

A Rainwater Management Strategy For The Comox Valley Regional District Electoral Areas

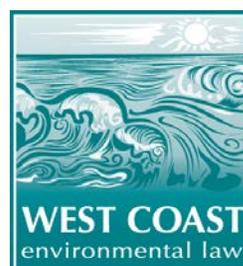
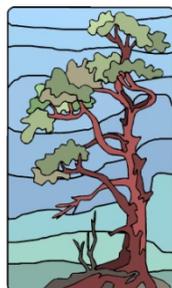


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Executive Summary

The Comox Valley Regional District (CVRD) continues to attract new residents, and incremental development and re-development is ongoing in the rural areas. In addition, there are three rural “core settlement areas” described in the Regional Growth Strategy (2010), where 90% of new development is expected to occur. The CVRD is aware that runoff from existing development is causing problems in some areas, and that increasingly dense development will only exacerbate these problems. The District has made it a priority to determine how they might take a more integrated, watershed-based approach to rainwater management.

This report builds on initial work done in 2012 and early 2013, which examined existing bylaws, policies and procedures to determine whether the CVRD was exercising due diligence with respect to rainwater management. The resulting February 2013 report identified gaps in rainwater management and provided some recommended options, including the development of a rainwater management strategy

This current report outlines a rainwater management strategy. The deliverables include:

- i) Providing draft wording for rainwater management, for the Rural Official Community Plan update to occur in 2014 (see Appendix One).
- ii) Assisting with collaboration between the Ministry of Transportation and Infrastructure (MOTI) and the CVRD, to address rainwater management issues.
- iii) Law and policy recommendations from West Coast Environmental Law, aimed at improving the way that rainwater is managed in the electoral areas.
- iv) Further development of a proposed rainwater management pilot project.
- v) Recommended next steps in the short, medium and long term, including implications for staffing and budgets.

The short, medium and long term recommendations will help ensure that rainwater is well managed within the rural areas of the CVRD, for the protection of private property and the receiving environment. A longer-term ambition is to foster and participate in multi-party efforts to maintain healthy watersheds throughout the Comox Valley. This type of collaboration has already begun through the CVRD’s involvement in CAVI (Convening for Action on Vancouver Island), where the regional working group is seeking funding to begin a watershed management pilot project for the Brooklyn Creek Watershed, starting in 2014.

The following are the suggested next steps to develop and implement a rainwater management strategy in the short, medium and long term.

Short term (2014 – 2016)

1. Develop watershed-specific targets using the Water Balance Methodology, working in cooperation with the CVRD municipalities and possibly MOTI;
2. Create language, performance standards and a process for a subdivision and development servicing bylaw for the core settlement areas, and relevant updates to the CVRD building bylaw. This will provide the basis for development servicing agreements and will include :
 - a. performance standards and design criteria;
 - b. requirements for the property owner to grant rights of way to accommodate ongoing operation, maintenance and replacement of rainwater infrastructure (and/or requirements for s.219 covenants to secure on-site infiltration and detention facilities);
 - c. erosion and sediment control requirements during construction;
 - d. a process that links the issuance of building permits to site servicing, to ensure that rainwater infrastructure complies to the subdivision and development servicing bylaw;
 - e. a review of CVRD administrative processes to determine future roles and responsibilities with respect to inspection and monitoring of rainwater management systems;
 - f. investigation and establishment (as appropriate) of a local service area(s) for ongoing monitoring and maintenance of offsite rainwater management works that service new subdivisions. This task will also require coordination with MOTI.
3. Include language in the 2014 Official Community Plan update that requires developers to prepare detailed watershed or hydrologic studies that can inform rainwater management approaches in new subdivisions, either in subdivision servicing regulations, or by creating Development Approval Information Areas. These studies should incorporate and be compatible with the watershed targets developed using the Water Balance Methodology referred to Item #1. (Draft rainwater management-related OCP language is attached as Appendix One to this document.)

4. Continue to work with the CVRD municipalities under the CAVI (Convening for Action for Vancouver Island) umbrella, including work to begin a watershed management plan (and a planning process) for the Brooklyn Creek watershed.
5. Develop a regionally-specific version of the Water Balance Model Express, and use it as a tool for public education and as part of a checklist in the building permit process.
6. Create a development permit area for watercourses that includes all riparian areas, and all parcels of land that include riparian areas;
7. Review existing CVRD floodplain regulations in light of climate change projections related to sea level rise and increased risk of extreme precipitation events, and update floodplain mapping and floodplain construction requirements.

Medium term (2016 – 2018)

8. Enact the subdivision and development servicing bylaw and associated service area(s) for monitoring and maintenance of works.
9. Together with other local governments and stakeholders, developers and landowners, create a watershed management plan for a high priority watershed(s) (e.g. Brooklyn Creek Watershed), as the first step of a region-wide watershed management strategy.
10. Gather information on the current condition of CVRD watersheds, through expert studies and by working with local groups and municipalities.
11. Identify areas within the CVRD that may be subject to erosion and landslip hazards, and establish tree cutting permit areas and natural hazard development permit areas (DPAs).
12. Establish topsoil requirements that will apply to all development and re-developments within the CVRD, and which specify both the depth and quality of soil to be used.

Long term (2018+)

13. Maintain current minimum parcel sizes in rural areas, that is, for hectares, or two hectares in particular circumstances, and place a cap on the number of two- and four-hectare parcels that can be created.
14. Consider processes to regulate and require onsite rainwater management for lands within the rural areas.
15. Explore the creation of a region-wide service area for water stewardship that would include research, planning and public education. This will allow for longer term planning, capacity building, assessment of priority areas, coordination with member municipalities, and assist in building public support for action. One of the outcomes of this service could be a region-wide integrated watershed management strategy.
16. Together with the CVRD municipalities, K'omox First Nation, local non-governmental groups, community members, developers and landowners, develop a region-wide integrated watershed management strategy and associated actions.
17. Develop a region-wide design and policy manual for rainwater management.

Some of the above actions will be accomplished by existing CVRD staff members. Other tasks will require outside expertise. For immediate planning purposes, a draft budget has been developed for the short term actions requiring outside expertise. In the time period between 2014 and 2018, a budget in the range of \$75,000 can be expected. More information will be required to determine the exact cost of these activities. Starting in the medium term, most costs will be of an ongoing, operational nature and these costs cannot be estimated at this time. In the medium to long term, it's possible that an additional watershed management and planning service area(s) will be established, as required.

1. Introduction

The Comox Valley Regional District (CVRD) continues to attract new residents, and small subdivisions and other developments and redevelopments are ongoing in the rural areas of the District. As well, three areas are identified in the Comox Valley Regional Growth Strategy (2010) as “core settlement areas”, where a significant amount of new housing will likely be built. 90% of development is expected to occur in these core settlement areas within the District.

Runoff from development is currently causing problems in some areas of the District, with erosion, flooding, slope stability issues, public safety concerns, water quality impacts and private property damage being brought to the CVRD’s attention. Given these concerns and the ongoing nature of development, the District has made it a priority to review how runoff and drainage is currently managed, and to determine how the CVRD might take a more integrated, watershed-based approach to rainwater management.

In general, urbanization has well-documented negative effects on the surrounding stream networks and the life they support. The streams in the Comox Valley are no exception. Managing rainwater (stormwater) properly and preserving and restoring aquatic and riparian ecosystems are objectives of both the Regional Growth Strategy and the Comox Valley Regional Sustainability Strategy (2010).

The CVRD currently controls some aspects of rainwater management, particularly when rezoning or development permits are required. However, the current rainwater-related requirements vary in scope and effectiveness, and their limited geographical application does not allow the CVRD to manage rainwater in a consistent or comprehensive manner.

A note on terminology:

“**Rainwater management**” is the term used in this report. This reflects the current goal to manage most rain where it falls, rather than allowing it to become problematic “runoff” or drainage from developed areas.

“**Stormwater**” is a commonly used term to describe the runoff or drainage from developed areas.

For subdivision applications where the correct zoning is in place, the Ministry of Transportation and Infrastructure (MOTI) reviews and approves the detailed subdivision designs, including roads and drainage works.¹ The CVRD is in an advisory role, except for any requirements imposed via development permits.

¹ Note: The MOTI has jurisdiction over road drainage, among other things. Neither the CVRD nor the MOTI oversee the drainage infrastructure built on the individual lots that result from subdivision. More detail on current land development processes and standards of practice can be found in the following report: *Partnership for Water Sustainability in BC. 2012. Primer on Land Development Process in BC: Industry Standards of Practice in Implementing Rainwater Management. September 2013.* http://waterbucket.ca/wp-content/uploads/2012/05/4_Primer-on-Land-Development-Process-in-BC_September-2013.pdf

A February 2013 report by Fernhill Consulting and West Coast Environmental Law² gives more detail on the CVRD's current rainwater management practices. The report concluded that there are gaps in rainwater management that the CVRD can help address, and gave a list of possible next steps, including the further development of a rainwater management strategy.

This current report outlines a rainwater management strategy to ensure that rainwater is well managed within the rural areas of the CVRD, for the protection of private property and the receiving environment. A longer-term ambition is to foster and participate in multi-party efforts to maintain healthy watersheds throughout the Comox Valley. This requires a shift in thinking and a more coordinated approach to action, but does not necessarily involve any increase to the cost of new development in the Comox Valley. This type of collaboration has already begun through the CVRD's involvement in CAVI (Convening for Action on Vancouver Island), where the regional working group is seeking funding for a watershed management pilot project on the Brooklyn Creek Watershed, starting in 2014.

2. Project Scope

Fernhill Consulting and West Coast Environmental Law were engaged to develop a rainwater management strategy for the Comox Valley Regional District electoral areas. Fernhill Consulting focused on the coordination and technical tasks while West Coast Environmental Law addressed the legal and policy aspects. Fernhill Consulting and West Coast Environment Law worked together to develop recommendations and next steps. The project included:

- i) Providing draft wording for rainwater management, for the Rural Official Community Plan update to occur in 2014 (see Appendix One).
- ii) Assisting with collaboration between the Ministry of Transportation and Infrastructure (MOTI) and the CVRD, to address rainwater management issues.
- iii) Law and policy recommendations from West Coast Environmental Law, aimed at improving the way that rainwater is managed in the electoral areas.
- iv) Further development of a proposed rainwater management pilot project.

² Gower, Tanis. 2013. Rainwater management in the Comox Valley Regional District electoral areas: current practices and future options. Prepared by Fernhill Consulting for the Comox Valley Regional District, February 2013. (*This report includes a legal and policy review provided in 2012 by Deborah Carlson of West Coast Environmental Law.*)

v) Recommended next steps in the short, medium and long term, including implications for staffing and budgets.

3. Wording for the Official Community Plan 2014 update

Draft wording was developed to guide the management of watersheds, coastlines and floodplains. It is expected that this wording will be incorporated as appropriate into an Official Community Plan (OCP) update occurring in 2014.

The draft OCP wording was based on current best practices as well as guidance from the following documents:

- Comox Valley Regional Growth Strategy (2010)
- Comox Valley Sustainability Strategy (2010)
- Existing Comox Valley Rural OCP language (1998)

It's important to note that some of the relevant guidance from the Regional Growth and Sustainability Strategies is informed by the document "Nature Without Borders – The Comox Valley Land Trust Regional Conservation Strategy" (2008). This document was endorsed by the CVRD board and local municipal councils in 2008. Nature Without Borders was updated in 2013, thus some terminology used in the draft OCP language (Appendix One) is from the most recent version.

Other information sources reviewed in the preparation of the draft language included:

- Ongoing work with the regional Convening for Action on Vancouver Island (CAVI) group, including the draft document, "A Guide to Waterwise Development"
- Draft performance standards from the Cowichan Valley Regional District Water Balance Model Express (beta version).
- OCP language from the following jurisdictions: Cumberland draft OCP (2013), Town of Comox OCP (2011), City of Courtenay OCP (2011), Metro Vancouver's Integrated Liquid Waste Resource Management Plan, District of North Vancouver OCP (2011), City of Coquitlam OCP (2011), Tofino draft OCP language.
- The Capital Regional District's proposed Integrated Watershed Management Program Plan (2008).
- Draft Courtenay River Estuary Management Plan (2000)
- Keeping it Living: A Vision and Guiding Principles for the Courtenay River Estuary (2009)
- Millard-Piercy Watershed Gap Analysis (2009)
- Nature Without Borders (Comox Valley Conservation Strategy) second edition (2013) and first edition (2008)
- Comox Valley Regional District (January 2011). A Natural Selection: Rural Comox Valley Parks and Greenways Strategic Plan 2011-2030

- CVRD corporate climate action plan
- NE Comox Neighbourhood Stormwater Management Plan - Phase 1 of 3 (2013)

The following subject areas were not part of the scope of work but are related. These may require additional goals, objectives, policies and/or implementation actions.

- “Greenhores” approaches to coastline management and development
- Form of development – land use patterns and appropriate servicing
- Natural hazards (floodplain, steep slopes, coastal erosion, wildfire)
- Tree retention (tree cutting permit areas/covenants)
- Carbon sequestration or off-sets as part of a greenhouse gas emission reduction strategy under the BC Climate Action Charter and the Zero Net Deforestation Act. (This may include estuary restoration or preservation/restoration of forested areas.)
- Management and preservation of natural areas and ecosystem services (priority ecological areas) within parks, open spaces and recreational greenways
- Groundwater protection (for water quality/safe drinking water and water quantity, as well as provision of base flows to streams), including aquifer mapping, studies and risk assessments, and managing the impact of septic systems
- Water conservation, rainwater harvesting and grey water re-use; sewage infrastructure
- Protecting water quality in drinking water supply watersheds
- Specific water quality measures for Baynes sound
- Managing invasive non-native plants and animals
- Managing runoff, erosion and sediment during construction
- Climate change mitigation (greenhouse gas reduction) and climate change adaptation for sewage and solid waste.
- Agricultural land uses and their effect on riparian buffers and water quality and quantity.

Note: surface water quality is not explicitly addressed in the draft OCP wording because water quality is usually protected if onsite rainwater management is put in place in developing areas. Further measures (e.g., managing sediment and erosion) will be required to protect surface water quality during development.

Coastal shorelines (coastlines) were included in the goals for their relevance to climate change adaptation and shared responsibility, but this aspect may need further development. For example, The Comox Valley Sustainability Strategy refers to exploring the Green Shores rating system for shoreline development. It also suggests revising development regulations and zoning for the estuary. The current (1998) OCP has a development permit area for shoreline protection devices (DPA #18) that could be updated to include environmental and climate change related concerns.

The draft OCP wording is attached as Appendix One.

4. Collaboration with the Ministry of Transportation and Infrastructure

The Ministry of Transportation and Infrastructure (MOTI) and the Comox Valley Regional District (CVRD) have shared interests and jurisdiction for managing rainwater and stormwater in the Comox Valley Region. In particular, the MOTI is in charge of subdivision approvals and the CVRD provides recommendations to this process. MOTI's jurisdiction with respect to subdivisions includes road drainage along with many other considerations. The CVRD provides zoning and building permits for the individual lots within the newly created subdivisions. These developments may also be subject to one or more development permits to be issued by the CVRD.

The CVRD and the MOTI are developing a process to guide closer collaboration. This may eventually result in new procedures and a greater joint capacity for managing rainwater and stormwater in the region. Fernhill Consulting has provided some information to a new joint committee, which began meeting in late 2013.

5. Law and policy recommendations for rainwater management

West Coast Environmental Law ("West Coast") was asked by Fernhill Consulting to prepare a list of law and policy recommendations for integrating rainwater management practices³ into development and re-development of lands within the Comox Valley Regional District (CVRD) outside municipal areas. In preparing these recommendations West Coast reviewed relevant CVRD bylaws, obtained information from Tanis Gower, Fernhill Consulting about CVRD policies and practice, reviewed examples from other jurisdictions, and held two afternoon meetings with CVRD staff to discuss, respectively, rainwater management approaches in general, including a demonstration of the Water Balance Model Express, and practical application of rainwater management in the CVRD, taking into account existing and proposed land use within the district, current practices and capacity, and availability of data regarding watershed function. West Coast also consulted Jim Dumont, P.Eng. and Water Infrastructure Specialist, to obtain advice about the technical information and standards which be necessary to inform any law or policy framework that would be adopted by CVRD. Mr. Dumont has also provided information about practical and administrative aspects of implementing the law and policy framework required to manage rainwater on and offsite.

³ These practices were described in a previous report prepared for CVRD in 2012, which was included in Fernhill Consulting's February 2013 report.

After a brief summary of this technical information and standards, West Coast discusses a number of possible steps with respect to land use planning and regulation, in addition to the Official Community Plan amendments and increased collaboration with the Ministry of Transport and Infrastructure outlined in other sections of this report. It should be noted that the options described by West Coast Environmental Law are necessarily limited to legal advice about how CVRD land-use planning and regulatory powers might be used to implement rainwater management approaches within the CVRD. This legal advice does not address the appropriateness or likely effectiveness of any particular technical measure or standard that is used or adopted or may be used or adopted by CVRD for the purpose of rainwater management and related objectives.

5.1 Technical prerequisites for rainwater management in the CVRD

Developing an integrated approach to rainwater management involves looking at a watershed as a system, and understanding how existing natural and manmade components of the watershed interact. This understanding can then be used as the basis for developing tools and policies to manage the watershed in a coordinated way to address a range of issues including not only drainage, but also environmental protection, water quality, slope stability, agriculture, and others.⁴ As well, as previous studies have indicated,⁵ climate change impacts such as increased precipitation and sea level rise may have, now and more so in the future, a significant impact on flooding events in the region, and these factors may be relevant over the longer term as well.

Translating this information into practical requirements means developing watershed-specific targets to manage the complete rainfall spectrum, not just storm events. Using the Water Balance Methodology⁶ these targets can be set at a level that not only provides future flood protection, but also meet rainwater management requirements and supports healthy watershed function as described above.

In terms of the process undertaken to develop watershed targets, there is potential for significant variation in scope of the investigation and the amount of consultation with stakeholders. An estimated cost to prepare this type of study for CVRD, based on existing levels of physical information available at a watershed level, that would be sufficient to inform the rainwater management options described below over the short

⁴ The Regional Growth Strategy (RGS) recognizes the need to acquire information relevant to rainwater management. See Goal 3.7, recommended policy: “Work with the development community to establish and adopt progressive stormwater/rainwater management practices, based on integrated watershed management plans, including source controls and treatment systems in all new development, where appropriate, including use of the Water Balance Model (www.waterbalance.ca).”

⁵ Northwest Hydraulic Consultants, *Tsolum River Flood Hydrology Investigation*, June 2011.

⁶ See, for example, *Water Balance Methodology: Integrating the Site with the Watershed and the Stream* <http://www.waterbucket.ca/cfa/sites/wbccfa/documents/media/555.pdf>

and medium term is included in the Resource and Budgeting Implications in section 7 of this report.

There may also be opportunities in the development process to require that property owners provide some relevant information, as discussed below.

At the subdivision and site level, watershed targets and rainwater management objectives need to be reflected in performance standards, standard details and/or design criteria. Ideally this would be coordinated by CVRD with the municipalities in the region to avoid a multiplicity of standards and an eventual race to the bottom. This would mean an agreement on a single set of standards. As well, regarding flood protection in areas other than floodplain the design standards included in standards applicable to subdivisions and roadways should be included.⁷

To address single parcel developments in rural areas, the use of the Water Balance Model Express could be explored⁸, informed by the watershed targets outlined above, and in cooperation with the Convening for Action on Vancouver Island process and the Water Sustainability Partnership.⁹

It is important to note that watershed targets, performance and design standards, and solutions to guide rainwater management on single parcels are relevant not only for CVRD, but also the municipalities of Comox, Courtenay and Cumberland and possibly MOTI as well. Costs associated with producing these technical requirements may potentially be shared among these authorities.

5.2 Opportunities for rainwater management in the CVRD

Development and re-development activity within the CVRD outside municipalities appears to be focused in two areas: new subdivision developments within the three core settlement areas designated in the RGS, and development and re-development activities on single parcels within the rural areas, where minimum parcel sizes are set at two hectares.¹⁰

⁷ BC Supplement to Transport Association of Canada Geometric Design Guide, 2007 edition. http://www.th.gov.bc.ca/publications/eng_publications/geomet/TAC/TAC_2007_Supplement/Ch1000-2007.pdf

⁸ The Water Balance Model Express (WBM Express) is a user friendly application that facilitates rainwater management at the site level. The WBM Express enables users to assess how well different site designs and measures meet three performance targets: baseflow release rate, storage volume and infiltration area. See *Water Balance Model Express for Landowners*, online at http://waterbucket.ca/cfa/files/2013/06/8_Hastings-Blueprint_WBM-Express-for-Landowners_May-2013.pdf

⁹ <http://waterbucket.ca/viw/2012/08/25/home-cavi-convening-action-vancouver-island/>

¹⁰ See RGS, Section 4, Managing Growth, 4.5 Rural Areas.

The recommendations below are divided into three types of measures:

1. Specific to core settlement areas;
2. Specific to single parcels in rural areas; and
3. Of general application throughout the unincorporated areas of the CVRD.

Each measure and a discussion of its authority and application are discussed below.

A note on legal authority of regional districts to support and regulate rainwater management

Regional districts have a variety of legal powers, including Part 26 Planning and Land Use Management powers related to zoning, subdivision and site servicing, development permitting, landscaping, parking, erosion control, and run-off, as well as powers related to the regulation of drainage, soil deposit and removal, and building and other types of permitting that can be used to implement aspects of rainwater management.

5.3 Analysis and recommendations for rainwater management in the CVRD

5.3.1 Core Settlement Areas

The Regional Growth Strategy (RGS) identifies core settlement areas and notes that 90% of development is expected to occur in these areas. The core settlement areas include three settlement nodes: Union Bay, Saratoga Beach and Mount Washington.

Recommendations for Core Settlement Areas:

1. Adopt a subdivision and development servicing bylaw that will incorporate design criteria and performance standards for rainwater management for subdivisions and on-site, applicable to core settlement areas, and implement the requirements of the bylaw through development servicing agreements¹¹;
2. Where the scale of development allows, consider requiring that developers prepared detailed watershed studies or obtain other locally relevant information (incorporating the watershed targets prepared for CVRD, as discussed in section 7) that can support rainwater management

¹¹ See *Local Government Act*, RSBC 1996, c.353, s.940(2)(b). A development servicing agreement between a developer and a local government, including the provision of security, enables construction to begin (i.e. the issuance of a building permit) while providing assurance that all required site servicing requirements will be completed by the developer. Otherwise the developer would be required to complete site servicing before construction, which may not be practical, particularly in the case of rainwater management techniques which often involve landscaping.

- approaches in new subdivisions. This can be required either through a subdivision and development servicing bylaw or by creating development approval information areas;
3. Require that the property owner grant rights of way to the CVRD to allow operation, maintenance and replacement of rainwater infrastructure as appropriate and/or require s.219 covenants to secure on-site infiltration and detention facilities;
 4. Require erosion and sediment control through development agreements, and through the creation of a bylaw;
 5. Establish local service area(s) for ongoing monitoring and maintenance of offsite works that serve the subdivision; and,
 6. Link the building permit approval process to the construction of servicing requirements, and require security from property owners.

Discussions with staff confirmed that intensive development of core settlement areas is proceeding or will be proceeding, at the scale of subdivisions. Zoning in these areas to date appears to be for comprehensive development, i.e. Kensington Comprehensive Development Zone (K-CD), Saratoga Beach Estates Comprehensive Development Zone One (SBE-CD1), and Mountain Washington Comprehensive Development Zone (MTW-CD).¹² Provisions in two of these comprehensive development zones suggest that “on-site stormwater detention” is being encouraged, but not mandated. See for example: (K-CD, e.g. 1102.4, Mixed-Residential (MR), s. 4, Sustainability Requirements), and plans for on-site stormwater retention ponds (SBE-CD1, Appendix 1). However, it does not appear that these subdivision developments are being required to meet performance standards with respect to rainwater management that would ensure surface flow, interflow and groundwater flow to maintain or mimic the natural hydrologic regime.¹³

At present CVRD has no subdivision and development servicing bylaw applicable to these core settlement areas, either for works designed to address rainwater management on individual parcels or at the scale of a subdivision. In the absence of regulation of site and subdivision servicing by CVRD, these areas are subject to the *Local Services Act*¹⁴ and Regulations, as applied by the approving officer at the time of subdivision.¹⁵ Those regulations primarily address natural hazards and public safety.¹⁶

¹² Bylaw No. 2781, Comox Valley Zoning Bylaw, 2005.

¹³ Master development agreements for the comprehensive development zones identified have not been reviewed in the preparation of this analysis.

¹⁴ RSBC 1996, c. 276

¹⁵ According to the Subdivision Regulations, BC Reg 262/70, subdivision may be refused where the approving officer finds that the proposed subdivision (a) contains

(i) land which is subject to erosion, or

(ii) a parcel which is divided by land subject to erosion into areas not suited to the use to which it is intended,

(b) contains land which

(i) may slip when developed, used or occupied,

(ii) when developed, used or occupied may cause land on an adjacent parcel to slip, or

Site requirements are dealt with through the CVRD building inspection service, but are limited to the requirements set out in the Comox Valley Regional District Building Bylaw.¹⁷ Generally these requirements relate to public safety and the protection of property.

However, relying on the regulatory powers provided in the *Local Government Act*¹⁸, ss. 694 and 938, the CVRD can adopt requirements for on-site servicing such as rainwater management performance standards that must be achieved before a building permit can be issued.¹⁹ Sequencing needs to be considered. Rainwater management techniques typically involve landscaping, and it may not be practical to undertake these measures prior to building construction. To address this issue CVRD can require security and a service agreement that confirms that these works will be completed by the property owner at a later date.²⁰

To the extent that offsite works such as rain gardens, street trees, ponds, pipes, etc. will be located on Crown land or MOTI rights of way, ongoing operating, maintenance and replacement costs will most likely need to be addressed by the CVRD through the creation of a local service area, subject to agreement by MOTI that CVRD will undertake ongoing management of these works. Annual levies or parcel taxes for properties within the service area would be set to cover costs. However, in accordance with the subdivision servicing and development servicing bylaw the developer-owner would be responsible for construction costs of on- and off-site works.

Other regional districts that have adopted subdivision and development servicing bylaws include the Squamish-Lillooet Regional District (SLRD), the Regional District of Central Okanagan and the Regional District of Nanaimo. The SLRD has taken the step of requiring proponents of new subdivisions to prepare and pay for integrated stormwater management plans for the watershed where the subdivision will be located, if one has not already been done.²¹ Relevant information can also be obtained through Development Approval Information Areas.²²

(iii) may be inundated by a land slip if land above on another parcel slips,

(c) contains land which is subject to flooding so as to render it unsuitable for the use to which it is intended, or

(d) contains land which because of inadequate drainage is not suitable for the use to which it is intended.

¹⁶ With respect to off-site drainage, the Approving Officer should also be taking into consideration the specifications in the BC Supplement to Transport Association of Canada Geometric Design Guide, 2007 edition.

http://www.th.gov.bc.ca/publications/eng_publications/geomet/TAC/TAC_2007_Supplement/Ch1000-2007.pdf

¹⁷ Bylaw No. 142, 2011.

¹⁸ RSBC, 1996, c.323.

¹⁹ s.938(7), s.940.

²⁰ S.940.

²¹ SLRD, Electoral Area D Subdivision and Development Servicing (Planned Communities) Bylaw No. 741, 2002, Schedule A, 3.3.2. "A subdivision will not be permitted until an ISWMP addressing engineering,

Further examples of subdivision and development servicing bylaws that incorporate performance standards and information from watershed studies include the District of North Vancouver, the City of Coquitlam, and the City of Surrey.

The regulation of erosion and sediment control is a critical part of a rainwater management strategy. The CVRD can specify requirements related to erosion and sediment control as part of a development services agreement for a subdivision, but may also use its power to regulate run-off in the *Local Government Act*,²³ s.907 to specify how “an owner of land who carries out construction of a paved area or roof area, manage[s] and provide[s] for the ongoing disposal of surface runoff and storm water.” Regional districts also have the power to impose fines, penalties and costs for the purposes of enforcing bylaws, and a related power to enter property for inspection purposes.²⁴

5.3.2 Rural Areas

The RGS anticipates that 10% of future population growth within the CVRD will occur in Rural Areas. While this is a relatively small proportion of overall growth, it is nonetheless recognized that development in rural areas over time has a cumulative effect on the watershed where it occurs, and in the interest of reducing flood risks and protecting downstream habitat it is important to address rainwater management in this rural context as well.

Recommendations for Rural Areas

1. Maintain current zoning and do not allow parcel sizes smaller than four hectares (two hectares in certain circumstances), and place a cap on the number of parcels that can be created at these minimum sizes;
2. Develop a regionally specific version of the Water Balance Model Express, and use it as a tool for public education and as part of a checklist in the building permit process.
3. Conduct a feasibility study to determine:

planning and environmental concerns has been completed for the watershed in which the land is situated. If an ISWMP has not previously been completed for that watershed, the Owner will be responsible for the costs of preparing one for the entire watershed in which the proposed subdivision or development is situated. The process must follow that described in the GVRD publication "Integrated Stormwater Management Planning - Terms of Reference Template" amended appropriately to the requirements of the Squamish Lillooet Regional District."

²² *Local Government Act*, RSBC 1996, c.353, ss. 920.01, 920.1.

²³ RSBC, 1996, c.323.

²⁴ *Local Government Act*, RSBC 1996, c. 353, ss. 266, 268.

- a. impacts of on-site rainwater management in Rural Areas at site and watershed level, taking into account the Water Balance Methodology²⁵ and,
 - b. appropriate measures to promote use of the Water Balance Model Express within the CVRD.
4. Regulate run-off, including erosion and sediment control, over the longer term, through a bylaw under s. 907, for example.²⁶

Land use planning and regulation is an important aspect of rainwater management because it shapes development at the watershed scale. One of the key land-use tools available to CVRD that can have an impact at this scale is zoning. The RGS acknowledges existing pressure to subdivide lands within Rural Areas, but notes that this may compromise the valued rural character of Rural Areas. The RGS specifies minimum lot sizes to be included in the Comox Valley Rural OCP, ranging from four - 20 hectares, or as small as two hectares where opportunities for intensive small-scale farming can be demonstrated. The RGS also promotes an overall cap on the number of two-hectare lots within the CVRD. Without appropriate data specific to the CVRD it is not possible to gauge the impact of lot size and accompanying levels of development in rural areas on the natural hydrologic regime. Nonetheless, without that data, a precautionary approach would suggest that the RGS policies related to minimum lot size should be rigorously implemented.

At the site level, although in principle it is possible to enact regulations, it appears challenging to propose a regulatory approach to on-site rainwater management for lands within the Rural Areas that can be effective in the CVRD at present. For example, the CVRD has the power to regulate run-off, and set requirements and performance standards for run-off, but does not appear to have enough relevant information about watershed impacts and area-specific concerns such as high water tables and impacts of onsite infiltration on septic systems. Further, it is assumed that owners of single parcels in the Rural Areas do not have expertise in rainwater management techniques, and it may be cost-prohibitive for this group of property owners to engage a consultant.

The Water Balance Model Express²⁷ is a tool that allows property owners to decide their own approach to onsite rainwater management. Owners supply a minimum amount of information about the site and their proposed rainwater approaches, and the tool allows the property owner to tailor their on-site plans to meet overall targets. Being able to specify that property owners use this tool or something similar would enable the CVRD to regulate onsite rainwater management through permitting.

²⁵ See, for example, Partnership for Water Sustainability in BC, *Water Balance Methodology, Integrating the Site with the Watershed and the Stream*, March 2012. Available online at <http://www.waterbucket.ca/cfa/sites/wbccfa/documents/media/555.pdf>

²⁶ *Local Government Act*, RSBC 1996, c. 353.

²⁷ Before the Water Balance Express could be used in the CVRD, it would need to be modified for CVRD conditions.

With this type of information available the CVRD could use its planning and land-use tools to regulate run-off.²⁸ An example of the regulation of rainwater management using the power related to run-off and drainage is the Surface Water Management Plan Bylaw developed by the District of Central Saanich.²⁹

5.3.3 General

In addition to targeted approaches tailored for areas that will experience denser development and rural areas where growth is expected to be accommodated, there are also region-wide issues related to rainwater management and watershed health that the CVRD should take into consideration.

Recommendations – General

1. Gather information on the current condition of CVRD watersheds, through expert studies as described in s. 5.1 and by working with local groups and municipalities;
2. Create a development permit area (DPA) for watercourses that includes all riparian areas, and all parcels of land that include riparian areas;
3. Identify areas within the CVRD that may be subject to erosion and landslip hazards related to natural topography and possibly land clearing or disturbance, and, consider establishing tree cutting permit areas and natural hazard DPAs;
4. Establish topsoil requirements that will apply to all development and re-developments within the CVRD, and which specify both depth and quality of soil to be used, and implement requirements through subdivision and development servicing regulation or landscaping requirements; and
5. Review existing CVRD floodplain regulations in light of climate change projections related to sea level rise and increased risk of extreme precipitation events, and update floodplain mapping and floodplain construction requirements.

As noted above, in order to be effective, regulation of rainwater management needs to be informed by relevant information. Further studies focused on information needed for implementation of rainwater regulation should be undertaken.

²⁸ LGA, s.909.

²⁹ District of Central Saanich, Bylaw No.1606, 2010.

6. A rainwater management pilot project

The CVRD wishes to develop a rainwater management pilot project to facilitate learning and capacity building. Currently there are limited opportunities for the District to take the lead in such a project, due to their lack of jurisdiction over roads and subdivisions. Thus the District wishes to collaborate with the MOTI and a developer on the next major subdivision to occur in an electoral area. A “green streets” approach would be explored, and individual lot drainage may also be addressed.

This type of collaborative project would be fairly unique. However, Fernhill Consulting has consulted with a major funder, the Federation of Canadian Municipalities’ Green Municipal Fund (GMF), to determine whether such a project would be supported. GMF personnel have indicated that this project would be eligible for funding under their current criteria.

To be eligible for Green Municipal Fund support, any rural “green streets” or “green subdivision” pilot project must:

- Have the CVRD as the main proponent;
- Meet stringent performance standards for rainwater management, and
- Fund consultant’s fees and not staff time.

Other funding sources may also be available. For example, a provincial Infrastructure Study Grant could provide \$5,000 to \$10,000 towards a pilot “green streets” project.

7. Next steps

7.1 Recommendations

The following are suggested next steps to develop and implement a rainwater management strategy in the short, medium and long term.

Short term (2014 – 2016)

1. Develop watershed-specific targets using the Water Balance Methodology, working in cooperation with the CVRD municipalities and possibly MOTI.
2. Create language, performance standards and an administrative process for a subdivision and development servicing bylaw for the core settlement areas, and relevant updates to the CVRD building bylaw. This will provide the basis for development servicing agreements and will include:
 - a. performance standards and design criteria related to rainwater management;
 - b. requirements for the property owner to grant rights of way to accommodate ongoing operation, maintenance and replacement of rainwater infrastructure (and/or requirements for s.219 covenants to secure on-site infiltration and detention facilities);
 - c. erosion and sediment control requirements during construction;
 - d. a process that links the issuance of building permits to site servicing, to ensure that rainwater infrastructure complies to the subdivision and development servicing bylaw;
 - e. a review of CVRD administrative processes to determine future roles and responsibilities with respect to inspection and monitoring of rainwater management systems; and
 - f. investigation and establishment (as appropriate) of a local service area(s) for ongoing monitoring and maintenance of offsite rainwater management works that service new subdivisions. This task will also require coordination with MOTI.
3. Include language in the 2014 Official Community Plan update that requires developers to prepare detailed watershed or hydrologic studies that can inform rainwater management approaches in new subdivisions, either in subdivision servicing regulations, or by creating Development Approval Information Areas. These studies should incorporate and be compatible with the watershed targets

developed using the Water Balance Methodology referred to Item #1. (Draft rainwater management-related OCP language is attached as Appendix One to this document.)

4. Continue to work with the CVRD municipalities under the CAVI (Convening for Action for Vancouver Island) umbrella, including work to begin a watershed management plan (and a planning process) for the Brooklyn Creek watershed.
5. Develop a regionally-specific version of the Water Balance Model Express, and use it as a tool for public education and as part of a checklist in the building permit process.
6. Create a development permit area for watercourses that includes all riparian areas, and all parcels of land that include riparian areas.
7. Review existing CVRD floodplain regulations in light of climate change projections related to sea level rise and increased risk of extreme precipitation events, and update floodplain mapping and floodplain construction requirements.

Medium term (2016 – 2018)

8. Enact the subdivision and development servicing bylaw and associated service area(s) for monitoring and maintenance of works.
9. Together with other local governments and stakeholders, developers and landowners, create a watershed management plan for a high priority watershed(s) (e.g. Brooklyn Creek Watershed), as the first step of a region-wide watershed management strategy.
10. Gather information on the current condition of CVRD watersheds, through expert studies and by working with local groups and municipalities.
11. Identify areas within the CVRD that may be subject to erosion and landslip hazards, and establish tree cutting permit areas and natural hazard development permit areas (DPAs).
12. Establish topsoil requirements that will apply to all development and re-developments within the CVRD, and which specify both the depth and quality of soil to be used.

Long term (2018+)

13. Maintain current minimum parcel sizes in rural areas, that is, for hectares, or two hectares in particular circumstances, and place a cap on the number of two- and four-hectare parcels that can be created.
14. Consider processes to regulate and require onsite rainwater management for lands within the rural areas.
15. Explore the creation of a region-wide service area for water stewardship that would include research, planning and public education. This will allow for longer term planning, capacity building, assessment of priority areas, coordination with member municipalities, and assist in building public support for action. One of the outcomes of this service could be a region-wide integrated watershed management strategy.
16. Together with the CVRD municipalities, K'omox First Nation, local non-governmental groups, community members, developers and landowners, develop a region-wide integrated watershed management strategy and associated actions.
17. Develop a region-wide design and policy manual for rainwater management.

7.2 Resource requirements

The following is a suggested approach that identifies new resource requirements as well as items that can be addressed with existing staff capacity.

Short term (2014 – 2016):

The following could be accomplished in whole or in large part with existing staff and existing budgets:

- Developing draft language for a development permit area for watercourses and riparian areas.
- Determining costs and logistics for a service area(s) for monitoring and maintenance of off-site rainwater works that service new subdivisions.
- Continuing ongoing work with CAVI, e.g., with plans for a Brooklyn Creek Watershed Blueprint.

The following may require additional resources, prepared by, or with the assistance of outside service providers:

- Developing watershed-specific targets using the Water Balance Methodology, working in cooperation with the CVRD municipalities and possibly MOTI;
- Incorporating watershed targets for the CVRD into the Water Balance Model Express, and operationalizing for the CVRD, to be used as a tool for public education and as part of a checklist in the building permit process.
- Performance standards for rainwater management.
- Developing draft language for a subdivision and development servicing bylaw.
- Linking the building permit process to site servicing compliance. This would entail the following: (1) reviewing CVRD administrative processes to determine capacity and future roles and responsibilities and training requirements with respect to inspection and monitoring of rainwater management systems; (2) depending on the outcome of (1), it may be necessary to identify qualifications and identify qualified service providers; and (3) create the necessary bylaws/amend existing bylaws, regulatory framework and cost recovery mechanisms.
- Reviewing and improving floodplain regulations/requirements and mapping.

It may be feasible to accomplish some of the above tasks with additional staff resources instead of outside service providers, and the CVRD will determine the most effective approach as this process unfolds.

Medium term (2016 – 2018)

The following could be accomplished in whole or in large part with existing staff and budgets:

- Creating tree cutting permit areas and natural hazard development permit areas.
- Creating a watershed management plan for a high priority watershed (e.g., Brooklyn Creek).

The following will require additional resources. For planning purposes we have assumed these resources will be supplied by an outside service provider rather than new staff, but the CVRD will determine the most effective approach for each item as the process unfolds:

- Determining compliance with the subdivision and development servicing bylaw, and issuing development permits after compliance is achieved.
- Conducting monitoring and maintenance on offsite rainwater management infrastructure.
- Working with consultants, municipalities, K’omox First Nation and local groups and individuals to obtain relevant watershed information, and using this information to understand current conditions and to inform planning and development of a watershed management plan for a high priority watershed.
- Establishing topsoil requirements (note, some of these requirements will be worked out as the subdivision and development servicing bylaw is drafted)

Long term (2018+)

The following could likely be accomplished in whole or in large part with existing staff resources:

- Maintaining current zoning and disallowing parcel sizes smaller than four hectares (two hectares in certain circumstances), and placing a cap on the number of parcels that can be created at these minimum sizes.
- Considering processes to regulate and require onsite rainwater management for lands within the rural areas.

The following would require an increase in resources:

- Ongoing work to coordinate and manage efforts to maintain and improve the health of priority and/or regional watersheds. This may include a new service area, and may include the development of a region-wide design and policy manual for rainwater management

7.3 Budget requirements

Short term

The following is a rough estimate of the funds required for outside service providers in the short term. The CVRD may determine that some tasks are better handled by staff; in that case a different cost estimate can be made. All tasks need to be better defined before a definitive cost can be attached, and the following table is for immediate planning purposes only.

Short term budget (2014 – 2016)
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Develop draft language for a subdivision and development servicing bylaw (legal and engineering costs)	\$10,000
Link the building permit process to site servicing compliance – administrative procedures and cost recovery mechanisms	\$15,000
A study to establish watershed targets using the Water Balance Methodology	\$15,000 ³⁰
Performance standards and design criteria for rainwater management	\$15,000 ³¹
Incorporate watershed targets for CVRD into WBM Express, and operationalize for CVRD, including staff education.	\$7,000 ³²
Legal costs (revisions to building bylaw, service establishing bylaw)	\$5,000 ³³
Reviewing/improving floodplain regulations/requirements and providing specifications for new mapping	\$10,000

Medium term

With the exception of establishing topsoil requirements, most medium term costs cannot be quantified at this time.

Medium term budget (2016 – 2018+)	
Establishing topsoil requirements for areas outside of settlement nodes	\$5,000
Ongoing operational and planning costs: see below	TBD

Medium term costs will primarily involve the oversight and enforcement of a new subdivision and servicing bylaw. This will be an ongoing, annual budget item. The amount of effort required will partially depend on how much development is occurring in the District. It is expected that this activity can be carried out by an outside service provider for less than it would cost to hire a dedicated staff member for this purpose.

Other medium term activities include working with other parties for watershed management planning. The CVRD is already allocating a small amount of its existing budget towards these activities as well as seeking grant funding through its membership in CAVI (Convening for Action on Vancouver Island). A watershed management function or service may be established in future.

Long term

³⁰ Note that these costs could be shared among CVRD, CVRD municipalities and possibly MOTI.

³¹ Note that these costs could be shared among CVRD, CVRD municipalities and possibly MOTI.

³² Note that these costs could be shared among CVRD, CVRD municipalities and possibly MOTI.

³³ Amount could vary depending on in-house capacity/contributions of external consultants preparing design standards, etc.

Long term resource requirements are to be determined. Costs will likely be for ongoing operations rather than one-time tasks. A new watershed management related service area(s) may be developed in the medium to long term, as required.

Appendix 1: Draft wording for the 2014 Official Community Plan Update

Official Community Plan 2013 update: Watershed and coastline management

Proposed wording for goals, objectives, policies and implementation actions

DRAFT

Goals

1. Implement rainwater management that preserves or restores the natural hydrology regime during development and redevelopment, in order to maintain and improve watershed health and protect downstream properties and infrastructure.
2. Foster shared responsibility among all levels of government and the community, for protecting and restoring watershed, estuary and coastline health.
3. Identify, protect, and where appropriate, restore the following *priority ecological areas* as identified in the Comox Valley Conservation Strategy: *aquatic habitat corridors, upland habitat corridors, sensitive ecosystems*, aquatic ecosystems, community drinking water sources and estuaries.
4. Prepare for climate change by increasing the resilience of natural systems.

Goals, objectives, policies and implementation actions

1. Implement rainwater management that preserves or restores the natural water balance during development and redevelopment, in order to maintain and improve watershed health and protect downstream properties and infrastructure.
 - a. Objective: maintain or restore the natural hydrological regime in CVRD watersheds, including natural rates of surface runoff, infiltration to shallow groundwater (interflow) and infiltration to deep groundwater.
 - b. Policy: utilize the ecological services provided by natural systems (such as rainwater interception and water quality treatment), and restore damaged watercourses wherever practical
 - c. Policy: encourage retrofitting of existing development and infrastructure to incorporate techniques that preserve or restore the natural hydrologic regime of the watershed.
 - d. Policy: hydrological studies and watershed management plans shall be required as necessary to guide major developments such as large subdivisions.

- e. Policy: on-site rainwater management will be required for all new development and redevelopment, to ensure that the pre-development (natural) hydrologic regime is maintained.
 - f. Implementation action: update bylaws, policies and procedures to support implementation of on-site rainwater management.
 - g. Implementation action: develop performance standards to mimic, preserve or restore the natural hydrologic regime through the land development or redevelopment process.
 - h. Implementation action: explore incentives and funding mechanisms for retrofitting existing development to preserve or restore the natural hydrologic regime.
 - i. Implementation action: develop an adaptive management approach to monitor, and as necessary, refine on-site rainwater management performance targets.
2. Goal: Foster shared responsibility among all levels of government and the community, for protecting and restoring watershed, estuary and coastline health.
- a. Implementation action: develop a process and/or mechanisms to work collaboratively with CVRD municipalities, provincial and federal government agencies, First Nations governments, non-governmental organizations, community members, developers and private landowners to protect and restore watershed, estuary and coastline health.
 - b. Policy: recognize and support the efforts of local non-governmental groups in promoting watershed, estuary and coastline health.
 - c. Implementation action: together with the CVRD municipalities, develop a region-wide watershed management strategy and associated actions.
 - d. Implementation action: work with CVRD municipalities and others to coordinate and prepare watershed management plans for high priority watersheds
 - e. Implementation action: develop or encourage watershed stewardship and education programs, and, where feasible, work with land owners to protect and restore the sensitive environmental and unique natural features on their land.
 - f. Implementation action: develop or identify tools, resources, workshops and education programs for local government staff, developers and the public, in order to increase capacity and shared responsibility for managing watershed, estuary and coastline health.
 - g. Implementation action: together with other local governments including the Ko'moks First Nation, commit to the principles and planning recommended in the draft Ko'moks Estuary Management Plan (2013).
3. Identify, protect, and where appropriate, restore the following *priority ecological areas* as identified in the Comox Valley Conservation Strategy: *aquatic habitat corridors, upland habitat corridors, sensitive ecosystems*, aquatic ecosystems, community drinking water sources and estuaries.

- a. Objective: cooperating with CVRD municipalities as appropriate, implement regional conservation planning throughout the CVRD using The Comox Valley Conservation Strategy's *priority ecological areas* as a framework, along with other resources and stewardship tools.
 - b. Objective: protect *priority ecological areas* through purchase, conservation covenants, voluntary protection by landowners (e.g., tax relief/exemption), dedication of park land, or through designation of development permit areas.
 - c. Objective: Further map, update and ground-truth *priority ecological areas*, through collaboration with provincial and federal government agencies, CVRD municipalities, First Nation governments, private landowners and non-governmental organizations, and as part of the development process for individual properties.
 - d. Implementation action: identify priority locations for protection and restoration and recommend conservation and management strategies and procedures.
 - e. Implementation action: monitor the implementation and effectiveness of regional conservation planning through the development and use of appropriate indicators.
4. Prepare for climate change by increasing the resilience of natural systems.
- a. Policy: design developments with nature to reduce environmental, social and economic vulnerabilities and to build community and ecological resiliency.
 - b. Objective: encourage the protection and restoration of *priority ecological areas* to increase the resilience of the natural environment.
 - c. Implementation action: assess vulnerabilities and develop strategies to address the effects of sea level rise and projected changes in precipitation on stormwater infrastructure and natural streams.
 - d. Implementation action: designate coastline and floodplain areas as Hazardous Area Development Permit Areas, and specify measures to mitigate future property damage and costs due to erosion, sea level rise, flooding, and expected increasing severity of storms.
 - e. Implementation action: review existing CVRD floodplain regulations in light of climate change projections related to sea level rise and increased risk of extreme precipitation events, and update floodplain mapping and floodplain construction requirements.
 - f. Implementation action: ensure climate change adaptation is being considered in the design of rainwater management infrastructure.

Glossary

Aquatic habitat corridors: *biodiversity corridors* designated to protect watercourses, and the wetlands and fisheries sensitive zones surrounding them. Aquatic habitat corridors include 30 meter buffers to protect and link aquatic and *riparian ecosystems*.³⁴

Biodiversity: The variety of life on earth in all its forms including genes, species, and ecosystems and the natural processes that link and maintain them.

Biodiversity corridors: the land and water pathways that link core parks and protected areas. They incorporate intact and restored ecosystems, as well as areas under human use, such as forestry and agriculture. These habitat connections are critical to maintaining health and *biodiversity* in plant and animal populations. They provide birthing and rearing spaces, and protection from predators. They include areas of public and private ownership. The two types of biodiversity corridors are *aquatic habitat corridors* and *upland habitat corridors*.³⁵

Estuary: An estuary is a partly enclosed coastal body of water with one or more rivers or streams flowing into it and a free connection to the open sea. Estuaries form a transition zone between river environments and ocean environments and are subject to both marine influences, such as tides, waves, and the influx of saline water; and riverine influences, such as flows of fresh water and sediment. These conditions make estuaries among the most productive natural habitats in the world.

Habitat refuge: a small patch of habitat that provides food, shelter and/or other needs for wildlife. Habitat refuges may include human-modified ecosystems, and generally are not large enough to maintain the genetic diversity of a population.³⁶

Habitat reservoir: a large area of relatively natural habitat that has sufficient size and ecological integrity to support a range of native species, including species that need interior habitats and those that are less tolerant of human presence. The size of the habitat reservoir depends on the species being managed. Habitat reservoirs are often hotspots of biodiversity in or near disturbed urban and rural landscapes.³⁷

³⁴ Aquatic Habitat Corridors are mapped in: Fyfe, L. 2013. Nature Without Borders Second Edition: Comox Valley Conservation Strategy. Produced by Juniper Environmental Services in collaboration with the CVCS Community Partnership.

³⁵ Definition from Fyfe 2013

³⁶ BC Ministry of Environment. 2006. Develop with Care: Environmental Guidelines for Urban and Rural Development in British Columbia.

³⁷ BC Ministry of Environment 2006.

Priority Ecological Areas: the following areas as identified in the Comox Valley Conservation Strategy³⁸: *biodiversity corridors*, *sensitive ecosystems*, aquatic ecosystems, community drinking water sources and *estuaries*.

Riparian ecosystem: a distinct ecological system surrounding streams and wetlands and delineated by site-specific vegetation, soil and elevation features. Riparian ecosystems support high levels of biodiversity, protect adjacent aquatic areas and stabilize stream banks. They are critical refuges and natural aquatic corridors for wildlife.³⁹

Sensitive ecosystems: rare, threatened and/or fragile ecosystems and other ecosystems of high biodiversity that have been identified during a Sensitive Ecosystems Inventory. For the East Vancouver Island SEI these sensitive ecosystems include the following: Coastal Bluff, Sparsely Vegetated, Terrestrial Herbaceous, Wetland, Riparian, Woodland, Older Forest, Seasonally Flooded Agricultural Fields and Older Second Growth Forests.⁴⁰

Upland habitat corridors: biodiversity corridors that provide connectivity between terrestrial ecosystems. Upland habitat corridors are mapped to recognize the existing or potential connections between *habitat refuges* and *habitat reservoirs* including core protected areas such as nature parks and conservation lands.⁴¹

Watershed Management Plan: a guidance document for managing a specific watershed, which assists local governments, landowners and others to maintain and restore watershed health. They contain high-level planning guidance as well as specific implementation items for all land users and land stewards. This guidance will typically be incorporated into local government planning documents as well as staff work-plans and budgets.

³⁸ Fyfe, L. 2013. Nature Without Borders Second Edition: Comox Valley Conservation Strategy. Produced by Juniper Environmental Services in collaboration with the CVCS Community Partnership.

³⁹ Definition from Fyfe 2013

⁴⁰ These nine ecosystem types are identified in Comox Valley Regional District. 2010. Comox Valley Regional Growth Strategy Bylaw No. 120, 2010. Map No. 4 Regional Conservation Framework Concept. More detailed information can be found in the Vancouver Island Sensitive Ecosystem Inventory publications: http://www.env.gov.bc.ca/sei/van_gulf/publications.html and in the CVRD's Sensitive Habitat Atlas.

⁴¹ Upland Habitat Corridors are mapped in Fyfe 2013