions. ** If there is any doubt regarding the substance spilled, specified amount, or whether it is reportable, take a cautious approach and report it.		

END – Spill Response Plan

Comox Valley REGIONAL DISTRICT

Briefing Note

SEWER EXTENSION SOUTH – SERVICE STRUCTURE OVERVIEW
December 12, 2022

Alongside the technical and engineering work required to facilitate the expansion of sewer services into Electoral Area A, administration of the expanded sewer service will also be required. Comox Valley Regional District Legislative Services staff have put forward a legislative proposal to facilitate the future administration of sewer servicing in existing residential neighbourhoods in Electoral Area A:

- Expansion of the existing Comox Valley Sewerage Service (CVSS) area (completed in September 2022)
- Establish new sewer collection services

This proposal is further described below.

Comox Valley Sewer Service Area Expansion

Through a recently adopted amendment to Bylaw No. 2541 being "Comox Valley Sewerage Service Establishment Bylaw No. 2541, 2003", the parts of Electoral Area A that are anticipated to be provided with sewer servicing in the future have now been added to the CVSS service area. This amendment also updated the apportionment to address the distribution of costs based on flows to the Comox Valley Water Pollution Control Centre to ensure Electoral Area A residents, once connected, pay an equitable share of operation and maintenance costs, including debt servicing costs related to regional infrastructure renewal and upgrade projects.

In consideration of the foundational nature of the service establishment bylaw, and the decision by the Sewage Commission to accept wastewater from the south, amending Bylaw No. 2541 is an appropriate first step within the overall servicing framework. Other bylaw amendments will also be required in due course as part of this extension.

Local Sewer Collection Services

In order to provide sewage treatment service to existing communities in Electoral Area A, a new sewage collection service will need to be established to connect individual homes and businesses with the new regional infrastructure. As local sewage collection infrastructure is not currently present within these communities, a service will need to be established and long-term borrowing approved to finance the construction, operations and maintenance of the collection system.

Maintenance and operation of this local collection infrastructure will be funded, owned and operated by the local sewage collection service and not considered a part of the regional CVSS. Through annual parcel taxes and/or user charges, property owners within the local sewer collection service area would contribute to both the operation and maintenance of the local collection service.

Comox Valley REGIONAL DISTRICT

Briefing Note

LOW PRESSURE SEWER SYSTEM CONSIDERATIONS
December 12, 2022

Low Pressure Sewer System Considerations

Low pressure sewer (LPS) systems are built in areas where servicing by traditional gravity systems is not viable, or when local factors prevent the siting of community pump stations. In the Royston/Union Bay area, proximity to coastal areas, presence of archaeological sites along the foreshore and other factors may make the construction of community pump stations challenging in some parts of the proposed service area. Given these challenges, a low pressure sewer system can provide a more cost-effective wastewater collection solution in some areas.

As noted in the November 23, 2022 "Discussion Paper 2: Collection System Options" document, there are two main types of LPS systems as noted below:

1. Septic Tank Effluent Pump (STEP) uses a two-chamber septic tank to capture solids, while the liquid effluent is then pumped into the collection system network.
2. Grinder pumps grind sewage collected from the home into a slurry that is then pumped into the collection system network.

In relation to gravity systems, low pressure systems offer the following advantages and disadvantages:

Advantages	**Disadvantages**
Reduced inflow and infiltration, particularly in areas with high winter water table	Individual pump units installed on private property, with two-chamber septic tank required for STEP systems
Shallow/narrow excavation with potential for trenchless installation, thus limiting neighbourhood and archaeological impacts during construction	Operation and maintenance costs for property owners, including supplying and paying for power to the pump unit.
Smaller pipes and shallower excavations can reduce initial capital costs	Limited storage capacity in pump chamber during power outages
Grinder pumps use smaller tank, with limited footprint on property	STEP systems require regular tank pump outs

Low Pressure Sewer Systems – Frequently Asked Questions

Q: When would a grinder pump or STEP system be required?

A: Dependent upon the preferred collection system configuration selected through the LWMP Addendum process and subsequent detailed design, the following instances are examples of where a pump unit would be required for servicing a property:

1. The wastewater plumbing exiting the home is lower than the gravity sewer main in the fronting street.
2. The sewer network in the fronting street is a low pressure sewer system.

There may also be instances where a property owner prefers an LPS system as it may better suit the existing configuration of structures, landscaping or other features of their property.

Q: For properties requiring a pump, who owns, operates and maintains it?

A: As the pump unit would be installed on private property, the property owner would be responsible for installation, operation and maintenance costs. That said, the CVRD is proposing to fund the initial cost to supply pump units as part of the overall cost of the project.

Q: How long do grinder pumps last? What will it cost to replace it when it stops working?

A: Grinder pumps will typically last 10 to 15 years prior to requiring significant repairs or replacement. Replacements costs will depend upon the model chosen, and would currently be in the $3000 range for full replacement.

Q: What does it cost to operate and maintain a grinder pump?

A: In other areas, annual operating and maintenance costs in the $40 to $50 range are estimated for a typical household.

Q: What happens during a power outage? How much emergency storage capacity is available?

A: During a power outage, domestic water consumption is typically reduced as appliances like dishwashers and laundry machines won't be in use, though it would be recommended to significantly limit indoor water use during an outage. Emergency storage capacity would depend on the size of the pump chamber or tank installed, and could be up to 24 hours.

For prolonged power outages, the CVRD would consider additional mitigation measures, such as providing pump outs for properties serviced by LPS.

Local Use of Low Pressure Sewer Systems

There are several examples of low pressure sewer systems in operation on Vancouver Island and in the Salish Sea area, as listed below:

View Royal
The Town of View Royal sewer system includes several privately managed sewer grinder pumps, located on properties that are lower than the gravity sewer system. (link)

Saanich
The District of Saanich recently upgraded the sewage system in Portage Inlet, replacing a gravity system and three sewer pump stations originally installed in the 1950s. After a comprehensive review of options to maintain sewer services in the area, a low pressure sewer system ranked the highest. This project brings the total number of LPS systems in Saanich to approximately 150. (link)

Langford
The City of Langford has 200 to 300 LPS systems as part of its sewer system, which is operated by West Shore Environmental Services, a division of Corix Utilities. (link)

Surrey

In areas that cannot be serviced by the City's gravity sanitary sewer network, low pressure sewer systems are used. Surrey has a few areas with LPS systems, with the largest being in the Bridgeview neighbourhood. (link)

Port Orchard, WA

The Beach Drive community of 200+ homes was faced with a similar problem to Royston and Union Bay—septic systems were failing, causing a health issue and impacting shellfish resources in Puget Sound. Upon review of four options for sewer servicing in the Beach Drive area, a low pressure sewer grinder pump system ranked the highest, due to low capital costs and minimized operations and maintenance costs. A follow up study after seven years of operation found that service call frequency was considerably less than anticipated when planning the project. (link)