Comox Valley REGIONAL DISTRICT

Staff Report

DATE: July 28, 2021

FILE: 3160-20/FR 1C 21

TO: Chair and Directors
Electoral Areas Services Committee

FROM: James Warren
Deputy Chief Administrative Officer

Supported by James Warren
Deputy Chief Administrative Officer

J. Warren

RE: **Site Specific Exemption to Floodplain Management Bylaw**
9520 Riverbend Road (Miller)
Puntledge – Black Creek (Electoral Area C)
Lot 4, Section 28, Block 29, Comox District, Plan 32398, PID 000-150-975

Purpose
To consider a request for a site specific exemption to the floodplain setback for a proposed residential development.

Recommendation from the Chief Administrative Officer:
THAT the Comox Valley Regional District Board grant an exemption to Bylaw No. 600 being the "Floodplain Management Bylaw No. 600, 2020" to permit the development of a single detached dwelling within the minimum 60 metre floodplain setback of Oyster River (FR 1C 21, Miller) on property described as Lot 4, Section 28, Block 29, Comox District, Plan 32398, PID 000-150-975 (9520 Riverbend Road);

AND FINALLY THAT, as a condition of the site specific exemption to the Floodplain Management Bylaw, the property owners, at their own expense, register a restrictive covenant under Section 219 of the *Land Title Act*, specifying conditions that would enable the land to be safely used for the use intended according to the terms of the engineer report prepared by Adrian Chesham, M.Eng., P.Eng., and reviewed by Peter Bullock, M.Eng., P.Eng., dated April 5, 2021 and revised June 2, 2021, which will form part of the restrictive covenant, as well as an acknowledgement that no Disaster Financial Assistance funding is available for the building or its contents and releasing and indemnifying the Comox Valley Regional District from liability in the event any damage is caused by flooding or erosion.

Executive Summary

- The subject property has a mobile home. The applicants propose to remove the mobile home, develop a new single detached dwelling and an accessory building. The location of the proposed single detached dwelling is less than the minimum 60 metre floodplain setback of the Oyster River.
- The engineer report analyzes the proposal relative to minimum floodplain setback and flood construction level (FCL) requirements. The engineer confirms that with the reduced floodplain setback, the proposed single detached dwelling is considered to be safe for the use intended, provided that their conditions are followed.
- As the engineer confirms that the proposal is safe as intended, staff supports this application. The engineers report will be registered as a Section 219 Restrictive Covenant on the Land Title of the subject property to release and indemnify Comox Valley Regional District (CVRD) from liability of damage due to flooding.

Prepared by:	Concurrence:	Concurrence:
B. Chow	*T. Trieu*	*A. Yasinkski for*
Brian Chow, RPP, MCIP Planner II	Ton Trieu, RPP, MCIP Manager of Planning Services	Amanda Yasinski Acting General Manager of Planning and Development Services

Government Partners and Stakeholder Distribution (Upon Agenda Publication)

Applicants	✔

Background/Current Situation

The subject property, located at 9520 Riverbend Road, is approximately 0.3 hectares in area. It is in Puntledge – Black Creek Electoral Area (Electoral Area C) (Figures 1 and 2). The subject property relies on private water and wastewater treatment systems. It is within Black Creek/Oyster Bay Fire Protection Local Service Area. The property is bound by Oyster River to northeast, Riverbend Road to southwest, and residential lots to the southeast and northwest direction. In addition, there is a watercourse (i.e., highway ditch) across Riverbend Road.

The applicants propose to remove the existing mobile home, and replace it with a single detached dwelling with a garage, and an accessory building (Figure 3). Bylaw No. 600, being the "Floodplain Management Bylaw No. 600, 2020" (Floodplain Management Bylaw) has a minimum setback of 60 metres from the present natural boundary (PNB) of Oyster River. The floodplain mapping for Oyster River indicates a minimum FCL between 65 metres and 66 metres of geodetic elevation.

The proposed single detached dwelling is 30 metres from Oyster River; therefore, a site specific exemption application to the Floodplain Management Bylaw is required.

Planning Analysis

Official Community Plan Analysis

Bylaw No. 337, being the "Rural Comox Valley Official Community Plan Bylaw No. 337, 2014" (OCP), designates the subject property within Rural Settlement Areas. Sections 15 and 16 of the OCP provides objectives and policies regarding development in the vicinity of natural hazards. Section 15(2) states, "To direct new development away from hazard areas" and Section 16(1) states, "Do not permit new development in hazard areas, including mapped floodplains, steep slopes and areas of active erosion." The proposed development is under guidance and recommendations by an engineer.

Zoning Bylaw Analysis

The subject property is zoned Rural Eight (RU-8) which permits a single detached dwelling and an accessory building. The proposed buildings meet the minimum lot line setbacks and maximum lot coverage requirements.

Floodplain Management Bylaw Analysis

Section 302(1)(b) of the Floodplain Management Bylaw states that where floodplain mapping is available, the FCL for a specific property shall be determined by interpolation from the flood construction levels shown on the floodplain mapping for Oyster River. The floodplain mapping shows that the FCL for the subject property is between 65 and 66 metres. Section 303(1)(a) prescribes a minimum 60 metre setback from the PNB of Oyster River.

The applicants submitted an engineering report prepared by Adrian Chesham, M.Eng., P.Eng., and reviewed by Peter Bullock, M.Eng., P.Eng. of Base Geotechnical Inc., dated April 5, 2021, and revised June 2, 2021 (Appendix A). The engineer determines the following minimum FCLs of Oyster River and the Riverbend Road watercourse for each proposed building (Table 1).

Table 1: Minimum FCLs for Each Proposed Building

	Minimum FCL of Oyster River	Minimum FCL of Riverbend Road Watercourse
Proposed Single Detached Dwelling	65.8 metres	66.0 metres
Proposed Accessory Building	65.8 metres	65.8 metres

There are two different minimum FCLs of Riverbend Road watercourse because it flows downhill, and the elevation drops between its relative location to the proposed single detached dwelling and proposed accessory building. The proposed single detached dwelling will meet the minimum FCL of both watercourses. The crawlspace within the single detached dwelling and the proposed accessory building are deemed non-habitable area, and are exempt from meeting the minimum FCL.

With respect to the minimum 60 metre floodplain setback of Oyster River, the proposed single detached dwelling is beyond 30 metres from the PNB of Oyster River. The proposed accessory building is beyond 60 metres from the PNB of Oyster River. Therefore, there is a need to exempt the proposed single detached dwelling from meeting this minimum floodplain setback. It should be noted that both proposed buildings meet the minimum 15 metre floodplain setback of Riverbend Road watercourse.

The engineer confirms that the proposed single detached dwelling is considered to be safe for the use intended with respect to the reduced Oyster River setback, provided that the report conditions are followed. The conditions are the habitable areas of the proposed buildings must meet the minimum FCLs as prescribed. As the engineer deems the proposal is safe for the intended use, planning staff supports this application.

Policy Analysis

Section 524 of the *Local Government Act* (RSBC, 2015, c. 1) (LGA) authorizes a local government to establish a bylaw to designate a floodplain and specify a setback from a watercourse, body of water or dike to any landfill or structural support required to elevate a floor system or pad above the flood level. Sections 524(7) and (8) allow a local government to grant an exemption to a floodplain bylaw upon receipt of a report by a qualified professional that the land may be used safely for the use intended and that the exemption may include terms and conditions the local government considers necessary or advisable.

Options

The board may choose to grant or refuse the site specific exemption of the floodplain specifications. Based on the discussions outlined in this report, the board is recommended to grant the floodplain exemption request.

Financial Factors

Applicable fees have been collected for this application under the "Comox Valley Regional District Planning Procedures and Fees Bylaw No. 328, 2014."

Legal Factors
This report and recommendation contained herein are in compliance with the LGA and CVRD bylaws.

Regional Growth Strategy Implications
Bylaw No. 120, being the "Comox Valley Regional District Regional Growth Strategy Bylaw No. 120, 2010" (RGS), designates the subject property within Rural Settlement Areas. Policy 1D-2 of the RGS, pertaining to the public costs of housing states, "Direct new housing away from high risk natural hazard areas such as flood plains, areas exposed to sea-level rise…" Policy 8F-6 pertaining to planning for climate change adaption states, "All new development within established floodplains should be discouraged and redevelopment of lands within floodplain areas should only be supported where technical analysis by a qualified professional has been undertaken to ensure that lands are safe for use, development will not impact floodplain functions, and construction levels include safety factors to account for climate change and potential sea level rise and associated extreme storm surges." The proposed development is supported by recommendations from an engineer.

Intergovernmental Factors
There are no intergovernmental implications with this application.

Interdepartmental Involvement
This proposal was referred to applicable internal departments. None of the departments had any concerns or comments on this application.

Citizen/Public Relations
There are no citizen and/or public relations factors related to this report

Attachment: Appendix A – Engineering Report

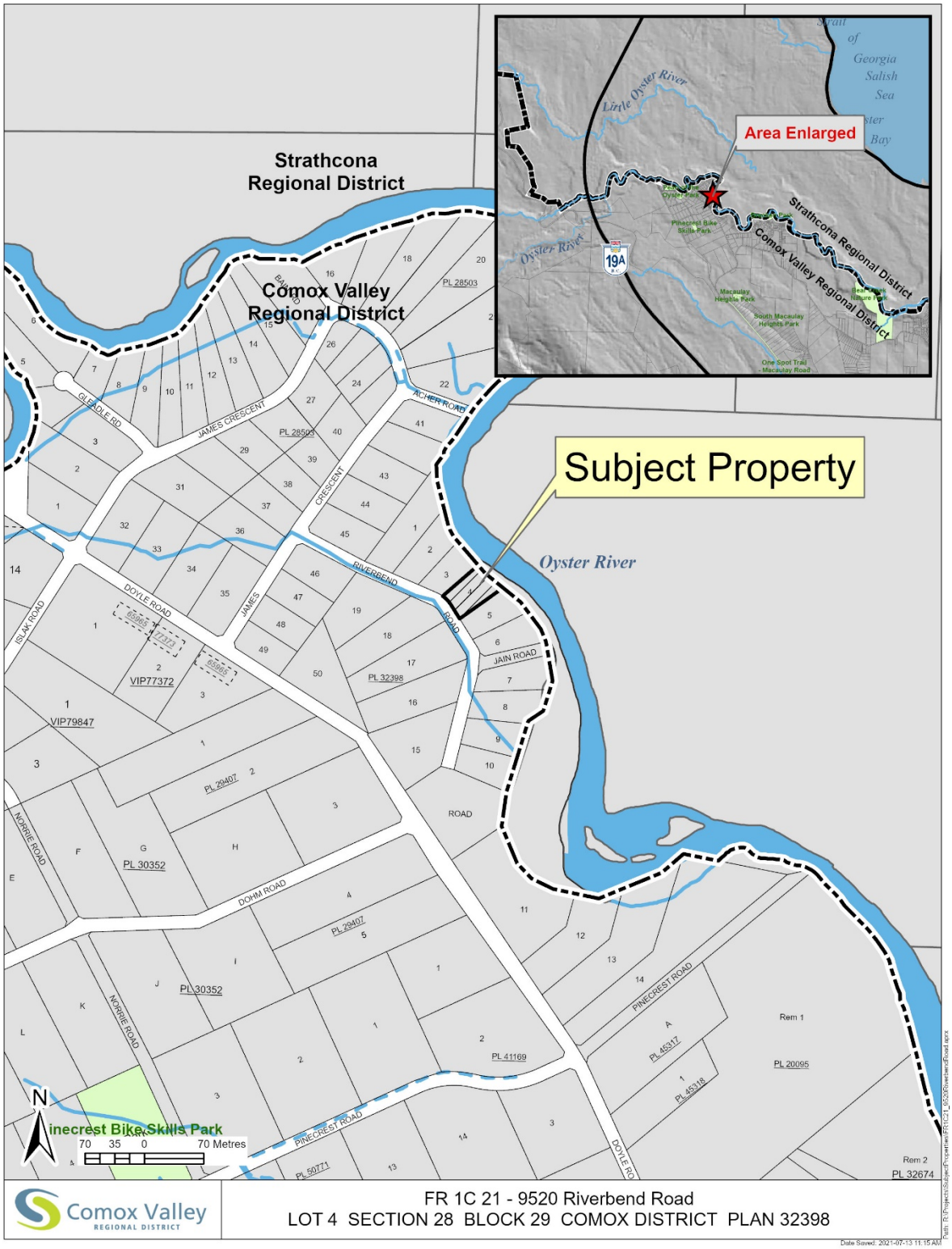


Figure 1: Subject Property Map

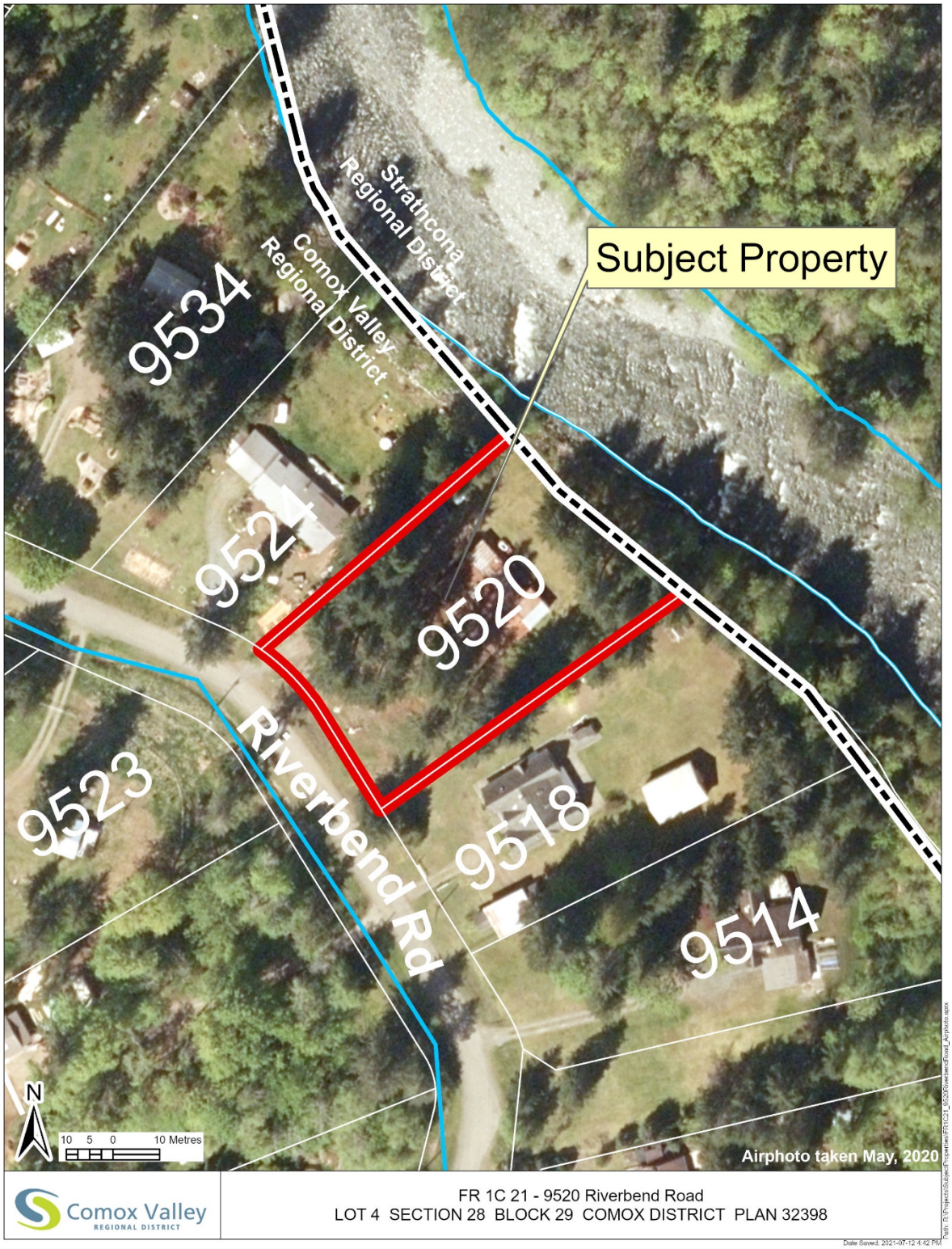


Figure 2: Air Photo

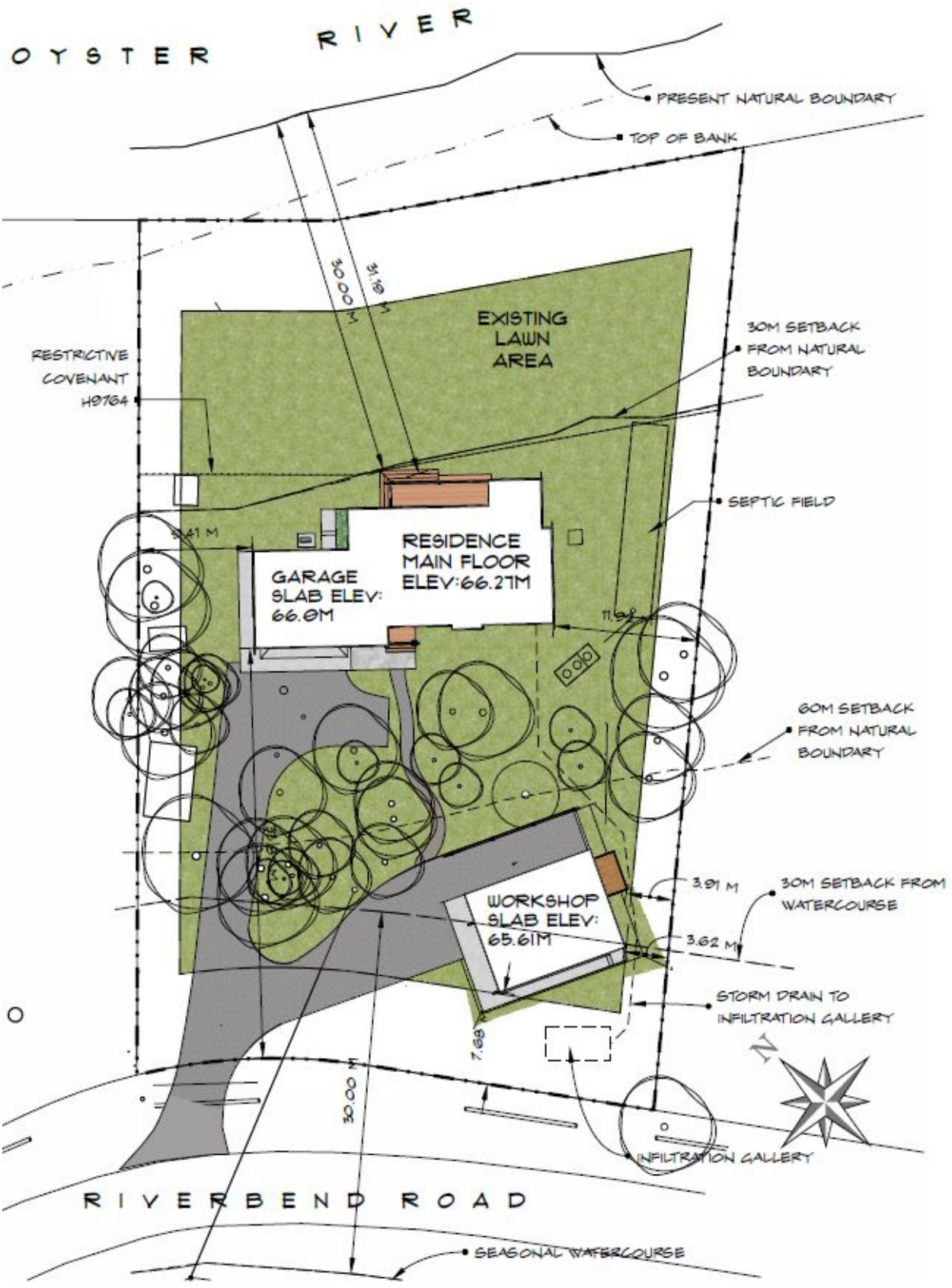


Figure 3: Site Plan

BASE Geotechnical Inc.
720 Fern Road East
Qualicum Beach, BC
V9K 1M3
250.228.2421
solutions@basegeotechnical.ca

Geotechnical Memorandum

Subject: Floodplain Assessment	File: 27820201213
Project: Proposed Single-Family Dwelling & Workshop	Pages: 26
Civic: 9520 Riverbend Road, Black Creek, BC	Memo Date: 2021-04-05 (revised 2021-06-02)
Legal: Lot 4 Section 28 Block 29 Comox District Plan 32398 (PID000-150-975)	To: Mike Miller, P.Eng.

1.0 Introduction

Base Geotechnical Inc. (BGI) was requested by Mr. Mike Miller, P.Eng. (property owner) on March 2, 2021 to assess both the Oyster River floodplain and a nearby watercourse with respect to the proposed new residential construction at 9520 Riverbend Road in Black Creek, BC in support of a floodplain management bylaw exemption application for the Comox Valley Regional District (CVRD). Adrian Chesham, P.Eng. (BGI) inspected the subject property with Mr. Mike Miller on March 11, 2021 and has reviewed the background documentation as listed in the References section.

This report is subject to the BGI's Statements of General Conditions, attached to this report. These should be clearly understood while reading or interpreting this report.

2.0 Bylaw Requirements

This geotechnical memo has been prepared in accordance with CVRD Bylaw No. 600 that relates to the floodplain management in the subject area. The following list provides a summary of some of the relevant sections.

Section 302

- The flood construction level for a specific property should be determined by interpolation from the flood construction levels shown on the "Schedule C – Floodplain Mapping for the Oyster River".
- Where floodplain mapping is not available, the following elevation is specified as Flood Construction Level: 1.5 m above the natural boundary of any other watercourse, where the land is within a distance of 100 m of that watercourse.

Section 303

- Stipulates that a minimum of 60.0 m is required from the natural boundary of the Oyster River.

Section 304

- A person must not site a building or structure within any floodplain setbacks as specified in Section 303.
- A person may use structural support or compacted landfill or a combination of both to elevate the underside of the floor system above the flood construction levels specified in Section 302.
- A person must not extend any compacted landfill required to support a floor system or pad within any floodplain setbacks specified in Section 303.

Section 403

- a person may make an application to the CVRD to exempt a specific parcel of land or a use, building or other structure on that parcel of land from the provisions of this bylaw.
- The CVRD may provide an exemption from the provisions of the bylaw where:

- The property owner has provided a report prepared by a professional engineer in accordance with the *Provincial Flood Hazard Area Land Use Management Guidelines* and the *Engineers and Geoscientists of BC's Professional Practice Guidelines – Legislated Flood Assessments in a Changing Climate* that provides a description of the proposed development and specifies conditions that would enable the land to be safely used for the use intended.
- The professional engineer has provided a completed Flood Hazard Risk Assurance Statement.

3.0 Project Description

The property owner is planning to remove the existing mobile home on the property and construct a new two-storey single-family dwelling (238.64 m^2) with attached garage. It is understood that the footprint for the new home will be approximately within the current footprint of the mobile home and will be greater than 30 m from the Present Natural Boundary (PNB) of the Oyster River. Also, a new detached workshop will be constructed on the south side of the property. The new detached workshop is offset approximately 60 m from the PNB of the Oyster River. The landowner also plans to construct a septic field between the new home location and the south-eastern property boundary.

4.0 Site Description

The subject property is situated in a rural neighbourhood that fronts onto the west side of the Oyster River that flows in a southeasterly direction. The property is approximately 0.34 Ha (0.83 Acres) and is rectangular in shape. The lot is elevated above the river by approximately 3 m and is relatively flat-lying with a gentle grade to the south. A shallow swale-like feature, approximately 0.5 m deep, cuts across the middle of the property in a southeast direction. The property is within the 1:200 Year (i.e., 0.5% Annual Exceedance Probability) Oyster River floodplain as defined by historical BC floodplain mapping. The west side of the riverbank has been armoured with rock revetment that extends from the northeastern corner of the property upstream several hundred meters. The property owner noted that the revetment had been installed by the provincial government possibly in the 1980's.

There is grassy ditch, noted as a smaller watercourse (as shown in Appendix A) that is graded in a southeasterly direction on the west side of Riverbend Road. This smaller watercourse was observed to be dry when inspected by BGI on March 11, 2021.

There are several mature fir trees on the western-most half of the property and an existing mobile home situated about 30 m from the river. The existing mobile home is supported by cinder blocks and the main floor has an elevation of El. 66.54 m geodetic, which is elevated approximately 1 m above the existing ground. The property has a Restrictive Covenant B55692 as shown on the legal survey drawing provided in Appendix A, which pertains to the protection of sensitive habitat.

There is a water well north-of the existing home that is contained inside a wooden shed structure. The property owner indicated that the top of the well casing is near flush with the ground surface and at an elevation of about El. 65.46 m. The property owner recently measured the water table elevation in the well to be approximately El. 62.7 m (i.e., 2.76 m below ground surface).

5.0 Oyster River

The Oyster River originates in the mountains of the Forbidden Plateau on Vancouver Island, and drains an area of about 376 km^2 before entering the Strait of Georgia and has several tributaries. The Oyster River's streamflow is characterized by a high flow in November due to fall rains, and another high flow in May and June due to snowmelt from high elevations. Minimum flows generally occur between August and October.

6.0 Subsurface Conditions

The western riverbank of the Oyster River on the neighbouring property to the south (i.e., immediately downstream of the rock armouring) had some bank erosion that exposed the geology. BGI observed this location to consist of approximately 3 meters of sand containing cobbles overlying a 0.5 m thick layer of very dense glacial till over bedrock. The exposed bedrock was observed across the river channel bottom. The top of the glacial till at this location was estimated to be at an elevation of about El. 62.3 m based on a rough estimate using hand laser and ground surface elevations provided on the legal land survey.

The property owner had recently excavated a test pit immediately southwest of the home that had not been backfilled when BGI inspected the property. The test pit was approximately 1.5 m deep and was observed to have 1.2 m of sand deposits (containing roots and rootlets) overlying a sandy matrix containing cobbles to the bottom of the test pit. The test pit was dry with no signs of seepage. The top and bottom elevations of the test pit were estimated to be approximately El. 65.3 m and El. 63.8 m, respectively. The landowner indicated that similar sandy material with cobbles was encountered in another test pit that had recently been excavated near the future septic field area. BGI did not visually observe the test pit at the proposed septic field location as it had been backfilled prior to the site inspection. It is understood that the test pit excavated in the septic field was also dry at completion and roughly the same depth (1.5 m).

7.0 Discussion

7.1 Flood Construction Level

The proposed location for the new home is within the 200 Year Oyster River floodplain (0.5% Annual Exceedance Probability) and will require a floodplain exemption by the CVRD based on Section 403 of Bylaw No. 600. Also, the proposed location for the new home is within the 60 m setback bylaw requirement from the natural boundary of the Oyster River and would require a floodplain exemption.

The design flood level was determined by comparing and taking the maximum FCL by comparing the FCL for the Oyster River and the FCL for the smaller watercourse. The CVRD Bylaw 600 states that the Flood Construction Level (FCL) for the Oyster River can be determined by interpolation of the 1 in 200 Year flood levels shown on the 1984 Oyster River floodplain inundation map. Based on the 1984 Oyster River floodplain map, the 1 in 200 Year flood level for the property is approximately EL. 65.5m, which includes a freeboard of unknown height. Typically, freeboard values for water floods that have been adopted in BC are 0.3 m above the maximum instantaneous design flood level but could be up to a meter or more depending on the uncertainties in the inundation mapping and the risk tolerance of the regulating jurisdiction. Based on the mapping and an additional 0.3 m freeboard, the FCL for Oyster River should be at or above El. 65.80 m.

The calculated smaller watercourse FCL was based on measuring perpendicular from the watercourse on the other side of the street to where it intersects the buildings. Since the stream flows downhill to the southeast it is lower at the point where it intersects the front face of the workshop than where it intersects the house. As such, a lower design FCL of El. 65.8 m, is permitted for the detached workshop, whereas the main home has an FCL of 66.0 m. Refer to Table 1 for the calculated Design FCL's to be used for the project.

The elevation of the underside of a wooden floor system or top of concrete slab for habitable buildings must exceed the FCL Design value provided in the table below. "Habitable" is defined as any room or space within a building that is or can be used for human occupancy, commercial use, or storage of goods, possessions, or equipment (including furnaces and electrical) which would be subject to damage if flooded.

Table 1 – FCL values for proposed construction works for subject property.

Structure	Offset to Oyster River PNB, m	Offset from Smaller Watercourse, m	FCL (Oyster River), m	FCL (Smaller Watercourse, m	FCL Design, m
Main Home & Attached Garage	>30	<55	65.8	66.0 (i.e., 64.5+1.5)	66.0
Detached Workshop	>60	~25	65.8	65.8 (i.e., 64.3+1.5)	65.8

7.2 Crawl Space

The property owner has requested BGI to also assess the implications if the top of the crawl slab was constructed to an elevation of El 64.33, with respect to groundwater levels.

The water elevation measured by the property owner in the nearby water well was El. 62.7 m, which is approximately 1.6 m below the top of the proposed crawl slab. The observations made on the riverbank nearby suggest that the top of the impervious layer (i.e., glacial till and/or bedrock) may be at an elevation of approximately at El. 62.3 m. As such, BGI suspects that the water level measurement in the water well is likely a perched water table within the old fluvial channel sandy deposits that overly this impervious layer. The bottom of the test pit extended about 0.5 m below the El. 64.33 m elevation and was observed to be dry with no seepage. The water table is expected to be hydraulically connected and draining toward the existing river channel. As such, it is anticipated that the groundwater table will fluctuate with the actual river elevation and could foreseeably rise above the El. 64.33 elevation. Consequently, BGI recommends that the crawl space be designed to accommodate a fluctuating groundwater level.

7.3 Foundation and Slab on Grade

At a minimum, the BC Building Code should be followed for the design and construction of the building foundation and concrete floor slabs, including the capillary break below the floor slabs. The 2018 BC Building Code requires that the gravel material below the floor slabs have less than 10 percent passing the 4mm sieve. Ideally, the best practice is to utilize a material that 100% passes the 25 mm sieve and 100% retained on the 19 mm sieve, which is expected to provide a greater void volume and a longer design life. The gravel will act as a capillary break and vapour vent below the concrete floor slab, which is important given the potential for a perched water table.

8.0 Summary

The proposed construction of the single-family dwelling at 9520 Riverbend Road in Black Creek, BC is considered to be safe for the use intended with respect to the Riverian floodplain hazard (with the reduced setback) provided the conditions in this geotechnical memo are followed. The property is within the 1:200 Year Flood Construction Level and the location of the proposed new home is less than the minimum 60 m setback bylaw requirement measured from the natural boundary of the Oyster River. As such, a floodplain exemption would need to be granted by the CVRD to approve the construction of the single-family dwelling on the property. The new home would need to be constructed based on a minimum FCL of El. 66.0 m and any habitable space within the new detached workshop must be based on a minimum FCL of 65.8 m. The crawl space for the new home should be designed to accommodate fluctuating groundwater levels.

9.0 Closure

This memo may be requested by CVRD Approving Officers and Building Inspectors in support of the floodplain exemption application for the new home. This memorandum has been prepared solely for, and at the expense of, the owner of the subject land. This memorandum has been prepared by Adrian Chesham, a Professional Engineer in good standing with the Engineers and Geoscientists of British Columbia and has adequate experience to provide this memorandum. The sealed Flood Assurance Statement is appended to this memorandum.

Sincerely,

Adrian Chesham, M.Eng., P.Eng.
Base Geotechnical Inc.
Senior Geotechnical Engineer

Reviewed By:

Peter Bullock, M.Eng., P.Eng.
Base Geotechnical Inc.
Principal Engineer

References

British Columbia Building Code 2018.

Bruce Lewis Land Surveying Inc. Site Plan of Lot 4, Section 28, Comox District, Plan 32398 PID 000-150-975. Civic Address 9520 Riverbend Road. File 2271-T01. December 8, 2020.

Comox Valley Regional District Bylaw No. 600 being "Floodplain Management Bylaw, No. 600, 2020.

Ebbwater Consulting. Comox Valley Regional District Oyster River / Saratoga Beach Flood Risk Assessment Final Report. May 3, 2018.

Engineers and Geoscientists of British Columbia. Natural Hazards – Legislated Flood Assessments in a Changing Climate in BC. Version 2.1. Published August 28, 2018.

Gower Design Group. Preliminary house design drawings. Dated February 5, 2021.

Homeowner Protection Office. Housing Foundations and Geotechnical Challenges: Best Practices for Residential Builders in British Columbia. 2015.

Land Title No. CA6584954. Lot 4 Section 28 Block 29 Comox District Plan 32398. November 24, 2020.

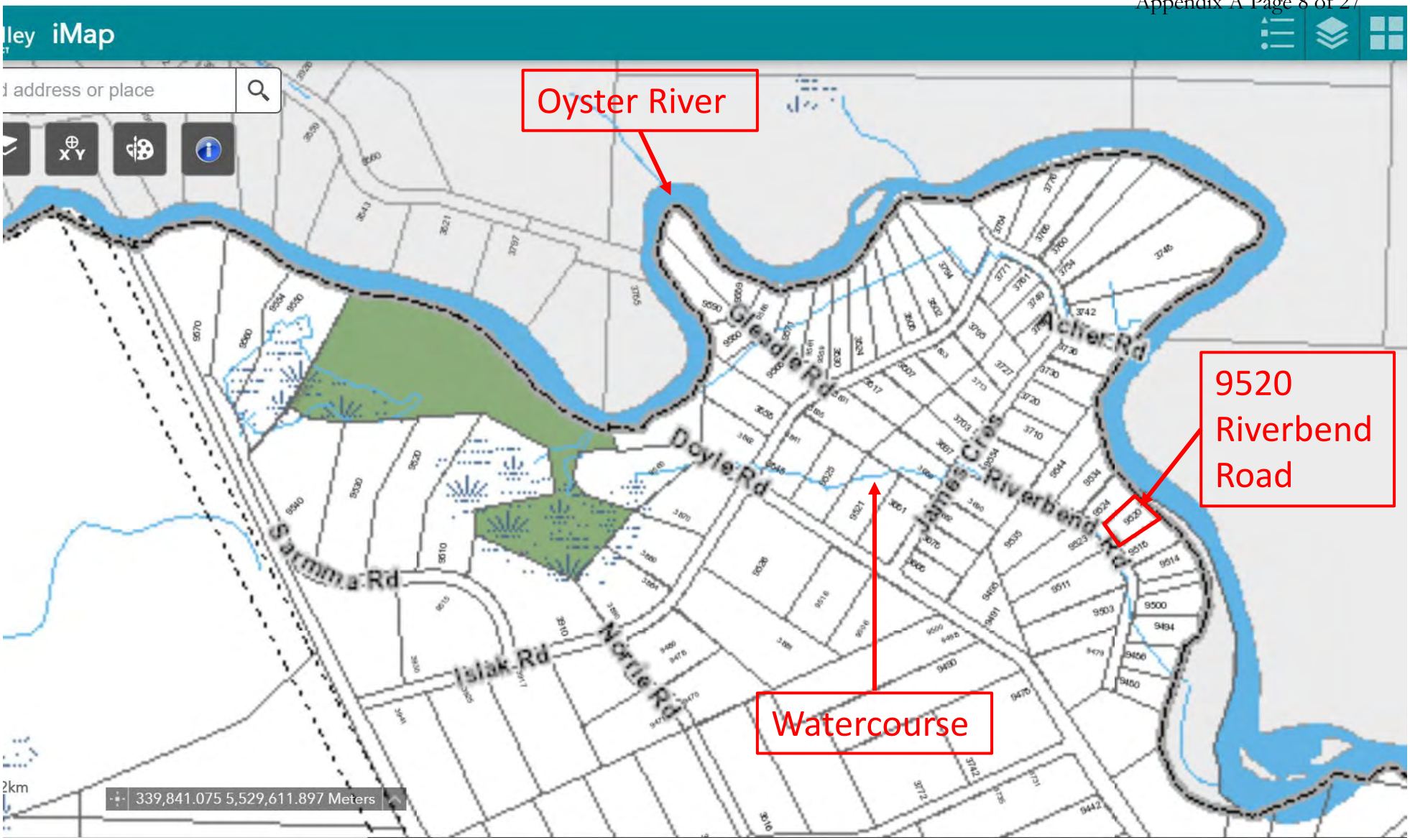
Province of British Columbia. Ministry of Environment Water Management Branch. Preliminary Floodplain Mapping – Oyster River. File No. 0305030-9. Scale 1:5000. Drawing No. 5532-2 Sheet 2 of 3. May 1984.

Province of British Columbia. Ministry of Water, Land and Air Protection. Province of British Columbia. Amended by the Ministry of Forests, Lands, Natural Resource Operations and Rural Development. May 2004.

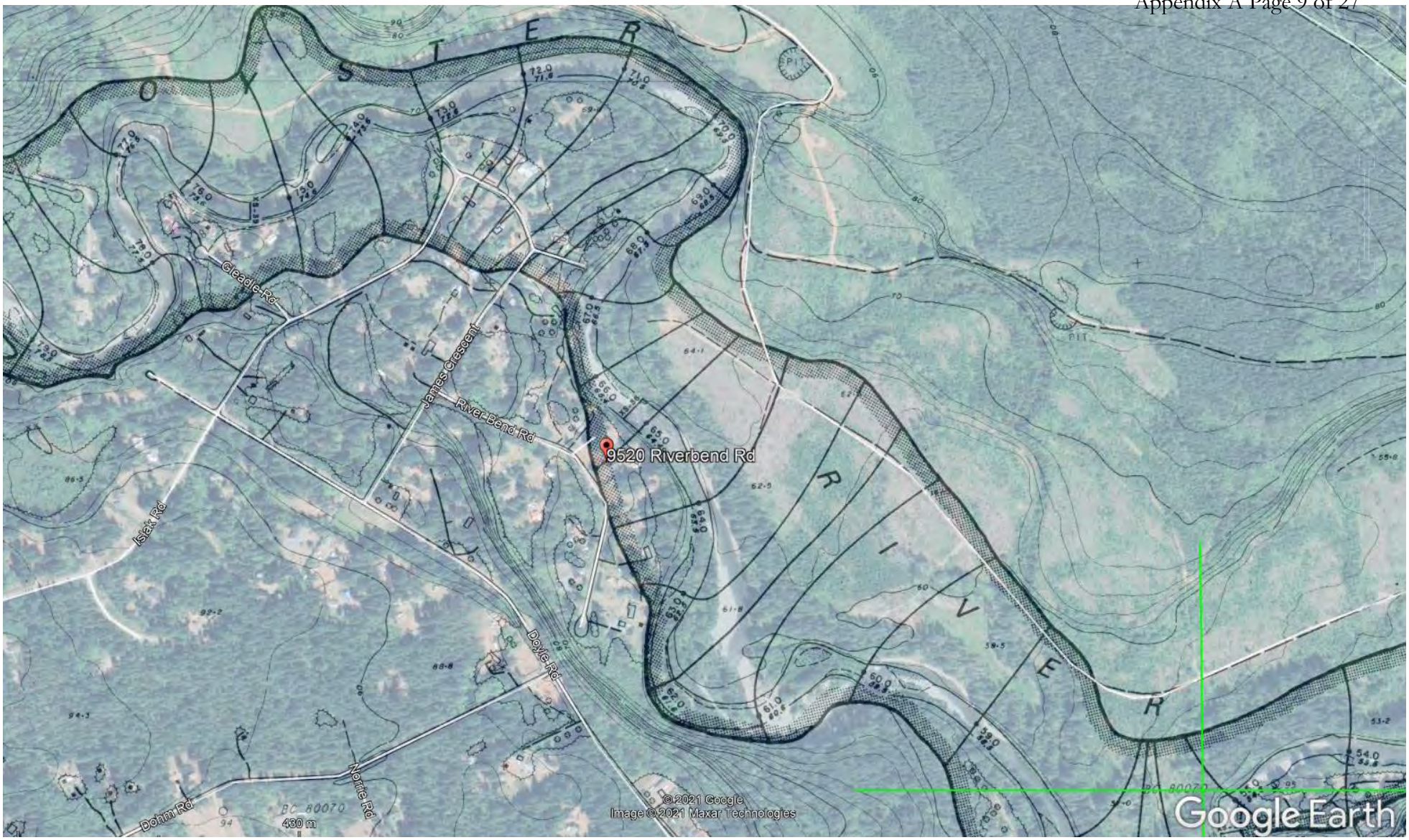
Site Location
Reference: Google Earth Imagery

BASE Geotechnical Inc.

Project: Geotechnical Floodplain Assessment 9520 Riverbend Road, Black Creek, BC Lot 4 Section 28 Block 29 Comox District Plan 32398 (PID 000-150-9750	Subject: Appendix A		
	Date: April 5, 2021 (revised June 2, 2021)	Rev. A	Page 1

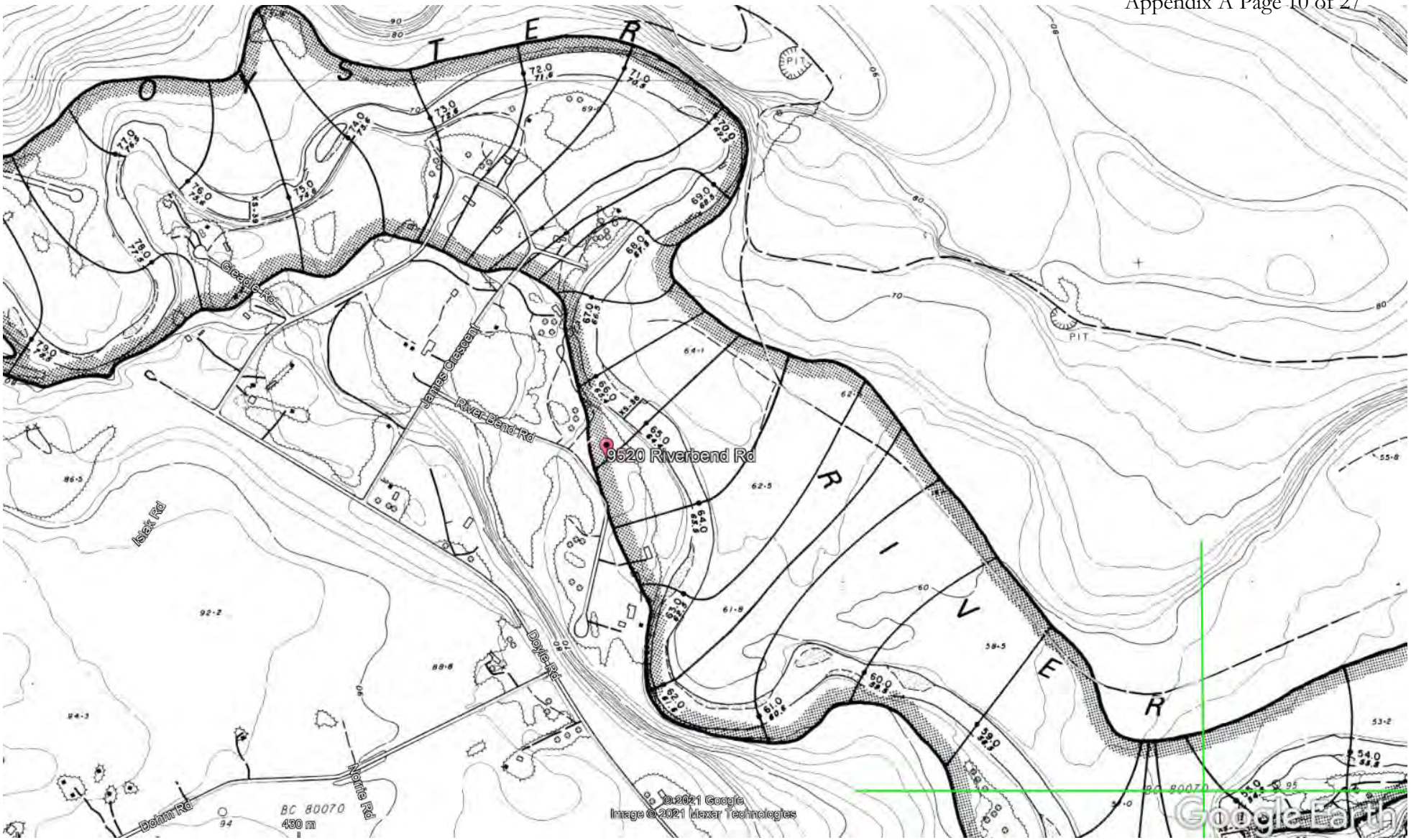


Reference: CVRD iMap (downloaded May 17, 2021)



Oyster River Floodplain Inundation Mapping

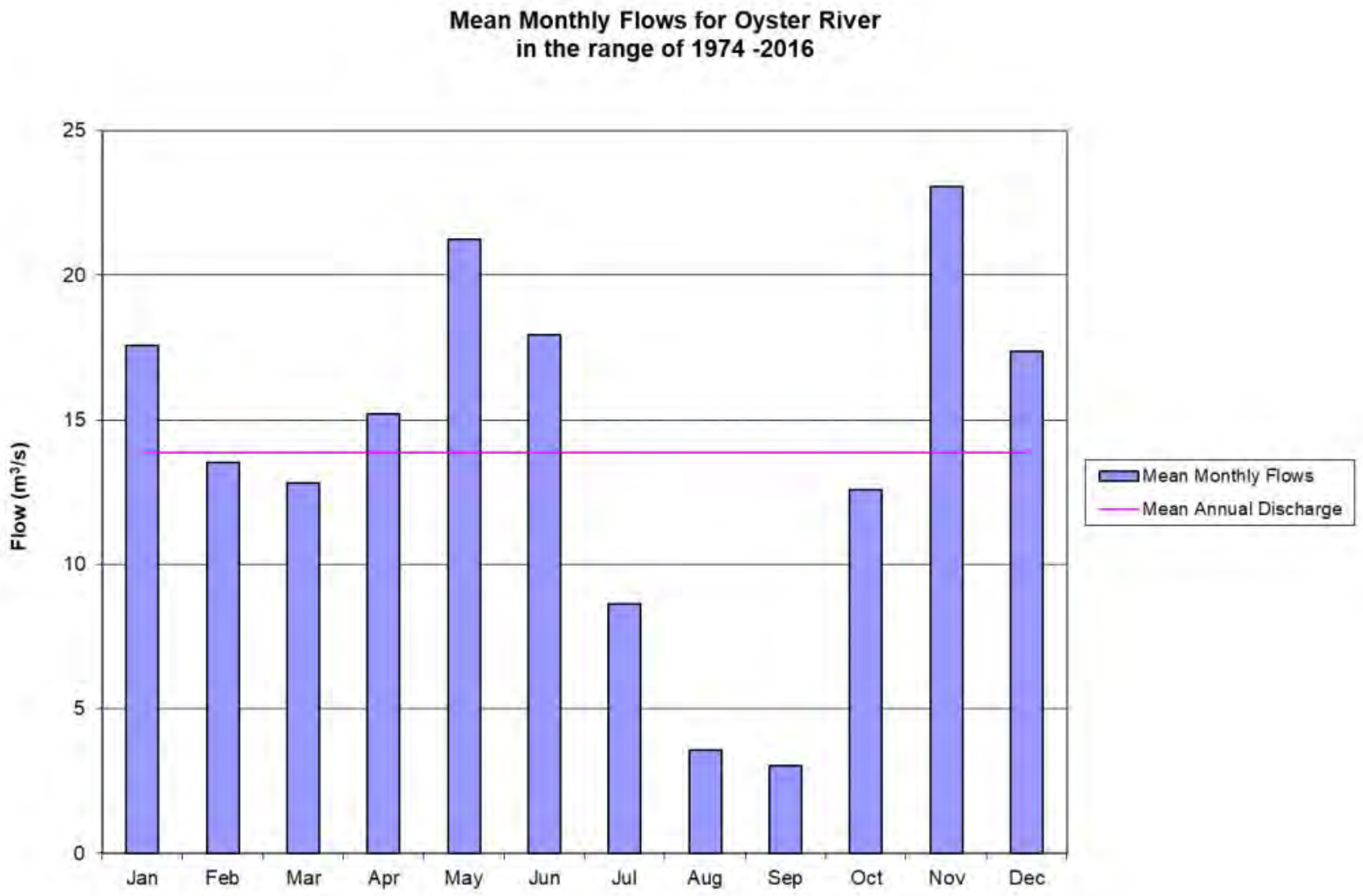
Reference – Province of BC Ministry of Environment Preliminary Floodplain Map from CVRD Bylaw No. 500 overlayed on Google Earth Imagery.



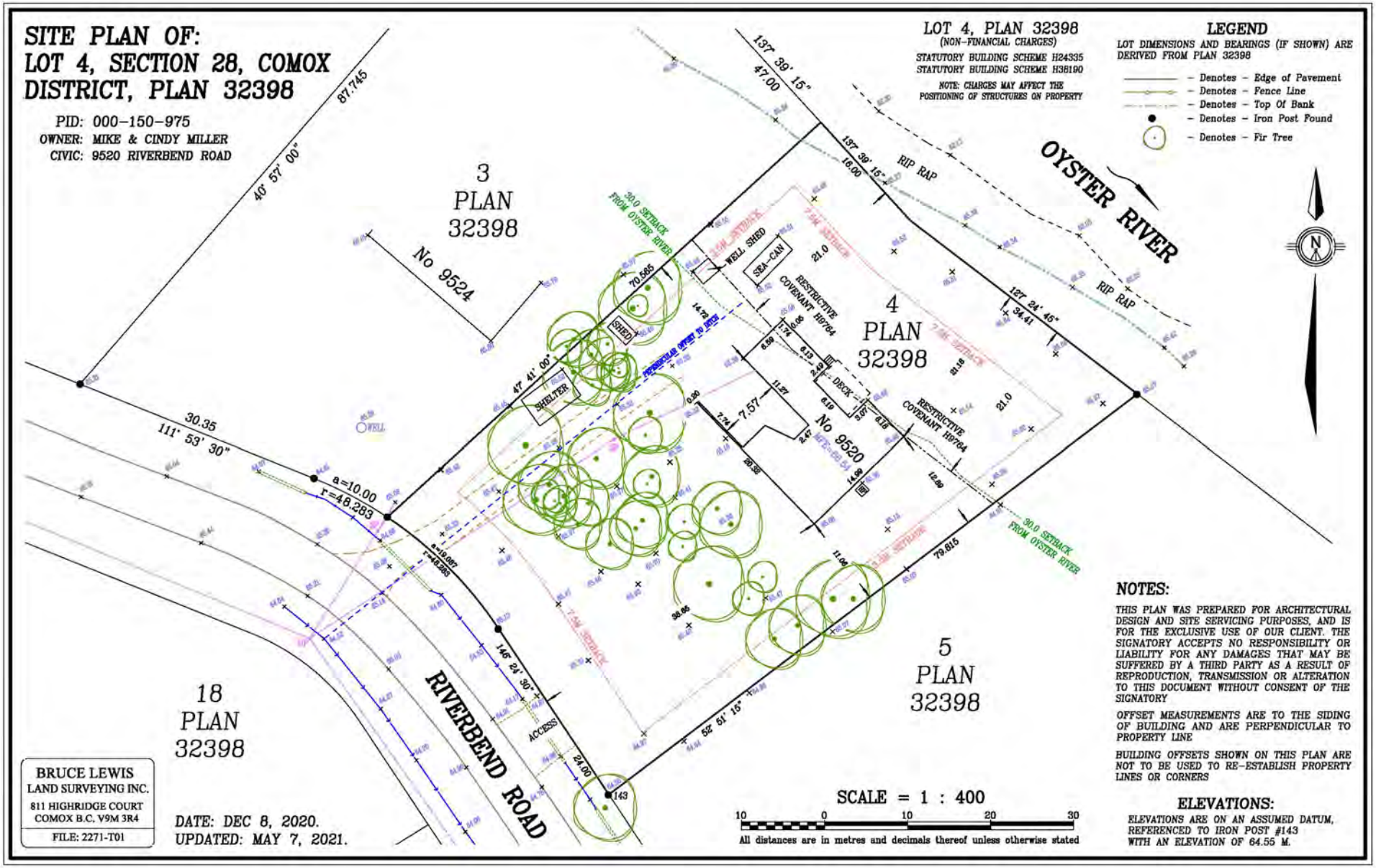
Oyster River Floodplain Inundation Mapping

Reference – Province of BC Ministry of Environment Preliminary Floodplain Map from CVRD Bylaw No. 500.

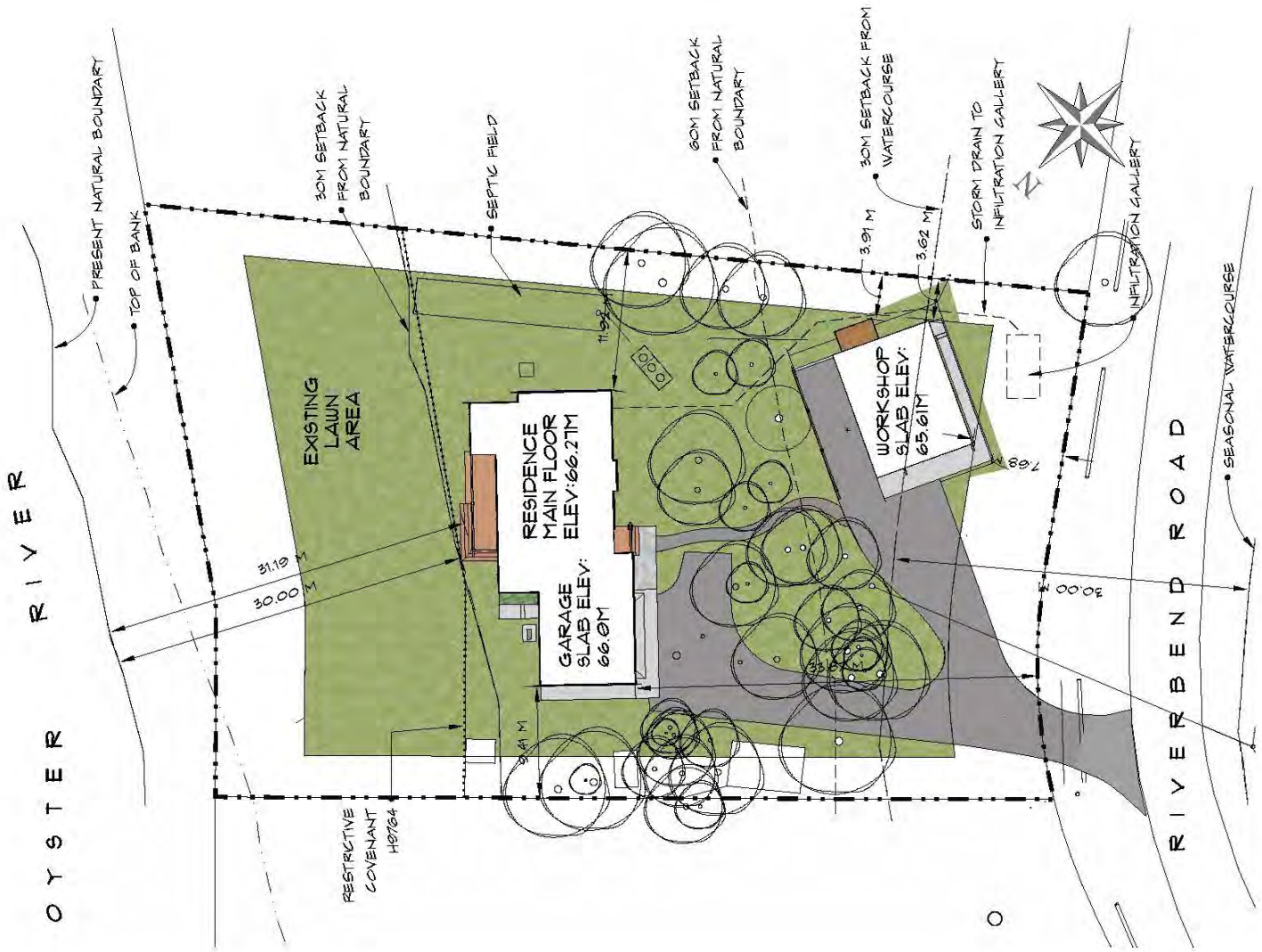
Oyster River Watershed (Ebbwater, 2018)



Oyster River – Mean Monthly Flows (Ebbwater, 2018)



Legal Survey Plan showing location of existing home



Proposed New Home Location
Reference: Gower Design Group

Photo 1 – Looking northeast from front of property.

Photo 2 – Existing mobile home to be removed from property.

Photo 3 – Oyster Riverbank rock armouring in front of subject property looking downstream.

Photo 4 – Backyard between Oyster River and existing home.

Photo 5 – Existing Home and wooden water well shack.

Photo 6 – Rock armouring looking downstream.

Photo 7 – Looking north at backyard.

Photo 8 – Looking upstream at rock armouring on bank.

Photo 9 – Looking upstream along crest of riverbank.

Photo 10 – Looking at rear side of existing mobile home from riverbank.

Photo 11 – Location of open test pit under blue tarp.

Photo 12 – Sandy fluvial deposits noted in test pit with roots and rootlets.

Photo 13 – Sandy material stockpiled from test pit containing some cobbles.

Photo 14 – Existing mobile home supported on concrete cinder blocks.

Photo 15 – Bank geology profile immediately downstream of end of riverbank armouring on neighbouring property. 3 meters of sandy material (with cobbles) overlying 0.5 m thick glacial till overlying bedrock.

Photo 16 - Watercourse along Riverbend Road (photo looking northwest across the street from the subject property).

Photo 17 - Swale along Riverbend Road.

FLOOD ASSURANCE STATEMENT

Note: This statement is to be read and completed in conjunction with the current Engineers and Geoscientists BC *Professional Practice Guidelines – Legislated Flood Assessments in a Changing Climate in BC* ("the guidelines") and is to be provided for flood assessments for the purposes of the *Land Title Act*, Community Charter, or the *Local Government Act*. Defined terms are capitalized; see the Defined Terms section of the guidelines for definitions.

To: The Approving Authority
Comox Valley Regional District (CVRD)
770 Harmston Avenue, Courtenay, BC
Jurisdiction and address

Date: April 5, 2021 (Revised June 2, 2021)

With reference to (CHECK ONE):

- ☐ *Land Title Act* (Section 86) – Subdivision Approval
- ☐ *Local Government Act* (Part 14, Division 7) – Development Permit
- ☐ Community Charter (Section 56) – Building Permit
- ☐ *Local Government Act* (Section 524) – Flood Plain Bylaw Variance
- ☒ *Local Government Act* (Section 524) – Flood Plain Bylaw Exemption

For the following property ("the Property"): Civic Address: 9520 Riverbend Road, Black Creek, BC
LEGAL LOT 4 SECTION 28 BLOCK 29 COMOX DISTRICT PLAN 32398 (PID 000-150-9750).
Legal description and civic address of the Property

The undersigned hereby gives assurance that he/she is a Qualified Professional and is a Professional Engineer or Professional Geoscientist who fulfils the education, training, and experience requirements as outlined in the guidelines.

I have signed, sealed, and dated, and thereby certified, the attached Flood Assessment Report on the Property in accordance with the guidelines. That report and this statement must be read in conjunction with each other. In preparing that Flood Assessment Report I have:

[CHECK TO THE LEFT OF APPLICABLE ITEMS]

X 1. Consulted with representatives of the following government organizations:
Comox Valley Regional District

X 2. Collected and reviewed appropriate background information

X 3. Reviewed the Proposed Development on the Property

X 4. Investigated the presence of Covenants on the Property, and reported any relevant information

X 5. Conducted field work on and, if required, beyond the Property

X 6. Reported on the results of the field work on and, if required, beyond the Property

X 7. Considered any changed conditions on and, if required, beyond the Property

8. For a Flood Hazard analysis I have:
   - X 8.1 Reviewed and characterized, if appropriate, Flood Hazard that may affect the Property
   - X 8.2 Estimated the Flood Hazard on the Property
   - X 8.3 Considered (if appropriate) the effects of climate change and land use change
   - X 8.4 Relied on a previous Flood Hazard Assessment (FHA) by others
   - X 8.5 Identified any potential hazards that are not addressed by the Flood Assessment Report

9. For a Flood Risk analysis I have:
   - X 9.1 Estimated the Flood Risk on the Property
   - X 9.2 Identified existing and anticipated future Elements at Risk on and, if required, beyond the Property
   - X 9.3 Estimated the Consequences to those Elements at Risk

FLOOD ASSURANCE STATEMENT

10. In order to mitigate the estimated Flood Hazard for the Property, the following approach is taken:
___ 10.1 A standard-based approach
___ 10.2 A Risk-based approach
___ 10.3 The approach outlined in the guidelines, Appendix F: Flood Assessment Considerations for Development Approvals
X 10.4 No mitigation is required because the completed flood assessment determined that the site is not subject to a Flood Hazard

11. Where the Approving Authority has adopted a specific level of Flood Hazard or Flood Risk tolerance, I have:
X 11.1 Made a finding on the level of Flood Hazard or Flood Risk on the Property
X 11.2 Compared the level of Flood Hazard or Flood Risk tolerance adopted by the Approving Authority with my findings
X 11.3 Made recommendations to reduce the Flood Hazard or Flood Risk on the Property

12. Where the Approving Authority has not adopted a level of Flood Hazard or Flood Risk tolerance, I have:
___ 12.1 Described the method of Flood Hazard analysis or Flood Risk analysis used
___ 12.2 Referred to an appropriate and identified provincial or national guideline for level of Flood Hazard or Flood Risk
___ 12.3 Made a finding on the level of Flood Hazard of Flood Risk tolerance on the Property
___ 12.4 Compared the guidelines with the findings of my flood assessment
___ 12.5 Made recommendations to reduce the Flood Hazard or Flood Risk

X 13. Considered the potential for transfer of Flood Risk and the potential impacts to adjacent properties

X 14. Reported on the requirements for implementation of the mitigation recommendations, including the need for subsequent professional certifications and future inspections.

Based on my comparison between:

[CHECK ONE]

☒ The findings from the flood assessment and the adopted level of Flood Hazard or Flood Risk tolerance (item 11.2 above)
☐ The findings from the flood assessment and the appropriate and identified provincial or national guideline for level of Flood Hazard or Flood Risk tolerance (item 12.4 above)

I hereby give my assurance that, based on the conditions contained in the attached Flood Assessment Report:

[CHECK ONE]

☐ For subdivision approval, as required by the *Land Title Act* (Section 86), "that the land may be used safely for the use intended":

[CHECK ONE]

☐ With one or more recommended registered Covenants.
☐ Without any registered Covenant.

☐ For a development permit, as required by the *Local Government Act* (Part 14, Division 7), my Flood Assessment Report will "assist the local government in determining what conditions or requirements it will impose under subsection (2) of this section [Section 491 (4)]".

☐ For a building permit, as required by the Community Charter (Section 56), "the land may be used safely for the use intended":

[CHECK ONE]

☐ With one or more recommended registered Covenants.
☐ Without any registered Covenant.

☐ For flood plain bylaw variance, as required by the *Flood Hazard Area Land Use Management Guidelines* and the *Amendment Section 3.5 and 3.6* associated with the *Local Government Act* (Section 524), "the development may occur safely".

☒ For flood plain bylaw exemption, as required by the *Local Government Act* (Section 524), "the land may be used safely for the use intended".

FLOOD ASSURANCE STATEMENT

I certify that I am a Qualified Professional as defined below.

June 2, 2021

Date

Adrian Chesham

Prepared by

Reviewed by

Adrian Chesham

Name (print)

Name (print)

Signature

Signature

720 Fern Road East

Address

Qualicum Beach, BC

250.228.2214

Telephone

adrian@basegeotechnical.ca

Email

(Affix PROFESSIONAL SEAL here)

If the Qualified Professional is a member of a firm, complete the following:

I am a member of the firm Base Geotechnical Inc.

and I sign this letter on behalf of the firm.

(Name of firm)

General Conditions and Limitations

1.0 USE OF REPORT AND OWNERSHIP

This geotechnical report pertains to a specific site, a specific development, and a specific scope of work. It is not applicable to any other sites nor should it be relied upon for types of development other than that to which it refers. Any variation from the site or development would necessitate a supplementary geotechnical assessment.

This report and the recommendations contained in it are intended for the sole use of Base Geotechnical Inc.'s (BGI) Client. BGI does not accept any responsibility for the accuracy of any of the data, the analyses or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than BGI's Client unless otherwise authorized in writing by BGI. Any unauthorized use of the report is at the sole risk of the user.

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of BGI. Additional copies of the report, if required, may be obtained upon request.

2.0 ALTERNATE REPORT FORMAT

Where BGI submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed BGI's instruments of professional service), only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by BGI shall be deemed to be the original for the Project. Both electronic file and hard copy versions of BGI's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except BGI. BGI's instruments of professional service will be used only and exactly as submitted by BGI.

Electronic files submitted by BGI have been prepared and submitted using specific software and hardware systems. BGI makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

3.0 ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, BGI has not been retained to investigate, address or consider and has not investigated, addressed or considered any environmental or regulatory issues associated with development on the subject site.

4.0 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems and methods employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. BGI does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

5.0 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

6.0 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historic environment. BGI does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional investigation and review may be necessary.

7.0 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

8.0 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

9.0 INFLUENCE OF CONSTRUCTION ACTIVITY

There is a direct correlation between construction activity and structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect, and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques are known.

10.0 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, as well as the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

11.0 DRAINAGE SYSTEMS

Where temporary or permanent drainage systems are installed within or around a structure, the systems which will be installed must protect the structure from loss of ground due to internal erosion and must be designed so as to assure continued performance of the drains. Specific design detail of such systems should be developed or reviewed by the geotechnical engineer. Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function.

12.0 BEARING CAPACITY

Design bearing capacities, loads and allowable stresses quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition assumed. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions assumed in this report in fact exist at the site.

13.0 SAMPLES

BGI will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the Client's expense upon written request, otherwise samples will be discarded.

14.0 INFORMATION PROVIDED TO BGI BY OTHERS

During the performance of the work and the preparation of the report, BGI may rely on information provided by persons other than the Client. While BGI endeavours to verify the accuracy of such information when instructed to do so by the Client, BGI accepts no responsibility for the accuracy or the reliability of such information which may affect the report.