

**Comox Lake Land Corporation
Cumberland, BC**

Rezoning and Servicing Report

Submitted by:

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Cumberland, BC V0R 1S0

Attention: Karin Albert, Senior Planner

**Reference: Rezoning and Servicing Report
Comox Lake Land Corporation, Cumberland, BC**

This report will provide a summary of servicing, physical, and bio-physical conditions of the Comox Lake Land Corporation properties on Comox Lake.

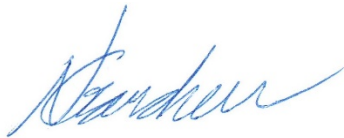
Within this report you will find a record of site observations, details of water supply and onsite waste-water systems, erosion control and flood set-back observations, and a review of the environmental values.

Should you have any questions regarding this submission or would like to discuss further, please contact me at 250-334-3263.

Yours truly,
Wedler Engineering LLP

Per:

Per:



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* Wedler Engineering LLP is a partnership of corporations.

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1 Executive Summary

Wedler Engineering LLP has been retained by the Comox Lake Land Corporation (CLLC) to assist with the rezoning and subdivision of their property into a strata subdivision to limit the liability of CLLC's shareholders, allow permitted development to occur, and increase compliance with local laws, bylaws, and regulations.

The CLLC owns approximately 3.6 hectares of land on the east side of Comox Lake used for permanent and seasonal residences. CLLC's land holds 25 cabins, with many being originally constructed in the 1930's when the land was owned by Weldwood Canada. The CLLC was created in 2001 when the land was purchased from Weldwood Canada by a group of cabin owners. In 2002, the Village of Cumberland extended their jurisdiction to include the land owned by the CLLC. At that time the land was zoned as Upland Rural One (UR-1), since then it has been rezoned to its current zoning status as Recreation and Tourism Zone (RE-1).

The current zoning is inappropriate because, among other things, it limits development on any single lot to one principal residence, and the CLLC lands currently have 25 residences / cabins built on them. The CLLC therefore proposes that the land be rezoned, in accordance with the recommendations in table 1 of this report, so the current uses are protected, and future alterations and construction are reviewed through the building / development permit process in a way that reflects their actual use.

Once the land is rezoned, the CLLC will be able to create a strata subdivision, which would make each cabin owner a landowner with all the rights and responsibilities associated with land ownership. This will make each owner responsible for the appropriate permitting for any proposed development and limit the liability of the shareholders in the CLLC.

To achieve this plan, the CLLC proposes a development process to address the issues observed. The development process has three possible stages:

1. Rezoning: change the property's zoning to match the current use.
2. Strata subdivision: subdivide the land to give ownership to the cabin owners with some common property controlled by a strata.
3. Building / development permits: cabin owners use normal building / development permit to develop their cabin/property.

For a breakdown of recommendations by development stage, see tables 2 through 3 on pages 24 through 26.

During the creation of this report, numerous issues have been identified. These issues and recommended solutions are summarized in table 4 on the following page. These issues will be addressed during the three development stages mentioned above.

Table 1: Summary of Recommendations by Topic Area

Topic Area	Recommendation
<p>4 - Environmental</p>	<ol style="list-style-type: none"> 1. Assessment of potential regulatory compliance issues of recent development as a considerable amount of old and new construction, particularly in the southern property area, does not appear to meet Riparian Areas Protection Regulation, provincial Water Sustainability Act, federal Fisheries Act, or best practices outline in the Develop with Care: Environmental Guidelines for Urban and Rural Land Development (BC 2014). 2. Assess old docks and structures along foreshore of the southern property to ensure they meet current environmental standards during subdivision stage of this project. 3. Compliance monitoring of any future development is recommended. Any future development should aim to bring the properties into compliance with applicable laws and regulations. 4. Improve riparian conditions with future developments. Do not remove trees within 15m setback of the present natural boundary. Late successional tree species (e.g., western redcedar and Douglas-fir) establishing in the understory should be retained 5. Where recent excavation on the southern property has left exposed soil within the 15m setback, it should be planted with native species. 6. No further access to the lakeshore should be constructed, and further soil disturbance within the 15m riparian setback should be avoided. 7. Vegetation and forest clearing should be minimized to maintain wildlife habitat. 8. Prior to demolition or renovation of unused buildings or wooden structures, surveys for evidence of roosting/hibernating bats or nesting birds should be conducted. 9. Future development proposals should aim to comply with timing windows for fish and wildlife. 10. An assessment of condition and effectiveness of wastewater facilities should be conducted to assess if there is potential for these systems to degrade the water quality in Comox Lake. <i>(Note – all systems are per Ministry of Health regulations, thus this is no longer an issue).</i> 11. Implement a 30m “no development” setback from the “full pool” elevation (135.3m) of the lake. This will provide a simple measure to ensure compliance with the BC RAPR and <i>Canada Fisheries Act</i>. <ol style="list-style-type: none"> a. No vegetation removal, placement of fill, or expansion of permanent structures is to be permitted within this setback; existing structures constructed prior to August 2019 will be permitted to remain. A mechanism to allow for application under a development permit process can be considered.

Topic Area	Recommendation
	<p>b. Expansion of cabins by a maximum of 25% of the total footprint of the cabins – including decks - to the landward direction may be considered under a development permit application.</p> <p>c. Consider setting up a series of markers to indicate the setback boundary to easily inform property owners of the “no development” area.</p> <p>12. Any future development proposals should seek opportunities to improve and expand the forested conditions on all sites, particularly within the 30m setback area.</p> <p>a. Use the development permit process to encourage expansion of vegetated areas may be considered.</p> <p>b. Recently cleared areas should be revegetated.</p> <p>c. Upland forested, including snags or wildlife trees, provide important habitat for wildlife.</p> <p>13. Best management practises for dock construction have been provided herein. Consider developing and implementing a process for dock construction and maintenance on the properties. Input from qualified professionals should be considered.</p> <p>14. For existing or proposed upgrades to hardscaped waterfront structures such as retaining walls, foundations, etc., implement the following measures:</p> <p>a. Explore the potential to establish native vegetation species – particularly smaller tree species and shrubs.</p> <p>i. This would include sloping shorelines to facilitate planting and reduce erosion related to wave action.</p> <p>ii. Support from engineering, biological, and landscape professionals is necessary to implement this.</p> <p>b. Prevent the use of materials with the potential to release deleterious materials into aquatic habitats, such as wood treated with creosote or other harmful preservatives.</p> <p>15. Implement a 30m setback from the high-water mark of Perseverance Creek that protects against development of any kind and protects vegetation within the setback area.</p> <p>16. Prevent development of the seepage area at the 45-degree bend in the shoreline area. This area appears to be moisture and nutrient receiving as the area is less sandy, more gently sloping and herbs and grasses are established on the foreshore substrate.</p> <p>17. Where recent excavation on the southern property has left exposed soil within 30m setback, it should be planted with native species. Examples of suitable species are provided in Table 6.</p> <p>18. Vegetation and forest clearing should be minimized to maintain wildlife habitat.</p> <p>19. Prior to demolition or renovation of unused buildings or wooden structures surveys for evidence of roosting/hibernating bats or nesting birds should be conducted.</p> <p>20. Any future development proposals should aim to comply with timing windows for fish and wildlife (e.g., in-stream works window and nesting bird season), as required.</p>

Topic Area	Recommendation
<p>5 - Floodproofing Review</p>	<p>21. Add riprap armour to slope in front of cabin 15 to limit erosion. 22. Raise cabin 3 above the designated flood level of 137.5m. 23. Cabin 4’s accessory structure be designated as “uninhabited” because it is below the floodplain level. 24. Ground (lowest) floor of Cabin 5 be designated “uninhabited” because it is below the floodplain level. 25. Leave retaining walls as is, until they require replacement. At that time, a geotechnical engineer should be retained to design an appropriate replacement. 26. The retaining walls for Cabins 1 and 6 will require replacement with the next year. 27. The retaining structures for Cabins 5, 18, and 19 should be replaced within the next 3 years.</p>
<p>6 - Stormwater Management Design</p>	<p>28. Direct stormwater from Cabin 13 into infiltration pits to prevent erosion. 29. Direct stormwater from new Cabin 16 structure away from toe of steep slope by adding a gutter to the structure. 30. Except for cabins 3, 10, 11, 19, 20, and 21, all cabins require minor alterations or improvements to the roof water drainage and gutters. 31. Provide maintenance (e.g., clean, and repair) to existing gutters.</p>
<p>7 - Transportation Review</p>	<p>32. At the subdivision stage, review options to improve visibility while still providing legal access, including: installing hidden driveway signs on either side of the properties along Comox Lake Road; trimming/removing vegetation on Lot 4 and to the east to maximize views; reviewing options to move Lot 3 and Lot 4 driveways to the west as much as possible and reviewing the option of a shared access point, which may require an easement. 33. At the subdivision stage, confirm sight distances with survey and realign Horbury Road intersection to a right angle with Comox Lake Road (minimum 80 degrees) at the centre of the horizontal curve to maximize sight distances. Also, move stop sign, include new stop bar at Comox Lake Road, and incorporate paint marking delineation at the intersection. Given the low risk, it is recommended that this work be done at the subdivision stage. 34. Apply to MOTI to have Horbury Road declared a highway per Section 42 of the transportation act. 35. Access to north lots are to be declared “water access only” to remove the need for a formalized surface access. 36. Snow clearing to be instituted for all access routes on the property (southern / central portions only). 37. “Dry pipe”, wayfinding signs, cabin numbers, and other fire fighting improvements to be implemented. 38. The north lots be designated “water access only” to remove the need for a formalized surface access, however the informal arrangement could remain.</p>
<p>8.1 - Onsite Wastewater and Sewerage Systems</p>	<p>39. The holding tank for Cabin 1 be reviewed by a ROWP, and a filing submitted to Vancouver Island Health Authority (VIHA). 40. Cabin 11, which is currently unused, have a ROWP complete a design and submit a filing prior to becoming occupied again.</p>

Topic Area	Recommendation
8.2 - Water Supply	<p>41. The current property is considered a single parcel, and as such wells serving multiple residences are exempt from licensing as the property is not currently strata titled. If the CLLC elects to pursue strata subdivision, then wells that serve more than one cabin will need to obtain extraction licenses per the <i>Water Sustainability Act</i>. All current onsite waste-water systems have been prepared per current regulations and accepted by VIHA, our comments on well proximity to waste-water systems are limited.</p> <p>42. Per the <i>Drinking Water Protection Act</i>, and single source serving multiple cabins is considered a water system. While VIHA may not move to regulate such a system, the cabin owners who share a water source should ensure the water is tested and then sign an agreement for sharing maintenance costs.</p>
9 - Geotechnical Review	<p>43. Replace wood footings bearing directly on subgrade with concrete placed atop subgrade.</p> <p>44. Base of all footings extend 450mm below adjacent finished grades for frost protection.</p> <p>45. Retention structures along the foreshore on Lots 1, 3, and 4 need to be reviewed by a geotechnical professional.</p> <p>46. Cut slopes on Lots 1, 5, 7, 12, 16, 17, and 18 be reviewed by a geotechnical professional to assess the stability and determine remediation solutions.</p> <p>47. Lock-block structures on Lots 1, 2, and 15 require review by a geotechnical professional to determine if alterations are necessary.</p>
10 - Next Steps	<p>48. Maintain current OCP designation.</p> <p>49. Create new zone for this property in accordance with recommended changes in this report, see table 8 for more details.</p> <p>50. Village to identify which issues to be addressed as part of rezoning.</p>

2 Introduction

This report is prepared to assist in the proposed rezoning of Comox Lake Land Corporation lands that include 25 cabins in the Comox Lake area. The cabins are in three distinct areas, for the purposes of this report referred to as the West Lots (off Comox Lake Road near Cumberland Lake Park), Central Lots (off Horbury Road) – (these lots are centred around Whytes Bay), and the North Lots (accessed via logging roads, adjacent Comox Lake). The cabins have a very long history in the area, dating back to the 1930’s, some of which remain in the same families.

2.1 History of the Cabins & the Comox Lake Land Corporation (CLLC)

Many of the cabins date back to the 1930’s, with the cabin layout remaining as they currently exist since the late 1950’s. The Comox Lake Land Corporation (CLLC) was created when the cabin owners, along with Mike Hamilton Logging, purchased the land from Weldwood Canada in 2001. Previously, cabin owners held leases to occupy the land (through Weldwood Canada since the 1960’s). In 1953, the BC Power Commission (BC Hydro’s predecessor) acquired the Puntledge hydroelectric system with plans to upgrade the system. In anticipation of higher water levels, some cabins were moved or removed at that time.

James Whyte, the overman at No. 2 mine built a house at Whyte’s Bay in 1890. No. 4 mine opened around the corner from the bay in 1892 and up to 30 families moved out to Whyte’s Bay with children taking the mine train into Cumberland for school. No 4 mine was closed in 1935 and the cabins that remain are utilized as summer cabins.



Picture 1: No. 4 Mine – Whyte’s Bay in the background, Bill Whyte collection (photo from Up the Lake, <http://www.cumberlandmuseum.ca/>)

The Cumberland Archives has published a brief compilation of some of the Comox Lake area history, including Whyte’s Bay history, in [Up the Lake | \(cumberlandmuseum.ca\)](http://www.cumberlandmuseum.ca/). Information was based on a book called Up the Lake, written by a Cumberland man whose family has a cabin up the top end of Comox Lake.

The parcel that the cabins occupy was created in 1906 and the property line was set at what was then the edge of the lake. The present natural boundary, when the parcel was created, was much lower than it currently is. In 1912 Canadian Collieries (Dunsmuir) Ltd created the Comox Dam, raising the water level of Comox Lake. CLLC’s lands are therefore on a regulated watercourse, and the property boundary is submerged in Comox Lake.

In 2002, the Village of Cumberland (“Village”) extended their jurisdiction to include the land owned by the CLLC and zoned it as Upland Rural One (UR-1), with current zoning Recreation and Tourism Zone (RE-1). Both zones are inappropriate for what the land is used for. Further, enforcement of zoning and building regulations by the Village on CLLC property has been inconsistent.

The land that the CLLC purchased included an area with coal mine tailings from mine number 4. In September 2018, the CLLC sold approximately 45.9 hectares of land to the Comox Valley Regional District (CVRD) including the area with environment concerns from the coal mine tailings. This purchase of the land reflects priorities outlined in the 2016 CVRD Comox Lake Watershed Protection Plan, including obtaining properties with the purpose of protecting the watershed.

2.2 Proposed Rezoning and Subdivision Process

After the completion of the 2018 sale of a portion of the property to the CVRD, the CLLC initiated discussions with the Village regarding having the remaining property rezoned to legitimize the 25 existing dwellings. Structures are in various conditions and cabin owners wish to update and improve their cabins and associated works to ensure they can continue to be used by the coming generations.



Picture 2: Comox Lake circa 1940's (photo sourced from Sylvia Mossey)



Picture 3: Mossey Cabin (photo sourced from Sylvia Mossey)

Wedler Engineering LLP (“Wedler”) has been retained by the CLLC to assist in the proposed rezoning process and been involved with the development of the Terms of Reference (TOR) included in Appendix 1. The Village’s response is also included as part of Appendix 1. To date, Wedler has been involved with the review of existing servicing conditions, identifying proposed parcels, and preparation of this summary report.

The Village did not assess the zoning of CLLC lands appropriately when the lands were annexed in 2018, then rezoned the lands again without recognizing the historic or existing use of the lands. The recommended process applies needed risk mitigation and regulatory compliance measures to the appropriate steps in the development process. Table 7 shows the recommended process to bring the lands into compliance with zoning and other applicable regulations. Table 3 shows key statistics of the CLLC property to help with drafting the zone for CLLC’s land. In addition, an Excel file with detailed statics and information on all 25 cabins and proposed strata lots has been provided separately to the Village to assist with the rezoning process.

Table 2: Development Stage Process and Risk Mitigation Measures

Development Process	Purpose of Process	Risks Mitigated	Comments
1. Rezoning	Addresses existing conditions and suitability for a change in land use.	Major existing condition risks assessed and identified.	Key recommendations (see Table 10) from this report identify risks that should be mitigated immediately. No OCP amendment is required.

2. Strata Subdivision	Addresses servicing requirements and land division for eventual development and construction.	Servicing risks – water and wastewater, emergency access, traffic / transportation, potentially stormwater.	Servicing risks identified and required to be addressed prior to subdivision. If individual cabins wish to proceed with improvements prior to subdivision, servicing risks related to those cabins should be addressed with the BP / DP process.
3. Building Permit / Development Permit	Addresses details of actual works to be constructed that are compliant with zoning, subdivision, and other applicable regulations.	Physical works and full compliance with all applicable regulations.	Upon rezoning, cabin owners should be able to apply for DPs and BPs to make changes / improvements to their properties. This is the appropriate time to work for incremental enforcement of all regulations.

Table 3: Key Statistics of CLLC Property

Statistic	Value
West and Central Lot Size	2.02 ha
North Lot Size	1.56 ha
Proposed Strata Lot Min	410 m ²
Proposed Strata Lot Max	3764 m ²
Lot Coverage Min	1.5%
Lot Coverage Max	24.5%
Cabin Floor Area Min	25.87 m ²
Cabin Floor Area Max	147.25 m ²
Tallest Cabin	3 stories

3 Design Development

Per the TOR, Sandy Grant, BCLS was engaged to conduct a detailed survey of all 25 cabins and all lands owned by the Comox Lake Land Corporation. Wedler analyzed this data and prepared the drawing set included as Appendix 2 to this report. Included are the following details:

- Key plan showing the extents of the properties.
- Sections through each cabin including flood elevations and floodplain setbacks.
- Details of water sources and connections
- Details of onsite wastewater collection and treatment systems.
- An overall grading plan of the property including areas designated as “steep slopes” with a grade steeper than 30 percent for a vertical distance of three metres or more.

4 Environmental Review

Current Environmental completed a biophysical assessment and a supplemental information memorandum of the site. Both the full report and memorandum are included as Appendix 3. The report provides an overview biophysical assessment of the CLLC properties, discusses potential environmental impacts resulting from past and current activities on the properties, and provides mitigation measures for impacts on the riparian ecosystem related to the



property improvements and structures located within the riparian area. In addition, Current Environmental also prepared an analysis of the property considering the Riparian Areas Protection Regulation. This report is also included in Appendix 3.

4.1 Biophysical Assessment Conclusions and Recommendations:

A flood plain level has been established by the Village for Comox Lake at the 137.50m elevation contour (Figures 2 and 3). There is also a 15m setback from the present natural boundary (PNB or high-water mark) for development as required by the Riparian Areas Protection Regulation (RAPR) which is applicable within the Village. Note that a 30m setback is required on southern exposures as per the regulation [1]. Much of the previous and ongoing development on the shoreline of the southern property are within these setback limits.

Developments on the northern properties are within the setback limits as well (Figure 3) but not within the high-water mark. The smaller footprints of the buildings, less extensive land clearing on the property and the high bank reduce the potential for adverse effects to the lake on the northern property.

The following recommendations are provided to improve value to and limit disturbance to wildlife, reduce potential erosion issues and bring the properties into compliance with applicable laws and regulations:

1. As part of an anticipated subdivision process, the assessment of potential regulatory compliance issues with regards to recent development at the properties is recommended, particularly so at the southern property area. A considerable amount of old and new construction likely does not appear to meet Riparian Areas Protection Regulation, provincial Water Sustainability Act, federal Fisheries Act, or best practices outlined in the Develop with Care: Environmental Guidelines for Urban and Rural Land Development (BC 2014).
2. The numerous old docks and structures along the foreshore of the southern property do not appear to meet current environmental standards. Most are grounded across the foreshore potentially limiting access along the shoreline for some smaller wildlife species. These should be elevated above the foreshore to prevent erosion and allow natural hydrology, transport of sediment and habitat connectivity along the shoreline. It is likely that these docks are affecting longshore sediment deposition in the area. The substrate appears fairly coarse, so issues related to turbidity are not expected to be an issue. The docks likely do provide habitat for fish and wildlife (e.g., perches for piscivorous birds, cover for fish) in their current condition. It is recommended that an assessment of these derelict structures be completed during the anticipated subdivision stage of the project.
3. Compliance monitoring of any future development with municipal, provincial, federal laws, regulations and best management practices is recommended. Any future development proposals on the properties should aim to bring the properties into compliance with applicable laws and regulations.
4. Any future development proposals should seek opportunities to improve the riparian conditions. No further tree removal should be conducted within a minimum 15m setback of the present natural boundary (high water mark). Where feasible, smaller, late successional tree species (e.g., western redcedar and Douglas-fir) establishing in the understory should be retained, to allow for natural succession of the vegetation community.
5. Where recent excavation on the southern property has left exposed soil within the 15m setback, it should be planted with native species. Examples of suitable species are provided in table 8 below.
6. No further access to the lakeshore should be constructed and further soil disturbance within the 15m riparian setback should be avoided.
7. Vegetation and forest clearing should be minimized to maintain wildlife habitat.
8. Prior to demolition or renovation of unused buildings or wooden structures surveys for evidence of roosting/hibernating bats or nesting birds should be conducted.
9. Any future development proposals should aim to comply with timing windows for fish and wildlife (e.g., instream works window and nesting bird season), as required.

10. An assessment of the condition and effectiveness of wastewater facilities (septic systems on the shoreline, outhouses) should be conducted to assess if there is potential for these systems to be degrading the water quality in Comox Lake.

4.2 Riparian Areas Regulation Assessment Conclusions and Recommendations

The *BC Riparian Areas Protection Regulation* (RAPR) calls on local governments to protect riparian areas during residential, commercial, and industrial development by ensuring that a Qualified Environmental Professional conducts a science-based assessment of proposed activities. This regulation is fundamental to the implementation of development permitting in areas adjacent to streams, rivers, creeks, ditches, ponds, lakes, springs, and wetlands connect by surface flow to a waterbody that provides fish habitat.

The implementation of a 30m “no development” setback, known as a Streamside Protection and Enhancement Area (SPEA) in the Riparian Areas Protection Regulation, from the full pool elevation of 135.3m will help protect Comox Lake and provide clarity for landowners and Village planners. The setback should be incorporated into the Village DPA#1 or a unique development permit for the subject properties. As the area is already highly developed and fragmented, the anticipated level of future development for the area is low.

The following recommendations are provided to improve value to and limit disturbance to wildlife, reduce potential erosion issues and bring the properties into compliance with applicable laws and regulations:

1. Implement a 30m “no development” setback from the “full pool” elevation (135.3m) of the lake. This will provide a simple measure to ensure compliance with the BC RAPR and *Canada Fisheries Act*.
 - a. No vegetation removal, placement of fill, or expansion of permanent structures is to be permitted within this setback; existing structures constructed prior to August 2019 will be permitted to remain. A mechanism to allow for application under a development permit process can be considered.
 - b. Expansion of cabins by a maximum of 25% of the total footprint of the cabins – including decks - to the landward direction may be considered under a development permit application. (note – some cabins in close proximity to their neighbours should be allowed to relocate the footprint laterally upon rebuilding in exchange for riparian plantings – this would improve fire safety in some cases).
 - c. Consider setting up a series of markers to indicate the setback boundary to easily inform property owners of the “no development” area.
2. Any future development proposals should seek opportunities to improve and expand the forested conditions on all sites, particularly within the 30m setback area.
 - a. Use the development permit process to encourage expansion of vegetated areas may be considered.
 - b. Recently cleared areas should be revegetated.
 - c. Upland forested, including snags or wildlife trees, provide important habitat for wildlife.
3. Best management practises for dock construction have been provided in Appendix 3. Consider developing and implementing a process for dock construction and maintenance on the properties. Input from qualified professionals should be considered.
4. For existing or proposed upgrades to hardscaped waterfront structures such as retaining walls, foundations, etc., implement the following measures:
 - a. Explore the potential to establish native vegetation species – particularly smaller tree species and shrubs.
 - i. This would include sloping shorelines to facilitate planting and reduce erosion related to wave action.
 - ii. Support from engineering, biological, and landscape professionals is necessary to implement this.

- b. Prevent the use of materials with the potential to release deleterious materials into aquatic habitats, such as wood treated with creosote or other harmful preservatives.
5. Implement a 30m setback from the high-water mark of Perseverance Creek that protects against development of any kind and protects vegetation within the setback area.
6. Prevent development of the seepage area at the 45-degree bend in the shoreline area. This area appears to be moisture and nutrient receiving as the area is less sandy, more gently sloping and herbs and grasses are established on the foreshore substrate.
7. Where recent excavation on the southern property has left exposed soil within 30m setback, it should be planted with native species. Examples of suitable species are provided in Table 9 below.
8. Vegetation and forest clearing should be minimized to maintain wildlife habitat.
9. Prior to demolition or renovation of unused buildings or wooden structures surveys for evidence of roosting/hibernating bats or nesting birds should be conducted.
10. Any future development proposals should aim to comply with timing windows for fish and wildlife (e.g., in-stream works window and nesting bird season), as required.

Table 4: Recommended Species for Riparian Planting

Common Name	Scientific Name	Notes
Native willows	Salix Sp.	There are a range of suitable species, and they can be propagated easily by willow staking.
Red-osier dogwood	Cornus stolonifera	Tall shrub tolerant of moist soils and disturbed sites. An attractive plant that provides forage for wildlife and good erosion control properties.
Black trin berry	Lonicera involucrate	Low, fast-growing shrub with a rapidly establishing root system that has good erosion control properties and prefers moist soils. Also, provides forage for wildlife.
Red Elderberry	Sambucus racemose	Fast growing tall shrub that provides excellent forage for birds.
*These species are all native, present in the area, and available at the Streamside Native Plants in Bowser, BC.		

5 Floodproofing Review

5.1 Floodproofing Setbacks, Flood Construction Levels & Elevations

Detailed plans of the property including all 25 cabin locations have been developed. Per the Village’s Floodplain Management Bylaw No 962, 2012, the following constraints apply:

- Flood Construction Level: 137.5 m
- Floodplain Setback: 15.0 m
- Reduced Setback: 7.5m “where the water frontage is protected from erosion by a natural bedrock formation.”

The property was surveyed in significant detail by Sandy Grant, BCLS. The elevations, locations and details of all cabins and existing retaining structures were obtained. The detailed drawings included in this report as Appendix 2 illustrate the data collected. Table 10 below summarizes the key features in terms of elevations, setbacks, and flood risk for each cabin.



Table 5: Key Features of Each Cabin - Floodplain Data

Cabin #	Lowest Floor Elevation	Above Flood Elevation?	Within 15m Setback? (7.5m when a rock bluff is at the shoreline)	Existing retaining Wall?
1	141.00	Yes	Yes – 9.66 m	Lock block wall along frontage
2	170.75	Yes	Yes – 10.55 m	Log retaining wall
3	137.49	No	Yes – 1.53 m	Log retaining wall / log plank wall
4	139.76	Yes	Yes – 12.37 m	Cast in place concrete wall / log wall
5	137.19	No	Yes – 9.47 m	Log/ timber retaining wall
6	137.93	Yes	Yes – 4.35 m	Wood plank retaining wall
7	138.51	Yes	Yes – 3.16 m	Low cast-in place concrete wall
8	144.92	Yes	No – 40.22 m	N/A – inland
9	149.17	Yes	No – 34.40 m	N/A - inland
10	149.49	Yes	No – 82.66 m	N/A – inland
11	153.83	Yes	No – 17.04 m	N/A - inland
12	143.22	Yes	No – 89.25 m	Stacked rocks with vegetation
13	138.97	Yes	Yes – 7.37 m	Wood plank retaining wall
14	137.76	Yes	Yes – 5.91 m	Cast-in-place concrete wall
15	142.82	Yes	Yes – 9.30 m	No
16	145.25	Yes	No – 20.11 m	N/A – inland
17	144.53	Yes	No – 21.04 m	N/A – inland and behind Cabin 18
18	139.90	Yes	Yes – 9.33 m	Vertical wood plank retaining wall.
19	146.52	Yes	No – 20.19 m	Stacked wood log wall
20	146.60	Yes	No – 21.74 m	Stacked wood transitions to riprap
21	150.84	Yes	No – 27.10m and rock bluff	N/A – rock bluff
22	149.17	Yes	No – 18.0m and rock bluff	N/A – rock bluff
23	144.18	Yes	No – 15.73m and rock bluff	N/A – rock bluff
24	142.80	Yes	No – 16.70m and rock bluff	N/A – rock bluff
25	139.63	Yes	NO – 11.10m and rock bluff	N/A – rock bluff

See the detailed field report on retaining structures in Appendix 4.



5.2 Mitigation Measures

Most of the cabins in this property require no mitigation measures as they are either above the flood construction level, or well beyond the required setbacks, or both. Additionally, several cabins are well above the flood-construction level, but within the setback. For these cabins (1, 2, 4, 6, 7, 13, 14, 15 and 18) an application for variance to the floodplain bylaw will be submitted separately. This is further supported by the existing retaining structures in front of most cabins, which provide some erosion protection in their current state. The one exception is cabin 15 – however it is noted that this cabin is significantly above the flood construction level, so the risks because of a high-water flood event are minimal. The only recommendation would be to add riprap armouring to the slope in front of this cabin. Further, there is likely bedrock near surface below this cabin and between it and the lake, and as such the reduction to a 7.5m setback could be appropriate.

5.2.1 Cabin 3

This cabin is both very close to the present natural boundary (PNB) of Comox Lake and the main floor is 1 cm below the flood-construction level. It is recommended that the cabin be raised above the designated flood plain elevation, while foundation issues are remediated.

Future renovations or changes to this cabin should be limited to the restraints as identified in Section 5 – General Exemptions – of the Village’s Floodplain Management bylaw.

5.2.2 Cabin 4 Accessory Structure

The main structure associated with this cabin lot is above the floodplain level, however a secondary structure that appears to be used for habitation is below the Village floodplain level. Further, this secondary structure is within the floodplain setback distance. This accessory structure should be granted a variance to the floodplain bylaw with the stipulation that it be considered “uninhabited” and can only be used in such a manner as is described in the Village floodplain management bylaw 5. A) iii):

That portion of a building or structure to be used as a carport, garage or entrance foyer, porches, domestic greenhouses and storage buildings not used for the storage of goods damageable by floodwaters;

As an alternative, the owners of this cabin could choose to elevate it above the flood construction level while leaving it in its current location. A variance should be granted in this case also.

5.2.3 Cabin 5

Like Cabin 3, Cabin 5 is both within the required setback and the main floor elevation is lower than the flood construction level. This cabin is set further back in comparison to Cabin 3, but it is located at a low elevation with the lower floor at 137.19 m. This cabin should be granted a variance to the floodplain bylaw with the stipulation that the ground floor be considered “uninhabited” and can only be used in such a manner as is described in the Village floodplain management bylaw 5. A) iii):

That portion of a building or structure to be used as a carport, garage or entrance foyer, porches, domestic greenhouses and storage buildings not used for the storage of goods damageable by floodwaters;

5.2.4 Existing Retaining Walls

The retaining walls present on the property vary considerably from cabin to cabin. It is recommended that all existing retaining walls be left as is, until they reach a condition that requires their replacement. At the time that replacement is required, permits will be submitted appropriately to allow for construction in the riparian zone. Additionally, a

geotechnical engineer should be retained to design an appropriate replacement with the following design guidelines followed:

- Retaining structure to be made from a non-degrading product – rock, concrete or similar. No timber / wood structures.
- Lake-side slope of retaining structure to be no greater than 4H-1V.
- Native vegetation be incorporated into the design as appropriate.
- All necessary environmental permits be obtained for the works.
- A building permit be obtained from the Village for the works.

Based on our review of the site, the retaining walls for cabins 1 and 6 will require replacement within the next year. The retaining structures for cabins 5, 18, and 19 should be replaced within the next 3 years.

A preliminary desktop geotechnical report was completed by Ryzuk Geotechnical and was referenced for this section of the report. For more information on the geotechnical review, see section 9. Please see Appendix 5 for the complete reports.

6 Stormwater Management Design

The TOR required the following be completed:

Calculations & design for all lots. Comment on the impact of the proposed development on groundwater quantity and quality; surface water generated by proposed development and recommend options for collection storage (Stormwater Management).

Given the development history of the site, the above would be a pointless effort. Included at Appendix 6 are historical aerial photos as obtained from the CVRD iMap website. All the cabin locations are included in the aerial photos provided for review. Except for the logging of a portion of the lands, no significant changes that would impact the stormwater runoff from the site have been made since at least 1992. As such, the stormwater flow regimes and impacts to the receiving environment are well established.

The development history of the site indicates that most of the cabins and site development was completed almost 90 years ago. The aerial photos indicate a relatively static state of vegetation and clear areas within the property owned by CLLC. As such, the “C” factor for runoff is likely unchanged since the original construction completion of the cabins. Further, the only hard surfaces observed were the cabin roofs and patios and decks. None of the roads or vehicle parking areas have hard surface treatments.

To summarize – there is no actual “proposed development” as all development is complete on CLLC property. However, there has been some development on CLLC lands that have impacted stormwater runoff and will have adverse affects if not remediated. Ryzuk Geotechnical noted raveling and sloughing of near vertical native soils slopes on Lots 1, 7, 15, and 18, and this erosion would be intensified if subjected to stormwater flow. Properties with foundation elements that include wooden or concrete foundations placed at ground level are at greater risk of damage from erosion of soils by stormwater than those whose foundation elements are embedded in soil or anchored to bedrock.

An assessment of drainage issues was conducted on June 29, 2021. During that review some minor issues with respect to roof water drainage and potential erosion issues were noted. Except for cabins 3, 10, 11, 19, 20 and 21, all the cabins require some minor alterations and improvements to the roof water drainage and gutters. These recommendations are summarized in table 6 below. See Appendix 7 for an inspection report from the June 29, 2021 assessment.

Table 6: Key Features of Each Cabin - Stormwater Management

Cabin #	Stormwater / Roof Drainage Recommendations
1	Gutters should be added to the cabin and drain to the flat sand area on the lake side of the cabin.
2	Gutters should be added to the front of the cabin and drained directly to the lake
3	No drainage issues.
4	It was observed that the secondary structure on this property appears to be used for habitation but is below the flood construction level.
5	Secondary structure to north of main cabin needs gutters that are piped to an in-ground rock pit beside the shared access road. Rain sheeting off the roof of this structure is currently causing an erosion issue.
6	When this cabin is re-built, gutters should be installed with downspouts that drain to the lake.
7	Gutter on side facing road. Gutters likely drain into rock pits. ADU and shop roofs drain onto steep slopes. Recommend gutters be installed.
8	All rainwater leader outlets should be extended to the access road and should discharge into a roadside rock lined swale. Currently most of the downspouts discharge in areas where erosion could cause structural issues to the cabin.
9	The downspout on the southern side of this cabin should have some erosion control where it discharges to the ground. Small rock / cobbles placed in a 300 by 300 mm square at the discharge would suffice.
10	No drainage issues.
11	No drainage issues.
12	New structure being built in front of Cabin 12. Structure is within riparian setbacks and potentially on unstable ground. Tools present indicate work has been recent. All roof water discharges need erosion control.
13	Southern downspout/outlet - no erosion control visible. Erosion control needed for all roof water discharges (rock / cobble where roof water hits the ground).
14	No drainage issues.
15	Gutters to be added and down-spouts to drain into erosion protection and away from any steep slopes.
16	New roof structure at draining onto toe of steep slope. Recommend a gutter is placed on roof structure to direct water away from toe of steep slope.
17	Downspout draining onto soil without any visible erosion control. Rocks / cobbles to be added at discharge point to provide erosion control.
18	Gutter on roadside of cabin. Requires routine maintenance/cleaning. All roof water discharges to have erosion control added or to drain direct to the lake.

Cabin #	Stormwater / Roof Drainage Recommendations
19	No drainage issues.
20	No drainage issues.
21	No drainage issues.
22	Gutters to be added to front / lake side of cabin and roof water to be directed away from steep slopes on the lake front.
23	Gutters to be added to front / lake side of cabin and roof water to be directed away from steep slopes on the lake front.
24	No drainage issues.
25	In need of significant repairs. Gutter to be added on inland side to direct roof water away from slope.

The following summarizes the current conditions on site in terms of the TOR requirements:

- Impacts on groundwater quantity and quality: the largest impact on water quality would be from untreated wastewater effluent streams, but this has been addressed by onsite wastewater and sewerage systems. The impacts on groundwater quantity from the existing development is considered minimal given the size of the CLLC property relative to the Comox Lake watershed and the buffering capacity of Comox Lake itself.
- Surface Water generated: as the flow patterns in the area are well established, given the length of time the sites have been developed, there is likely negligible and only local impacts on surface flow. Erosion and revegetation will have mitigated any surface flow impacts and additional changes would add negative impacts to surface. Some attention is required to the roof water drainage of several cabins, and this should be addressed as soon as possible.

It is recommended that no storm works be addressed or assessed as a component of this rezoning process. Rather, when individual plans for development permit and building permit applications are submitted, individual rainwater management plans for substantive changes to the existing conditions of existing cabins be developed.

7 Transportation Review

7.1 Overview

The four West Lots (1 to 4) are located along Comox Lake Road, each having driveway access.

The Central 16 Lots (5 to 20) are provided access from the paved rural Horbury Road and the connective gravel road network south of Perseverance Creek. Horbury Road connects with Comox Lake Road approximately 1 km in advance of Cumberland Lake Park.

The North Lots (21 to 25) are currently accessed by the gravel forestry road network north of Perseverance Creek, providing access from Comox Lake Road. Access to the properties requires passing through a locked gate.

7.2 Impact of Development on Proposed Traffic Volumes

The residences have existed in their current state for numerous years (upwards of 80) and are planned to remain. No additional new residences are planned as part of the development.

Conclusion: As the cabins have been in their current state for over 20 years and no additional development is planned, no change in traffic volumes on the surrounding road network are anticipated.



7.3 Access to West Lots

Legal access to each of the west lots include driveway access (lots 3 and 4), and parking adjacent Comox Lake Road (Lots 1 and 2). Driveways are in the area between the 40 km/h speed warning (curves) section, and the 30 km/h section approaching Comox Lake parking areas. Based on existing conditions through this area, running speeds are anticipated to be around 40 km/h. Based on TAC guidelines, the limiting condition are left turn exit movements that require 85m sight distance in each direction.

Typical with driveways, exiting vehicles will inch out to the edge of Comox Lake Road to check for oncoming traffic. Sight distance is not met for Lots 3 and 4 which have approximate sight distances to the east (left) of 70m and 60 m, respectively. A horizontal curve, vertical grade, and vegetation alongside Comox Lake Road limits these sight distances to the east. Stopping sight distance for 40 km/h is 50m for passenger vehicles, however, the downhill grade and height of vehicle for other types (such as RV’s and truck/travel trailers) will require additional length to for stopping.

Recommendations: At the subdivision stage, review options to improve visibility while still providing legal access, including:

Installing “Hidden Driveway” signs on either side of the properties along Comox Lake Road.

Trimming/removing vegetation on Lot 4 and to the east to maximize views.

Review options to move Lot 3 and Lot 4 driveways to the west as much as possible, and review option of shared access point. The latter will require an easement to be included.

7.4 Central Lots - Access and Emergency Access

Horbury Road and Comox Lake Road currently exists as a Y-intersection, likely to ease access in the past for westbound vehicles turning right off Comox Lake Road while on the horizontal curve. A gravel apron is provided for vehicles to ease left and right hand turns from Horbury Road onto Comox Lake Road, however, the large area is not well defined for vehicle movements.

A sight line review has been undertaken. For simplicity, Comox Lake Road is generally referred to as the east-west road and Horbury Road Referred to as the north-south road.

Comox Lake Road has an official speed limit of 50 km/h, however a speed warning for 40 km/h is posted for the curves in this area. With a stop condition on Horbury Road, departure movement sightline guidelines have been consulted. Sight distance requirements for left turn and right turn movements exiting the access have been reviewed assuming a running speed of 45 km/h (considered conservative for existing conditions), with requirements summarized in Table 11 on the following page.

Table 7: Left and Right Turn Movements Departure Sight Distances – Horbury Road

	Minimum Required for 45 km/h	Reference
Left Hand Turn (SB to WB movement)	95m each direction	TAC Figure 9.9.4; Passenger Vehicle
Right Hand Turn (SB to EB movement)	85m to the left (east)	TAC Figure 9.9.6; Passenger Vehicle

A field visit conducted on December 8, 2020, reviewed departure sight triangle distances for Horbury Road, assuming an exit location at the centre of the Comox Lake Road horizontal curve (roughly near the westbound Y-entrance).

Parameters used were per TAC guidelines Figure 9.9.2, with resulting estimated distances provided in Table 12 below:

Table 8: Departure Sight Distances (Stop-Controlled)

	Estimated Intersection Sight Distance to Left along Comox Lake Road (m) - East	Estimated Intersection Sight Distance to Right along Comox Lake Road (m) - West
Horbury Road	Over 150 m	Estimated 100 m

Conclusion: Horbury Road has adequate sight lines for both left- and right-hand turn movements out of the intersection, assuming the egress location at the centre of the horizontal curve. In the case that a vehicle may enter Comox Lake Road unsafely, stopping sight distance is provided for vehicles approaching from either side. The stopping sight distance for Comox Lake Road is 58m (based on 45 km/h speed for passenger vehicles).

Recommendations: At the subdivision stage, confirm sight distances with survey and realign Horbury Road intersection to a right angle with Comox Lake Road (minimum 80 degrees) at the centre of the horizontal curve to maximize sight distances. Also, move stop sign, include new stop bar at Comox Lake Road, and incorporate paint marking delineation at the intersection. Given the low risk, it is recommended that this work be done at the subdivision stage.

Horbury Road is on private land, however in accordance with section 42 of the Transportation Act, it can be declared a highway as follows:

Travelled roads becoming highways

42 (1) Subject to subsection (2), if public money is spent on a travelled road that is not a highway, the travelled road is deemed and declared to be a highway.

(2) Subsection (1) does not apply to any road or class of roads, or to any expenditure or class of expenditures, that is prescribed by the regulations.

Historically, paving and snow clearing have both been completed on Horbury Road by the Village and MOTI. As such, it has had public money spent on it and can become a highway. Application materials need to be submitted to MOTI, but there is no reason that process should hold up zoning. If it can be confirmed public money has been spent, then a Reference Plan pursuant to Section 107 to the Land Title Act could be prepared and registered formally dedicating the road. Alternatively, an approach to FLNRO could be made to purchase and then dedicate the road.

The Central Lots are accessed from Horbury Road and its connective gravel road network along three legs (refer to Wedler Drawing V20-0427/A-08) including Horbury Road and its extension towards Comox Lake, the west gravel road off Horbury, and the east gravel road. Some lengths of the access road are narrow, particularly the Horbury Road extension towards Comox Lake (i.e., around Lot 5 to 9, and 12). Driveways are of varying condition and width, ranging from generally wide and easily accessible to narrow and constrained by a variety of features (such as slopes, existing topography, buildings, and other constructed and natural features).

A review with the Village Fire chief and planning staff was conducted onsite on August 12, 2021 to determine any significant issues with potential fire fighting on the property. Of concern is a lack of snow-clearing to the lower lots. If the roads throughout the property are not regularly cleared, emergency vehicles cannot access them. Even with clear roads, there are sections of the property that would be difficult to access with emergency vehicles, specifically cabins 5, 6 and 7. Some possible solutions include “dry pipes” with standpipes above ground that fire hoses can be directly connected to. A “dry pipe” from the vicinity of Cabin 12 down to Cabin 5 would enable hoses to be attached at either end for fire fighting to begin quickly. Other possible improvements could include a fire pump drawing from

the lake, with a standpipe that could be connected to a fire truck. Finally, installation of wayfinding signs and cabin numbers on all cabins would improve safety for the whole property. Appendix 8 illustrates fire fighting access and solutions.

Conclusions: Bearing in mind that usage is not increased or modified by subdivision of the existing configurations and access network, opportunities for widening and improvement to accesses should be reviewed at the subdivision design stage and / or at building permit / development permit stage for individual cabins. This will entail:

- Review constraints and potential options for widening the internal access road network, considering emergency vehicle movements CAD software.
- Review constraints and potential options for any upgrading works to driveways proposed.
- Access roads should be maintained at a minimum of 6.0m carriageway width to accommodate both domestic, commercial, and emergency vehicle access and passing.
- Consider installation of stop signs at connections to Horbury Road along both the west and east gravel roads.
- Install way finding signage (street signs, cabin numbers) throughout the property.
- Ensure snow clearing on all access routes within the property.
- Consider installation of “dry pipes” to bring fire fighting water to the Cabin 5 area.
- Any driveway access for one lot that crosses another lot will require an easement or shared access agreement.

7.5 Access to North Lots

Access to these lots via road is currently provided via an informal arrangement with Hancock Timber Resource Group. Forest service roads from an intersection on Comox Lake Road approximately 950m east of Horbury Road are used to travel to these cabins. Keys to the forest service road gate have been provided to the cabin owners and the Village. Further, the portion of the CLLC property that was purchased by the CVRD has an access easement registered over it in favour of CLLC, so the only area where a formal agreement for access is not provided is over the Hancock portion of the land between the CLLC property and Comox Lake Road. No traffic capacity or intersection safety issues are present with this arrangement given the small number of cabins in this portion of the property.

Recommendations: This portion of the property to be designated “water access only” to remove the need for a formalized surface access, however the informal arrangement could remain.

8 Onsite Water and Sewerage Systems

8.1 Wastewater Systems

As all current onsite waste-water systems have been prepared per current regulations and accepted by VIHA, our comments on well proximity to onsite waste-water systems are limited.

When the lands belonging to the CLLC were purchased by the CVRD, a portion of the proceeds of the sale were set aside for new onsite wastewater and treatment systems for each cabin. Included in Appendix 9 is a report of our observations of the installed systems along with the accepted filings as submitted to Vancouver Island Health Authority (VIHA). All systems are newly installed per all current regulations and standards within the last 2 years. The drawings provided in Appendix 2 also illustrate the details of these systems.

The only recommendations are as follows:

- The holding tank for Cabin 1 be reviewed by a ROWP, and a filing submitted to VIHA.



- Cabin 11, which is currently unused, have a ROWP complete a design and submit a filing prior to becoming occupied again.

There are no safety or risk concerns with any of the systems as installed as observed during our site visits. The “high risk” rating assigned to the cabins in the Comox Lake Watershed Protection Plan was related to the onsite wastewater treatment systems. As they have all / will all be replaced with compliant systems, this risk has been mitigated.

8.2 Water Supply Review

All water systems currently in place were reviewed during site visits, with a report included in Appendix 10. Table 13 below summarizes the water supply situation for each cabin.

Table 9: Summary of Water Supply to Each Cabin

Cabin #	Water Supply	Additional Features
1	Drilled Well	
2	Water line (source is likely the Comox Lake)	Filtration System
3	Dug Well (based on neighbours’ interpretation, as well could not be physically observed at time of site visit)	Contained in well house
4	Drilled Well	
5	Well adjacent to cabin	Pump in adjacent well
6	Well servicing Cabins 6-9 concurrently	Pump in well for this cabin only.
7	Well servicing Cabins 6-9 concurrently	Pump house located between Cabins 6 and 7
8	Well servicing Cabins 6-9 concurrently	Pump house located between Cabins 6 and 7
9	Well servicing Cabins 6-9 concurrently	Pump house located between Cabins 6 and 7
10	Well	Well house
11	Abandoned	Observation of hose bib
12	Drilled Well servicing Cabins 12-14 concurrently	Well housed in a water chamber in front of Cabin 12
13	Drilled Well servicing Cabins 12-14 concurrently	
14	Drilled Well servicing Cabins 12-14 concurrently	
15	No Water Source	
16	Drilled Well	
17	Well servicing Cabins 17-20 concurrently	Pump house located between Cabins 19 and 20
18	Well servicing Cabins 17-20 concurrently	Pump house located between Cabins 19 and 20
19	Well servicing Cabins 17-20 concurrently	Pump house located between Cabins 19 and 20
20	Well servicing Cabins 17-20 concurrently	Pump house located between Cabins 19 and 20
21	Likely serviced from system at Cabin 23 (Comox Lake source)	
22	Likely serviced from system at Cabin 23 (Comox Lake source)	
23	Elevated Reservoir (Comox Lake source)	Pumphouse and water filtration system
24	Likely serviced from system at Cabin 23 (Comox Lake source)	
25	No observed water sources.	

The Water Sustainability Act defines “Domestic Purpose” as follows:

...the use of water for household purposes by the occupants of, subject to the regulations, one or more private dwellings, other than multi-family apartment buildings, including, without limitation, hotels and strata titled or cooperative buildings, located on a single parcel, including, without limitation, the following uses:

(a) drinking water, food preparation and sanitation;

(b) fire prevention;

(c) providing water to animals or poultry kept

(i) for household use, or

(ii) as pets;

(d) irrigation of a garden not exceeding 1 000 m² that is adjoining and occupied with a dwelling;

Wells serving multiple residences are exempt from (extraction) licensing because the current property is considered a single parcel and is not strata titled. If the CLLC pursues strata subdivision, then wells that serve more than one cabin must obtain extraction licenses per the Act. Surface water systems may require different arrangements, and this should be addressed in the subdivision stage for this property, or when changes to individual cabins are proposed and a building permit process is initiated.

Under the *Drinking Water Protection Act* a single well servicing multiple cabins is considered a water system. However, in communications with Island Health they indicated that they don't necessarily regulate such systems. They did recommend that testing of the water be conducted and that those cabin owners sharing the water source sign an agreement to share maintenance costs.

9 Geotechnical Review

Ryzuk Geotechnical was retained by Wedler to complete a geotechnical review of the CLLC lands. Two reports were completed, and both are included as appendix 5. Their work included a site reconnaissance to visually inspect foreshore revetment structures, retaining walls, steep slope areas, and reviewed available information pertaining to the project. No subsurface investigation work or detailed review of existing slopes and/or structures was carried out.

9.1 Foundations and Subgrade

Foundations appear to bear on native compact to dense gravelly sand soils, or a veneer of fill placed atop such. Ryzuk Geotechnical considers these subgrade conditions suitable to provide long term support to the footings. Unfortunately, nearly all the foundations observed are deficient, with either wood material bearing directly on soil or atop temporary removable concrete footings. Ryzuk Geotechnical recommends any wood footings bearing directly on subgrade soils be replaced with concrete placed atop subgrade approved by a geotechnical professional. Further, it is recommended that the base of all footings extend to a depth of at least 450mm below adjacent finished grades for frost protection.

Loads from building footings generally project down through the underlying soils at 1H:1V (Horizontal: Vertical) from the edge of the footings. As such no cut slopes and/or scarps can encroach within this area. In areas on Lots 1, 8, 16, and 17, building footings were located next to cut slopes that were over steepened and do not meet the criteria noted above. Additional erosion and/or slope regression in these locations could lead to loss of support for footings, which could lead to structural damage to buildings.

9.2 Foreshore Revetment

There are numerous styles and ages/conditions of foreshore revetment structures in place on the lakefront side of most of the existing residences. Lot 1 has a lock block foreshore revetment structure which sits below the lake high water level of 135.33m. This could lead to erosion of the foreshore slope and possible damage to building footings if it were to be overtopped. Lot 4 has a carriage house with a main floor elevation that resides below the floodplain level, and whose revetment structure consists of a single log retaining wall, which is insufficient for flood protection. The Lot 3 residence is located below the floodplain level as well. To protect buildings on Lots 1, 3, and 4, and prevent damage to the structure, it is recommended that the revetment structures be reviewed in more detail. In general, the revetment structures other than those noted above are in poor condition and may require upgrading or replacing soon.

9.3 Retaining Walls

Retaining walls on CLLC land are of varying types and age. They include lock-block, boulder stack, railway tie, and wood log walls. On Lots 1, 2, and 15, lock-block retaining walls have been constructed in the near vicinity of an existing building, such that they pose an immediate hazard to persons or structures built adjacent to them. On Lots 8, and 18, existing wood cribbing walls have been constructed to support failed slopes or existing fills close to buildings footings. In both cases, the walls appear to be in a state of disrepair or are failing, and it is recommended that they be replaced to prevent damage to adjacent buildings. Several boulder stack retaining walls appear to have been recently built on Lot 12. The retaining walls have been constructed with varying face inclinations, are up to 4m tall, and in areas support concrete slabs and buildings. The wall on Lot 12 near the foreshore currently has an outbuilding under construction within 1m of the crest wall. Boulder stack walls are generally intended to support landscape areas and not structural building loads, since rocks within the walls can shift over time which can cause the loss of support for the footings. As such, the structure atop the wall will likely need to be removed or the wall reinforced to allow for the structural building loads and should be reviewed further.

It is recommended that the existing walls on Lots 1, 2, 8, 12, 15, and 18 be formally reviewed by a geotechnical professional to assess the stability under static and seismic loading conditions.

9.4 Steep Slopes

In most cases the excavated cut slopes in the native sand soils are steepened beyond what we would consider permanently or temporarily stable, and evidence of raveling and sloughing was noted on all the exposed cuts. Several over steepened cut slopes in the order of 2-4m tall were observed on Lots 1, 5, 7, 12, 16, 17, and 18 directly adjacent to existing building footings. If the slopes in these areas were to fail, the building footings could lose support which would likely cause damage to the building structure. It is recommended that the cut slopes in these areas be reviewed by a geotechnical professional to assess the stability and determine remediation solutions.

10 Discussion and Next Steps

Given the lack of enforcement of zoning and development regulations by the Village and previously the CVRD, and the inappropriate zoning assigned to the CLLC lands, the property is considered to have “legal non-conforming” status. Per the BC Local Government Act:

10.1.1.1 Non-conforming uses: authority to continue use

528 (1) Subject to this section, if, at the time a land use regulation bylaw is adopted,

(a) land, or a building or other structure, to which that bylaw applies is lawfully used, and

(b) the use does not conform to the bylaw, the use may be continued as a non-conforming use.

As all structures on the CLLC lands are “lawfully used” in that they are owned by the corporation and occupy the land owned by the corporation, while they do not conform to the current zoning bylaw, they are considered legal and are not required to be removed or changed. However, the Act does go on to place restrictions on their use and alterations / repairs which should be adopted as appropriate into the eventual zoning for the property.

The current OCP designation for the property is:

Recreation Residential CPA: Means an area specifically designated to acknowledge the Comox Lake Land Corporation community and help manage new and existing development within the CPA in a self-contained, ecologically responsible and sensitive manner.

As nothing proposed is in opposition to this current definition, it is not required to amend the OCP to support the rezoning and possible strata subdivision. The following are recommended elements to include in a zone for this property (for coverage / GFA – the proposed strata lot with the maximum per existing conditions is referenced):

Table 10: Recommended zoning elements

Note: The following zone proposal will be reviewed by Village staff in discussion with the CLLC.

1. Principal Uses		<i>Recreational cabin</i>
2. Accessory Uses		<i>Accessory buildings and structures. Home occupation.</i>
3. Lots Created by Subdivision	Area, minimum	Only strata subdivision allowed, 400 m ²
	Frontage, minimum	Only strata subdivision allowed, 4 m
4. Density	Principal Buildings or uses per lot, maximum	<i>Southern Parcel - 20 Northern Parcel - 5</i>
	Accessory buildings or uses per lot, maximum	<i>Southern Parcel - 40 Northern Parcel - 10</i>
	Building GFA, maximum	Per current conditions – Cabin 7
5. Lot Coverage	Coverage, maximum	Per current conditions – Cabin 7, 25%
6. Principal Buildings and Structures	Setbacks, minimum	All lot lines
	Height, maximum	10.0 metres (32.8 feet)
7. Accessory Buildings and Structures	Setbacks, minimum	All lot lines
	Height, maximum	6.0 metres (19.7 feet)
8. Conditions of uses	Year-round occupancy permitted. All cabins to have onsite waste-water systems per Ministry of Health / Sanitary Sewerage Regulation.	
9. Other regulations	Only strata subdivision allowed. Only 1 strata lot per existing cabin authorized. Secondary suites and accessory dwellings permitted.	

Tables 10 through 12 show recommendations to mitigate risks and address any regulatory issues at each stage of the proposed development process.

Table 11: Rezoning and OCP Amendment Stage Recommendations

Rezoning Stage (note – only changes land-use designation)		
Risk Area	Specific Risk	Proposed Mitigation
Environmental	No new construction proposed.	None at this stage. Reporting has been completed.
Floodplain / Geotechnical	Cabin 3 – no erosion protection	Cabin be raised above designated floodplain level at same time foundation concerns are addressed. A BP/DP be applied for to regulate these works.
	Cabin 4 – accessory building below floodplain elevation	The building either be declared “uninhabited” or raised above the floodplain elevation and granted a variance.
	Cabin 5 – one level is below the flood construction level	This cabin should be granted a variance to the floodplain bylaw with the stipulation that the ground floor be considered “uninhabited”.
	All cabins above the flood construction level but within setbacks.	For cabins 1, 2, 4, 6, 7, 13, 14, 15 and 18 a variance be granted.
	Geotechnical risks / steep slopes.	Safety issues require professional review at cabins 1, 2, 3, 4, 5, 7, 12, 15, 16, 17 and 18
Stormwater	Impacts to groundwater / surface water.	None at this stage.
	Roof run-off issues.	Except for cabins 3, 10, 11, 19, 20, and 21, all cabins require minor alterations or improvements to the roof water drainage and gutters.
Traffic	General review of access to the development areas. Can legal access be provided?	Legal access to lots is possible. Easements/ access locations to be confirmed in subsequent stages. Identify constraints, potential substandard conditions, or other issues for review. Subdivision Stage process to analyze and design any upgrades to proposed common infrastructure. Includes cost / benefit analysis to justify recommendations.
Wastewater	Onsite wastewater treatment and disposal.	Complete filings for all onsite wastewater systems with VIHA and provide those records to the Village.
Water Supply	Are water supplies legal and safe.	None at this stage. All liability resides with the property owners.

Table 12: Strata Subdivision Stage Recommendations

Strata Subdivision Stage (note – only changes land ownership – not use) <i>*If any building / development permits applied for after rezoning and before subdivision, the following measures recommended to be completed as part of those individual cabin improvements, where appropriate.</i>		
Risk Area	Specific Risk	Proposed Mitigation
Environmental	Any impact from proposed changes to address other servicing issues and risks.	Specific physical works to have environmental review and reporting completed as a component of the subdivision process. Dedication of resource conservation land to be considered at this stage.
Floodplain / Geotechnical	Existing retaining structures.	Like for like replacement should be completed for aging retaining structures. Full DP / BP process to be followed so that the works are regulated.
Stormwater	Impacts to groundwater / surface water.	Any works triggered by the subdivision (road alignment changes, retaining wall changes) to be reviewed from a stormwater management perspective and any mitigating measures implemented.
Traffic	Interior Access Road Conditions and Emergency Vehicle Access – Central and North Lots	Review access road conditions, analyze constraints, cost / benefit analysis for retrofit conditions, and propose any improvements. Confirm improvements warranted for emergency vehicle access improvements. Consider “dry pipe” fire fighting systems for the Cabin 5 area.
	Intersection Improvement – Horbury Road Access	Realign Horbury Road intersection to a right angle with Comox Lake Road (minimum 80 degrees) at the centre of the horizontal curve to maximize sight distances. Also, move stop sign, include new stop bar at Comox Lake Road, and incorporate paint marking delineation at the intersection.
	Sightlines / stopping distance – Lots 3 and 4	Confirm sight distances with detailed site survey and review alternatives (see discussion in Section 5.0) to determine measures for improving visibility. Include cost / benefit analysis.
	Any accesses proposed over adjacent strata parcels.	Agreement for shared access or easement obtained.
	Access to northern group of cabins	Agreement with Forestry company for access or Road ROW or Easement obtained.
Wastewater	Onsite wastewater treatment and disposal.	All filings will be completed as part of the rezoning stage. Any agreements between strata lots or easements to be registered as part of the strata subdivision.
Water Supply	Are water supplies legal and safe.	Licenses for extraction for wells to service multiple strata lots will be required.

Table 13: Building Permit / Development Permit Stage Recommendations

Building Permit / Development Permit Stage (note – addresses physical construction and material changes to the site and the works)		
Risk Area	Specific Risk	Proposed Mitigation
Environmental	Any impact from proposed changes to address other servicing issues and risks.	Specific physical works to have environmental review and reporting completed as a component of the subdivision process.
Floodplain / Geotechnical	Existing retaining structures – flood plain elevations – flood protection.	Any changes to an individual cabin would trigger needed upgrades / changes to retaining structures. Raising floor levels also would be triggered as required. DP / BP for works with full regulatory review required.
Stormwater	Impacts to groundwater / surface water.	Any changes to the size / footprint of any works would trigger the need for a stormwater management report and mitigation planning. Would be part of the DP / BP process for proposed works.
Traffic	Driveway access conditions and locations	Specific driveway improvements to individual lots responsibility of the owner. Recommendations reviewed and provided to owner.
	Access roads, emergency access, and driveway accesses.	Implementation of identified improvements with rationale.
Wastewater	Onsite wastewater treatment and disposal.	Per standard procedure with properties serviced with onsite wastewater systems, the capacity of those systems to be reviewed and verified with respect to proposed physical changes. This would be included in the DP / BP process.
Water Supply	Are water supplies legal and safe.	Any physical changes to lots serviced by wells or surface water extraction to be reviewed as part of the DP / BP process. Servicing capacity to be addressed.

11 Conclusion

We trust this report meets the needs of the Village, which summarizes existing servicing and conditions to each of the West, Central and North locations. No changes to use or density is proposed for the lots. For the Rezoning stage, changes to the zoning will allow for future subdivision of the residences into individual strata lots and subsequent processes for undertaking improvements to the cabins.