

DATE: February 16, 2024

FILE: 3160-20/FR 1C 23

TO: Chair and Directors
Electoral Areas Services Committee

Supported by Marc Rutten
A/Chief Administrative Officer

FROM: Marc Rutten
Acting Chief Administrative Officer

M. Rutten

**RE: Application for Site Specific
Floodplain Specifications 3736 James Crescent - (Giese)**

Purpose

To consider a request to construct a dwelling within the Floodplain Management Bylaw's 60 metre floodplain setback for the Oyster River (Appendix A).

Recommendation from the Acting Chief Administrative Officer:

THAT the application made under section 403 of Bylaw No. 600, being the "Floodplain Management Bylaw No. 600, 2020," be approved for the construction of a house on the property described as Lot 41, Block 29, Comox District, Plan 28503, PID 002-329-930 (3736 James Crescent);

AND FINALLY THAT as a condition of the approval the property owners, at their expense, prepare and register a restrictive covenant under Section 219 of the *Land Title Act* in favour of the Comox Valley Regional District, 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 Emma Rose, EIT, and Alex McBride, P.Eng., of McElhanney, dated November 6, 2023, 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 0.4 hectare subject property is entirely within the mapped floodplain of the Oyster River. The applicant is seeking to construct a house here.
- The Floodplain Management Bylaw requires a floodplain setback of at least 60 metres along the entire length from the Oyster River.
- The applicants are requesting to construct within that floodplain setback and provided a report prepared by a professional engineer (Appendix B) to support

the request. That report recognizes the lot may be inundated during periods of high flow from the river and provides recommendations that would enable a siting of the house on this lot, as close as 30 metres to the Oyster River.

- As the entire lot is within the mapped floodplain, regardless of the regulated floodplain setback, staff recommends the application be approved and the professional engineer report, with the conditions necessary for the safe use of the land, be registered on title.

Prepared by:

Concurrence:

Concurrence:

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Government and Community Interests Distribution (Upon Agenda Publication)

Applicant	✓
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Background/Current Situation

The 0.4 hectare subject property is located up the Oyster River in the James Crescent/Doyle Road subdivision area (Figures 1 and 2). The only structures currently on the lot are two small sheds and a pumphouse. The owner is seeking to construct a house. The applicant is seeking to site the house between 30 and 60 metres from the present natural boundary of the Oyster River (Figure 3). Because the Comox Valley Regional District (CVRD) Floodplain Management Bylaw states that land within 60 m from the natural boundary of the Oyster River is designated as a floodplain setback, a site-specific exemption is required.

Planning Analysis

Floodplain Management Bylaw

Bylaw No. 600, being the “Floodplain Management Bylaw No. 600, 2020,” designates the land on this subject property as being within the floodplain of the Oyster River (Figure 4) and requires the following:

- a flood construction level (FCL) no lower than 68.0 metres (CGVD 1928), as illustrated in Figure 4, and
- a floodplain setback of 60.0 metres from the natural boundary of the Oyster River.

Similarly, more recent mapping of the Oyster River floodplain, undertaken in the Coastal Flood Mapping Project and illustrated in Figure 5, also shows the subject property completely within the Floodplain Limit with an anticipated River Flood Elevation between the 68.0 and 69.0 metre contour.

Section 403 of the bylaw allows an owner to apply for a site-specific floodplain exemption with a report prepared by a professional engineer that specifies conditions that would enable the land to be safely used for the use intended. If the Board considers the proposal advisable and approves the application, conditions of the approval must include registering the report prepared by the professional engineer onto the land title for all future owners to follow, an indemnification of the CVRD from liability in the event any damage is caused by flooding, and acknowledging that provincial Disaster Financial Assistance Funding is not available for such a development.

As the owners would like to locate the house closer than 60.0 metres, they had a report prepared by Emma Rose, EIT, and Alex McBride, P.Eng., of McElhanney (Appendix A) to review the flood risks and provide recommendations for siting a house. The report recommended a floodplain setback of no closer than 30 metres to the present natural boundary of the river and a FCL of at least 68.8 metre (CGVD 2013). The report includes risk reduction strategies that must be implemented, including keeping a vegetated ground cover or alternate means of erosion protection, and keeping the setback area free of drainage impediments.

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 (RSAs). Sections 15 and 16 of the OCP provide objectives and policies regarding development in the vicinity of natural hazards. Section 16(1) states, “Do not permit new development in hazard areas, including mapped floodplains, steep slopes and areas of active erosion.” As the entirety of the subject property is within the mapped floodplain (Figures 4 and 5), it is prudent to follow the recommendations of the professional engineer which accounts for the specifics of the development proposal, site-specific characteristics of the individual lot, and a risk analysis. As noted above, the professional engineer’s report provided recommendations that would allow for the house to be located up to 30 metres from the natural boundary of the river.

Zoning Bylaw

The subject property is zoned Rural Eight (RU-8). This zone allows for a residential density of one single detached dwelling and one secondary dwelling (e.g. secondary suite or carriage house). The zone requires a 7.5 metre setback from lot

lines abutting a road right-of-way. The proposal to construct a house on this subject property is consistent with the Zoning Bylaw.

Options

1. Approve the application subject to the registration of the engineer’s report as a covenant against the land title.
2. Request more information on flood analysis and risk, generally done through a third-party review of the report.
3. Deny the application.

As the entire lot is within the mapped floodplain, staff recommends Option 1.

Financial Factors

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

Strategic Considerations: Strategic Drivers and Regional Growth Strategy

Strategic Considerations - Strategic Drivers						
Fiscal Responsibility	✓	Climate Crisis and Environmental Stewardship and Protection	✓	Community Partnerships	Indigenous Relations	Accessibility, Diversity, Equity and Inclusion

Fiscal Responsibility: Careful management of services and assets is essential to providing affordable and reliable services to citizens and businesses in the CVRD.

- A condition of approval of this application is a covenant, registered at the applicant’s expense, which includes indemnifying the CVRD from liability in the event that any damage is caused by flooding.

Climate Crisis and Environmental Stewardship and Protection: The CVRD is committed to reducing our impact on the environment and accelerating our actions to adapt and respond to climate change impacts.

- The professional engineer’s report utilizes a 0.5 per cent Annual Exceedance Probability (e.g. 1-in-200 year storm event) in the risk analysis.

Strategic Considerations - Regional Growth Strategy Goals						
Housing		Ecosystems, Natural Areas and Parks		Local economic development		Transportation
Infrastructure		Food Systems		Public Health and Safety	✓	Climate Change

Public health and safety: Support a high quality of life through the protection and enhancement of community health, safety and wellbeing:

- Policy 8F-6 of the Regional Growth Strategy recommends discouraging new development within established floodplains, and that this type of development 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”. The professional engineer’s report contains risk reduction strategies that will allow for the safe use of the land.

Intergovernmental Factors

There are no intergovernmental factors related to this application.

Citizen/Public Relations

Public consultation is not required for this application.

Attachments: Appendix A – Report prepared by Emma Rose, EIT, and Alex McBride, P.Eng., of McElhanney, dated November 6, 2023

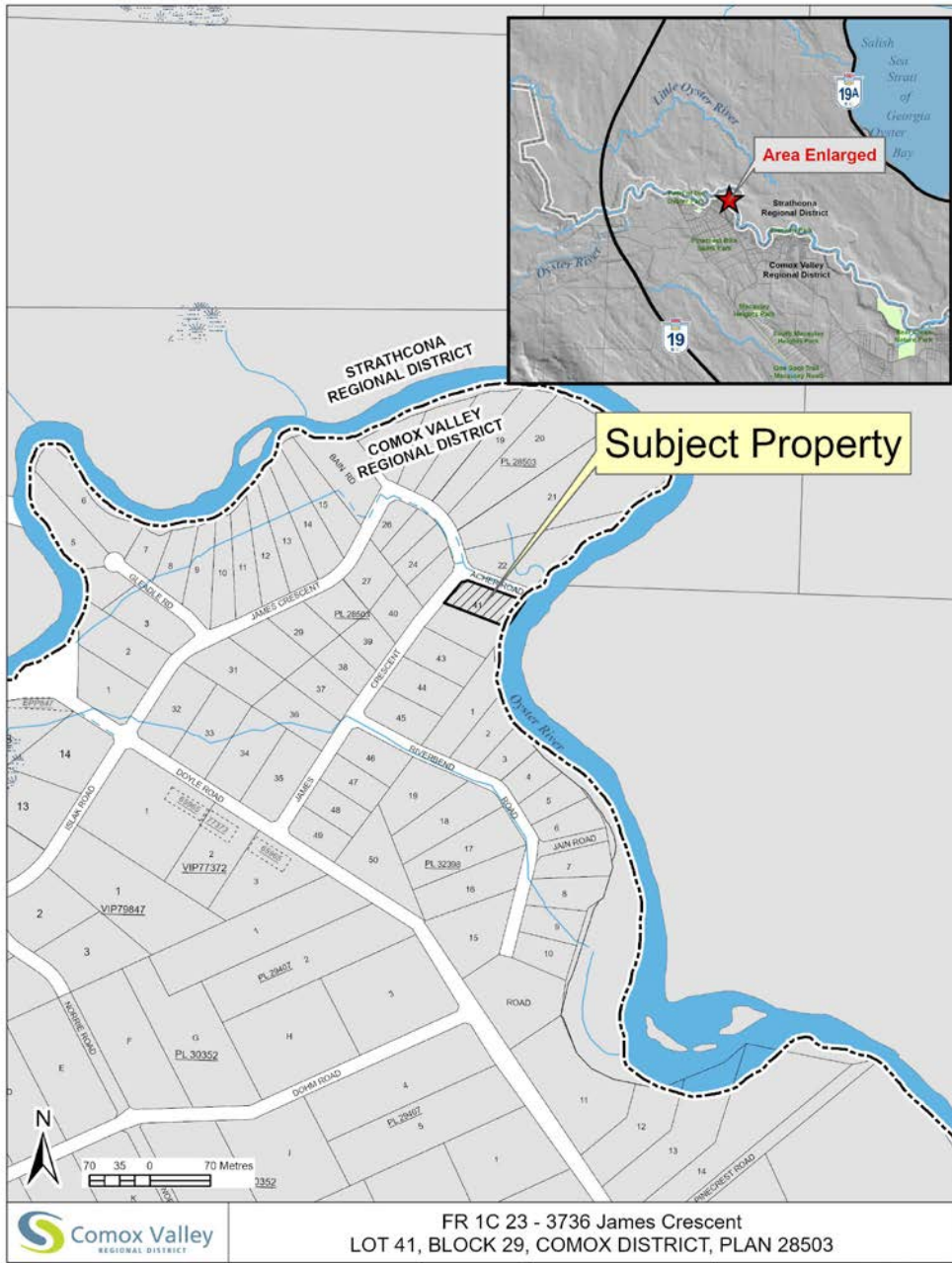


Figure 1: Subject Property

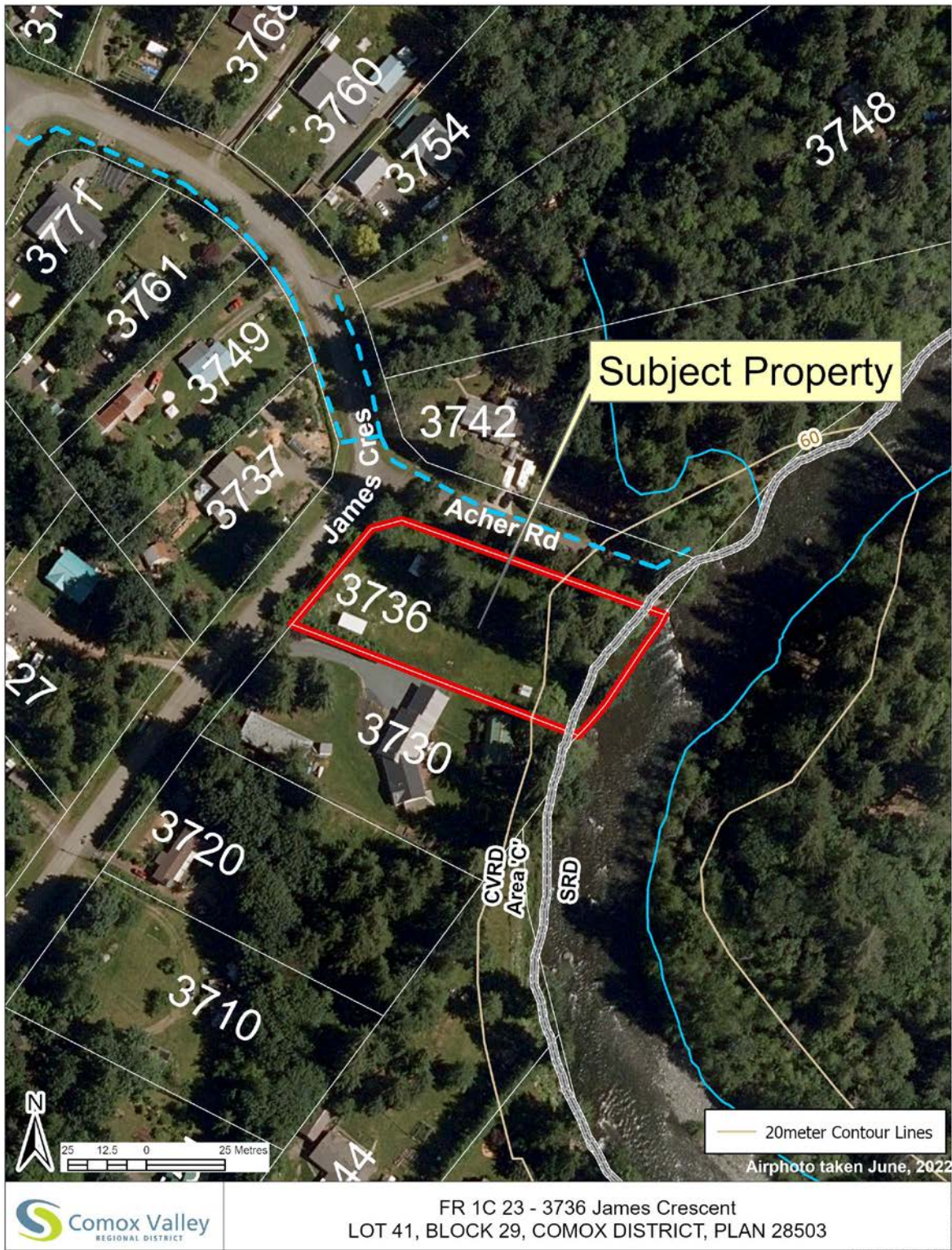


Figure 2: Airphoto

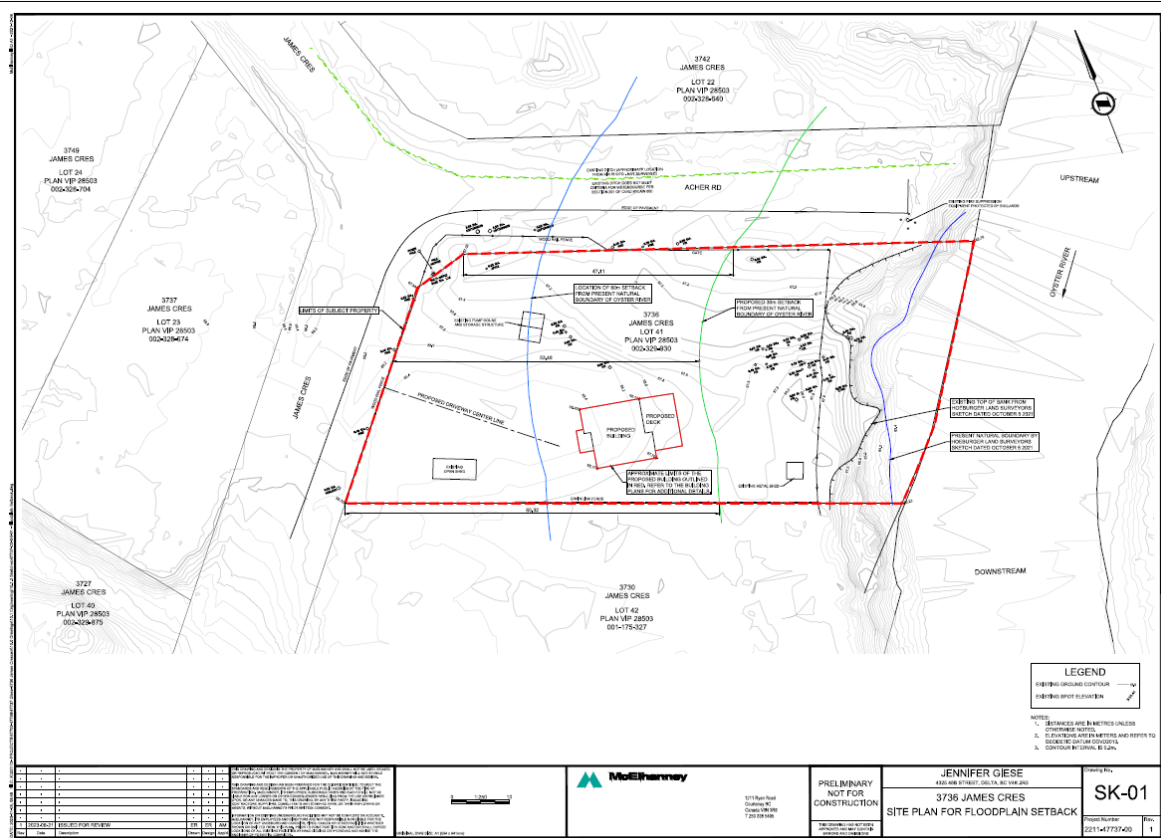


Figure 3: Site Plan, illustrating proposed location of house (red), with 30 m setback (green) and 60 m setback (blue) from Oyster River

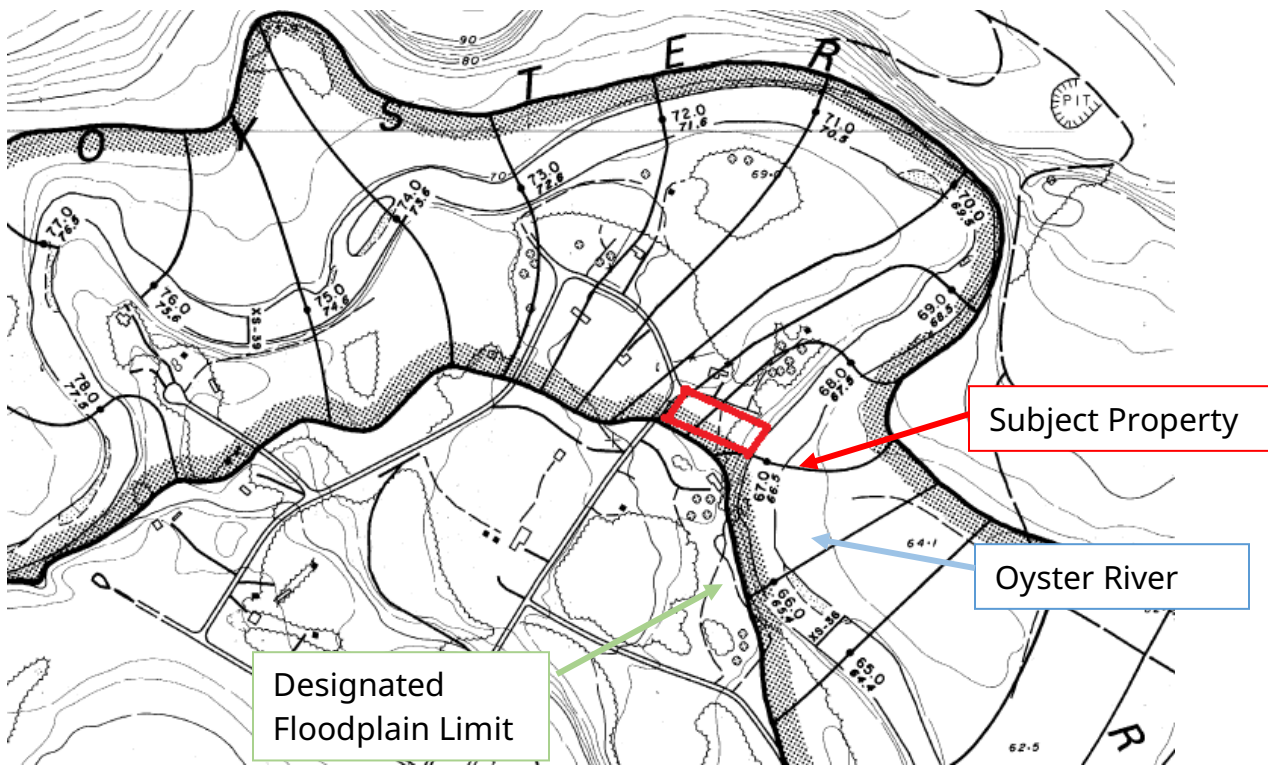


Figure 4: Designated Floodplain Limit of Oyster River within Floodplain Management Bylaw

Our File: 2211-47737-00

TECHNICAL MEMO

To Jennifer Giese 4325 48B Street Delta, BC V4K 2R3	From Alex McBride, P.Eng. McElhanney / 2211
Re Flood Assessment Report Single-Family Residential Development 3736 James Cres, Black Creek, BC	Date November 6, 2023

1. Introduction

As requested, McElhanney Ltd. (McElhanney) has prepared this memo which summarizes our recommendations for a Flood Construction Level (FCL) and building setbacks at the above-referenced site (see **Figure 1.1**), in support of permitting applications for construction of a single detached dwelling on the subject site.

The intention of this memo is to address floodplain regulations in Comox Valley Regional District Bylaw (2020) No. 600, part 300. Per Section 403(2) of the Floodplain Management Bylaw No.600 (2020), any proposed construction of habitable area within flood construction levels or floodplain setbacks requires a professional engineer to confirm that the land can be safely used for the use intended. The proposed Site Plan is attached to this memorandum in **Appendix B**. No biological, archaeological, or environmental reviews were completed as part of this assessment.

The development work on the subject property that triggers this assessment is construction of a single family home. The FCL at the subject property has been determined as part of this Flood Assessment Report for the purposes of determining building setback requirements.

The site requires a site specific exemption from the building setback criteria listed in Section 303(1) (summarized below) of the Comox Valley Regional District Bylaw No. 600 due to the lower lying existing ground elevations at the Site (relative to the 0.5% Annual Exceedance Probability flood level). The outcome from this assessment is that the land is considered safe for the use intended (construction and habitation of a single family dwelling) provided that the risk reduction strategies outlined in **Section 6.5** are applied.

This report confirms that McElhanney is appropriately qualified for this assessment, and the undersigned is a member 'in good standing' with Engineers & Geoscientists British Columbia (EGBC).

McElhanney

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Figure 1.1 – Subject Property 3736 James Cres, Black Creek, BC (Image Source: CVRD iMap)

2. Scope of Work

The following line items were included in the scope of work for this project:

- Field review of subject site and proximal river bank conditions;
- Desktop review of surficial geology & local river processes;
- Review of the EGBC Professional Practice Guidelines for Legislated Flood Assessments in a Changing Climate in BC (EGBC Guidelines), including the completion of Flood Hazard and Risk Assurance Statement (see **Appendix C**);
- Review of Comox Valley Regional District’s “Floodplain Management Bylaw, No.600, 2020”, and associated floodplain management reports;
- Review of the Ministry of Forests, Lands and Natural Resources Operations – Coastal Floodplain Mapping – Guidelines and Specifications (June 2011)
- Review of the Ministry of Forests, Lands and Natural Resources Operations (MFLNRO) – Amendment to Flood Hazard Area Land Use Management Guidelines (January 2018)
- Review of the CVRD Coastal Flood Mapping Project, Final Report dated April 2021; and
- Analysis of the Flood Construction Level (FCL) for the property.



3. Site Description

The subject site is located at 3736 James Cres, Black Creek, BC. The Site is zoned Rural Eight (RU-8), covers a plan area of approximately 0.43 Ha, and is bound by a single family lot to the south, James Cres to the west, Acher Rd to the north, and the Oyster River to the east.

The legal address is: LOT 41 BLOCK 29 PLAN VIP28503 LAND DISTRICT 15, PID 002-329-930.

The existing development on the property includes an open timber shed on concrete blocks, a combined pump house and storage structure, and a small metal shed. The lot generally slopes towards the river at approximate grades of 1-4%. The subject property is vegetated with mature grass meadow and a variety of tree species concentrated in pockets at the rivers edge, center of the lot, and surrounding the perimeter. The east side of the property features a steep drop from the meadow to the riverbed of approximately 2.0 m in height.

The proposed development on site is a 1200 sq. ft single storey residence. The architectural plans for the building show a timber framed superstructure with a concrete foundation heated crawlspace for storage.

3.1. GEOLOGICAL SETTING

Surficial geology mapping indicates that the study area consists primarily of Salish Sediments including shore, deltaic, and fluvial deposits such as gravel, sand, silty, clay. Several areas nearby to the northwest and southwest have been identified as having potential bedrock outcrop.

3.2. RIVER SETTING

The subject site directly borders the Oyster River, with the present natural boundary of the river lying within the legal limits of the property. The riverbank slopes up gradually for approximately 3-5 m until reaching a steep bluff of approximately 2.0 m in height situated on east side of the property that fronts the Oyster River.

There is dense vegetation present from the bank of the river to the bluff. There is a cluster of fir trees on the top of the bluff at the center of the property, as well as some fir trees below the bluff, very close to the river. The mature vegetation present along the riverbank in front of the property helps to protect the bank from erosion during high flow events.

The riverbed fronting the subject property consisted of soft shale bedrock. The bedrock layer provides stability to the riverbank and limits rapid erosion of the riverbed. In some locations, tree roots were exposed and present at the river boundary, indicating that some surficial bank erosion has occurred in the past.

The site is immediately upstream of a bend in the river, and at the downstream end of a straight stretch of the river's meandering alignment. There is a natural bedrock vane (within the main channel and near perpendicular to the river channel's alignment) just upstream of the site, which evenly concentrates flow across the channel and vane, and aids in limiting concentrated flow from being directed at the bank in front of the property.

There are two unnamed ditches (local drainage network) in proximity to the subject site, one running alongside of Acher Road and one north of Acher Road. The ditch running along the north side of Acher Road, approximately 15m to the north of the subject property and with an upstream drainage catchment area of approximately 0.2 km², flows east to the end of the Acher Road right-of-way fronting the Oyster River. The ditch north of the Acher Road right-of-way, approximately 35m to the north of the subject



property and with an upstream drainage catchment area of approximately 0.05 km², flows east to a ditch outfall at the Oyster River.

3.3. SITE DEVELOPMENT CONSTRAINTS

At the time of this report, it is McElhanney's understanding that the property owner is seeking this exemption to help facilitate future development and supporting infrastructure on the property.

The following site development summary from the property owner (for the currently proposed single family dwelling and future development) provides the context for the proposed single family dwelling placement relative to the Oyster River:

- Placement of a Septic Dispersal System/Field (by others) is fixed along southern side yard setback and western side of the property to meet necessary setbacks from other features (e.g., potable water wells, Oyster River) and occupying an area that would otherwise allow for placement of the proposed single family home closer to the existing roadway in the southwest corner of the property.
- The property owner has noted intention to retain all existing trees with the proposed development, which makes the proposed single family building location ideal to limit impacts to the existing large diameter fir trees on the northern half and eastern sides of the property.
- In line with permissible secondary dwelling uses allowed per current zoning, the property owner has future plans to build a carriage house on the north side of the proposed driveway and south/west of the existing pump house and existing fir trees. The addition of a carriage house would increase residential density on the property which meets provincial and local densification objectives, and was a long-term key consideration when the property owner purchased the property. The property owner will retire to this property and the carriage house will be necessary to allow a family member to live with them full-time.
- The proposed 30m setback recommended in this report would allow for the property owner to build the proposed single family dwelling, maintain necessary separation from fixed location of septic dispersal field and house, and maintain the feasibility of constructing a future carriage house in the location described above. If the location of the proposed single family dwelling moved westward, the property owner expects that the ability to site a future carriage house adjacent to the single family dwelling would be compromised.

Refer to Section 8.0 of this report for further commentary on building setback requirements for this property.





Photo 3.1. The riverbank in front of the subject property, looking south



Photo 3.2. Vegetation between the subject site and the riverbank, looking west





Photo 3.3. View of subject site from the southwest corner of the site, looking east



Photo 3.4. View of river in front of subject site from Acher Rd, looking south



4. Floodplain Bylaws and Guidelines Review

4.1. COMOX VALLEY REGIONAL DISTRICT FLOODPLAIN MANAGEMENT BYLAW 600 (2020)

Applicable guidelines from the CVRD Bylaw 600, are summarized below. Section 301, Floodplain Designation states:

- 1) *The following land is designated as floodplain:*
 - a) *Lands shown as floodplain on the following:*
 - ii) *Schedule C - Floodplain Mapping for the Oyster River.*
 - b) *Land lower than the flood construction levels specified in Section 302.*
 - c) *Land within the floodplain setbacks specified in Section 303.*

Section 302, Flood Construction Levels, states:

“1) Where Floodplain Mapping is available, the flood construction level for a specific property shall be determined by interpolation from the flood construction levels shown on the following:

- b) Schedule C - Floodplain Mapping for the Oyster River.*

2) Where Floodplain mapping is not available, the following elevations are specified as flood construction levels:

- d) 1.5 metres above the natural boundary of any other watercourses, where the land is within a distance of 100 metres of that watercourse.”*

A Flood Construction Level (FCL) is defined in the Floodplain Management Bylaw as “The Designated Flood Level plus the allowance for freeboard and is used to establish the elevation of the underside of a wooden floor system or top of concrete slab for habitable buildings.”

Section 303, Floodplain Setbacks, states:

- “1) The following distances are specified as floodplain setbacks:*
- a) 60.0 metres from the natural boundary of Oyster River.*
 - c) 15.0 metres from the natural boundary of any watercourse.”*

Section 403, Site Specific Exemptions, states:

- “2) The Comox Valley Regional District Board may provide an exemption from the provisions of this bylaw where:*
- a) The Comox Valley Regional District Board considers the exemption advisable.*



b) *The exemption is consistent with the Provincial Flood Hazard Area Land Use Management Guidelines.*

c) *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, as amended from time to time, that provides a description of the proposed development and specifies conditions that would enable the land to be safely used for the use intended.*

d) *The professional engineer has provided a completed Flood Hazard and Risk Assurance Statement."*

4.2. MFLNRO: FLOOD HAZARD AREA LAND USE MANAGEMENT GUIDELINES

Section 3.2.1 states the following regarding standard FCLs and setbacks for watercourses:

"Setback –

Buildings should be setback at least 30 metres from the natural boundary of any watercourse ...

FCL where a designated flood level has been determined –

Areas used for habitation, business, or storage of goods damageable by floodwaters should be constructed within any building at an elevation such that the underside of the floor system thereof is no less than the Flood Construction Level."

4.3. EGBC GUIDELINES: LEGISLATED FLOOD ASSESSMENTS IN A CHANGING CLIMATE IN BC, V.2.1

Given the location of the Site adjacent to the Oyster River, within the specified floodplain setbacks and lower than the specified flood construction levels (Bylaw 600), Appendix F of the EGBC Guidelines, Section F2.2.2: New Single Family or Duplex House (Not a Fan and No Dike) applies. Section F2.2.2 states:

"Where a proposed building site is located in an area adjacent to a creek, river, lake, or ocean that is not protected by a Dike, the need for both Dike works and Mitigation Measures must be considered. In general, new buildings should be considered for unprotected floodplains only if:

- the local government has adopted an appropriate bylaw or land use regulation that provides for building Construction with knowledge of the Flood Hazard; or*
- the QP concludes that the site may be suitable for the intended use.*

A QP may conclude that the site may be suitable for the intended use if at least one of the following conditions applies:

- A standard/adequate Dike or equivalent other Structural Mitigation Works is constructed with the pertinent approvals as part of the development*
- The building site is not in a high hazard area of the floodplain (i.e., an avulsion path, a flood velocity greater than 1 m/s, a flood depth greater than 2.5 m, and where safe access and egress is not possible)*



- A Risk Assessment is undertaken whereby the local government establishes a tolerable level of Risk, and the QP assessment confirms that the Risk would be within this level

If the QP concludes that the land may be suitable for the intended use, the FCL should be at the 200-year return period flood level plus Freeboard (0.3 m for instantaneous peak floods and 0.6 m for daily peak floods). Particular attention needs to be given to specification of appropriate on-site Mitigation Measures such as foundation design, method of achieving the FCL, and site grading.”

5. Flood Hazard Assessment

Flood Hazard Assessments (FHA), as defined in the EGBC Guidelines, determine the probability of floods of variable magnitudes and assess their intensities. Appendix D of the EGBC Guidelines provides the outline for an FHA. It is important to determine the appropriate level of effort that is to be applied to the FHA as the type of assessment changes with the size of the study and the potential elements at risk. As flood levels are governed by bounding sea level conditions, **Table D-1** from the EGBC guideline is referenced.

Table D-1: Types of Flood Hazard Assessments for Rainfall- and Snowmelt-Generated Floods and Ice Jam Floods

CLASS	TYPICAL HAZARD ASSESSMENT METHODS AND CLIMATE/ENVIRONMENTAL CHANGE CONSIDERATIONS	TYPICAL DELIVERABLES	APPLICATIONS	RETURN PERIODS FOR FLOOD HAZARD MAPS	APPLICATION FOR DEVELOPMENT TYPE
0	<ul style="list-style-type: none"> • Site visit and qualitative assessment of Flood Hazard • Identify any very low hazard surfaces in the consultation area (i.e., river terraces) • Estimate erosion rates along river banks 	Letter report or memorandum with at least water levels and consideration of scour and bank erosion	Very low loss potential for rivers and floodplains; loss of life very unlikely	20-year 200-year 500-year (for Alluvial Fans)	Building Permit: <ul style="list-style-type: none"> • Renovations, expansions, new single house, new duplex house

This assessment is in support of a building permit; therefore a Class 0 hazard assessment is appropriate. A typical deliverable for a Class 0 assessment is a technical memorandum.

The hazards for this property are tied to river flood levels. The potential loss is mainly related to flooding of property and water damage to structures.

Water levels could change quickly due to rainfall; however, flood depths and velocities would be low outside of the proposed setback area and loss of life is unlikely. Evacuation of the property is possible along James Crescent to higher ground south of the property.

6. Flood Risk Assessment

Appendix E of the EGBC Guidelines provides the grounds for a Flood Risk Assessment (FRA). An FRA involves the estimation of the likelihood that a flood will occur and cause some magnitude/type of damage or loss. The FRA must follow the steps listed below.

1. Identify flood hazard scenarios
2. Estimate the probability of hazard scenarios
3. Estimate the consequences
4. Define tolerable risk



5. Prioritize risk reduction strategies

Table E-2 referenced below summarized a typical FRA for building permit applications.

Table E - 2: Types of Flood Risk Assessments

RISK LEVEL	CLASS	TYPICAL RISK ASSESSMENT METHODS	DELIVERABLES	APPLICATIONS	FLOOD RETURN PERIODS (YEARS)
Very Low	0	<ul style="list-style-type: none"> Include a short site survey with qualitative assessment of potential Consequences 	<ul style="list-style-type: none"> Memorandum or Letter Sketch Maps 	<ul style="list-style-type: none"> Building permits 	

6.1. HAZARD SCENARIO

The hazard scenarios for this property are related river flooding from the Oyster River. There is potential for the Site to be inundated during periods of high flow from the river. Factors contributing to higher water levels include storm and freshet events, with flood events most likely to occur in late fall and early winter. Floodwaters are not expected to be fast moving on the property as the property is situated in a densely vegetated and residential overbank area with shallower flood depths, and outside of the main conveyance channel of the river.

6.2. PROBABILITY OF HAZARD SCENARIO

The probability of the hazard scenario, flooding from the river, is estimated to have an 0.5% Annual Exceedance Probability (AEP), therefore a 200-year return period has been applied to analyze the consequences and tolerable risks.

6.3. ESTIMATED CONSEQUENCE

Since this assessment only includes the single site, the estimated consequences pertain only to this property. Consequences are primarily related to flood damage to ground floor level of the proposed building and ancillary structures. There is also a potential for erosion of exposed subgrade soils as floodwaters progress and recede. In light of the following, there is considered to be a low risk for injury or loss of life:

- Site egress south along James Cres should be possible in advance of and during high water levels
- The floodwaters in the area would have slow velocities (< 1 m/s) and be temporary, therefore limiting the potential for erosion in hardscaped and vegetated areas outside of the setback area.

6.4. TOLERABLE RISK

Referring to **Figure E-4** in the EGBC Guidelines, referenced below, the subject property is within the very low risk category as it relates to Safety and Social & Cultural consequences. As previously noted, serious injuries or loss of life is unlikely as the water level would rise with heavy rainfall and freshet events. Water levels could change quickly; however, flood depths and velocities would be low and allow for evacuation of the property.



Relative to economic and ecological risk ratings, the subject property is within the low risk category which corresponds to potential economic asset loss/interruption of less than \$100,000 and moderate ecological impacts that would be expected to be recoverable and mitigated within several months. For the Intangibles risk rating, the subject property is within the low risk category based on the anticipated personal hardship (e.g., substantial home repairs, stress induced from post-flood recovery) that would be expected to be managed over the course of several months.

On aggregate of the five risk categories in **Figure E-4**, the subject property falls within a very low to low rating. It is important to qualify that risk ratings classifications are not intended to conclude an inherent risk rating associated with development on the subject property, but rather highlight that the appropriate risk reduction strategies are necessary to be incorporated into the development's design such that risk levels for the five risk categories remain tolerable (low or moderate risk rating). The risk reduction strategies within **Section 6.5** are proposed to maintain tolerable risk ratings. The risk reduction strategies generally speak to protecting the site from erosion, ensuring clear drainage paths to the river, and maintaining the prescribed setback, all of which are intended to increase the building's resiliency during

FLOOD RISK EVALUATION

LIKELIHOOD DESCRIPTIONS Likelihood of Undesirable Outcome			RISK EVALUATION AND RESPONSE									
			VH	H	M	L	VL	Very High	High	Moderate	Low	Very Low
Scenario can be expected on average every other year			Very Likely	0.5 – 0.2	M	H	H	VH	VH	VH	VH	VH
Scenario typically occurs on average every 10 years			Likely	0.2 – 0.07	L	M	H	H	VH	VH	VH	VH
Scenario typically occurs on average every 50 years			Moderate	0.07 – 0.02	L	L	M	H	H	VH	VH	VH
Scenario occurs on average every 100 years			Unlikely	0.02 – 0.007	VL	L	M	H	H	H	H	H
Scenario occurs on average every 200 years			Very Unlikely	0.007 – 0.004	VL	VL	L	L	M	H	H	H
Scenario occurs on average every 500 years			Extremely Unlikely	0.004 – 0.0013	VL	VL	VL	L	L	M	M	M
CONSEQUENCE DESCRIPTIONS	INDICES		1	2	3	4	5	6				
			Negligible	Minor	Moderate	Major	Severe	Catastrophic				
	SAFETY (INJURY/LOSS OF LIFE)		Minor injuries of few individuals	Major injury of 1 person	Major injury of several persons	Single fatality	<10 fatalities	>10 fatalities				
	ECONOMIC (MONETARY LOSSES)		Negligible; no business interruption; <\$1,000	Some asset loss; <\$10,000 damages	Serious asset loss; several days business interruption; <\$100,000	Major asset loss; several weeks business interruption; <\$1 million	Severe asset loss; several months business interruption; <\$10 million	Total loss of asset; 1 year or more business interruption; >\$10 million				
	SOCIAL AND CULTURAL		Negligible impact	Slight impact; recoverable within days	Moderate impact; recoverable within weeks	Recoverable within months	Long-term (years) loss of social and cultural values	Complete loss of significant social and cultural values				
	INTANGIBLES (PERSONAL SUFFERING)		Negligible impact	Slight impact; recoverable within days	Moderate impact; recoverable within weeks	Personal hardship; usually recoverable within months	Leaves significant personal hardship for years	Irreparable personal hardship				
	ECOLOGICAL (FLORA AND FAUNA)		Negligible impact	Slight impact; recoverable within days	Moderate impact; recoverable within weeks	Recoverable within months	Severe species loss	Irreparable species loss				

Figure E-4: Example Risk matrix to determine the relative level of Flood Risk for Proposed Developments.



flood events and maintain the risk categories of economic, intangibles, and ecological at negligible impacts.

6.5. RISK REDUCTION STRATEGIES

The following are recommendations to reduce risks associated with flooding of the Site and to mitigate the extent of property damage during flooding events:

1. FCL and building setbacks prescribed by this report for all habitable structures on the property must be enforced.
2. Applicable bylaws relating to the recommended FCL must be enforced.
3. Vegetated ground cover or alternate equivalent means of erosion protection must be maintained throughout the lot.
4. The set back area, discussed in **Section 8** below, must remain free of drainage impediments.
5. The Site must continue to be graded in a way that promotes efficient drainage of flood flows to the river.
6. No area below the FCL must be used for habitation, business, storage of goods or installation of fixed equipment that would present a safety hazard or be damaged by exposure to flood waters. Vehicle storage below the FCL is acceptable and at the Owner's risk.
7. Building foundation design must consider hydraulic loading.
8. Building foundations must bear on suitable, naturally deposited soil, as approved by a qualified engineer.
9. An Engineer's certification of building foundation design should be included in the Building Permit application.
10. Earth embankments within the setback area and adjacent to proposed buildings must be adequately protected from scour and other forms of erosion that may be caused by flood events.
11. A Post-Development Report, including post-construction photos, must be completed by a Qualified Professional to document and confirm that the construction of the proposed development (construction of single detached dwelling) aligns with the description provided within this report and that the risk reduction strategies are met. Risk reduction strategies that are not completed at the time of construction of the building construction should indicate an expected timeline for completion.
12. This report must be registered as a covenant on title to ensure that the current and future owners are aware of the risks and consequences of building a single family dwelling or accessory structure on this site. The covenant should also address a release of liability of the approving authority for damages caused by flooding from the river.

7. Flood Construction Level

Riverine flooding from the Oyster River resulting from rainfall and snow melt appears to be the governing flood hazard for this site.



The Flood Construction Level (FCL) was determined by one dimensional flood modeling for the upper Oyster River, as outlined in the CVRD Coastal Flood Mapping Project Report Appendix F (Technical Memorandum 5). The FCL estimate accounts for the 0.5% AEP peak instantaneous flow, a 15% allowance to account for projected climate change impacts to the year 2100, and a freeboard allowance of 0.6m.

The recommended FCL at the subject property is **68.8 m** (CGVD2013 datum). This number was extrapolated from the highest corner of the subject property from the flood contours provided in the CVRD Regulatory Floodplain Mapping. The FCL establishes the minimum elevation for the underside of wooden floor system or the top of concrete slab for habitable buildings. The existing grade at the proposed structure location is below the FCL. The FCL will be achieved by raised/projected foundations, or fill (or a combination of both).

It's noted that the two ditches described in **Section 3.2** of the report (local drainage ditches along Acher Road and to the north of Acher Road) do not meet the criteria of a watercourse (as defined in Section 201 of CVRD Bylaw 600 as "*Any natural or man-made depression with well-defined banks and a bed 0.6 metres or more below the surrounding land serving to give direction to a current of, or acting as a retention area for, water at least six months of the year and having a drainage area of 2 square kilometers or more upstream of the point of consideration*") and therefore do not generate any additional FCL criteria to the subject site.

8. Setback

As summarized in **Section 4**, the building setback should be at least 60m from the current natural boundary of the Oyster River, and at least 15m from the natural boundary of any other watercourse. The location of the 60m setback from the river lies about 25 m from the west property line of the subject site (see blue line in **SK-01 in Appendix B**). The two ditches described in **Section 3.2** of the report (local drainage ditches along Acher Road and to the north of Acher Road) do not meet the criteria of a watercourse (as defined in Section 201 of CVRD Bylaw 600) and therefore do not generate any additional setback criteria to the subject site.

Due to the Oyster River building setback requirement being further inland than much of the subject property, and based the property owner's site development constraints noted in Section 3.3 of this report, a building setback exemption is required for the proposed single family dwelling.

A building setback of 30m from the PNB is recommended for this site. This setback lies 50-65m east of the west property line (fronting James Cres). A 30m setback would serve to provide adequate buildable area while providing an area free of drainage impediments in the east portion of the lot.

Considering the nature of the flood hazards expected, as well as the low risk for injury and loss of life, a minimum horizontal setback of 30m from the PNB would be considered reasonable if the risk reduction strategies outlined in **Section 6.5** are adhered to.

Note that this report pertains only to the current proposed construction of a single family home at the location as shown on **SK-01 in Appendix B**. Any future construction of habitable space on the property should be reviewed by an engineer.



9. Assurance Statement

The Regional District Bylaw requires that a qualified professional must demonstrate that the land may be used safely for the intended purpose. In this report, “safely” is defined as the condition in which the hazards and resulting harm or damage are tolerable or acceptable. This report identifies the flood hazard risks to the subject property.

Since the risk to human life is low it can be determined that the land may be used safely for the use intended, including construction of and habitation of the single detached dwelling (per current RU-8 Zoning), provided that the risk reduction strategies outlined in **Section 6.5** are applied.

Per the EGBC guidelines summarized in **Section 4.3**, the building site is not in a high hazard area of the floodplain (i.e., an avulsion path, a flood velocity greater than 1 m/s, a flood depth greater than 2.5 m, and where safe access and egress is not possible).

10. Conclusions

The flood risk and Flood Construction Level and building setback from the Present Natural Boundary has been reviewed for the proposed development on 3736 James Cres, Black Creek, with the following recommendations:

- FCL and building setbacks prescribed by this report for all habitable structures on the property must be enforced.
- Applicable bylaws relating to the recommended FCL must be enforced.
- Vegetated ground cover or alternate equivalent means of erosion protection must be maintained throughout the lot.
- The set back area within the Site must remain free of drainage impediments.
- The Site must be graded in a way that promotes efficient drainage of flood flows to the river.
- No area below the FCL must be used for habitation, business, storage of goods or installation of fixed equipment that would present a safety hazard or be damaged by exposure to flood waters. Vehicle storage below the FCL is acceptable and at the Owner’s risk.
- Building foundation design must consider hydraulic loading.
- Building foundations must bear on suitable, naturally deposited soil, as approved by a qualified engineer.
- Earth embankments within the setback area and adjacent to proposed buildings must be adequately protected from scour and other forms of erosion that may be caused by flood events.
- A Post-Development Report, including post-construction photos, must be completed by a Qualified Professional to document and confirm that the construction of the proposed development (construction of single detached dwelling) aligns with the description provided within this report and that the risk reduction strategies are met. Risk reduction strategies that are not completed at the time of construction of the building construction should indicate an expected timeline for completion.



- The owner is required to grant a covenant under Section 219 of the Land Title Act respecting the use the development of the land which includes an indemnity in favour of the Regional District to indemnify and save harmless the Regional District against any loss or damage with respect to the flooding to the property, or flood damage to the land, structures, and contents thereof, or any injury (including death) to any person or animal arising from the flooding of the property or flood damage to the land.
- This report must be made available to future landowners by registering a covenant on title.

11. Quality Assurance

We recommend that the Client retain a BC Land Surveyor (BCLS) to provide FCL elevation and setback references in the field, prior to construction as required. Floor elevations should be reviewed by a BCLS after construction to ensure they meet the above requirements. Building subgrades must be reviewed by a geotechnical engineer prior to placement of foundations to ensure that foundations will bear directly on undisturbed, competent native soils.

12. Acknowledgements

McElhanney acknowledges that this report may be requested by the local governing authority as a pre-condition to the issuance of a development or building permit. It is acknowledged that the Approving Officers and Building Officials may rely on this report. The report has been prepared for, and at the expense of the Client. McElhanney has not acted as an agent for the local governing authority in the preparation of this report.

13. Closure

The attached **Limitations** apply to this report and are hereby incorporated herein.

We trust that the information contained in this report is suitable for your current needs. If you have any questions or require additional information, please do not hesitate to contact us.



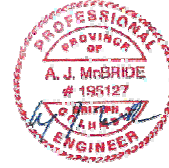
Sincerely,
McElhanney Ltd.

Prepared by:



Emma Rose, EIT
erose@mcelhanney.com

Reviewed by:

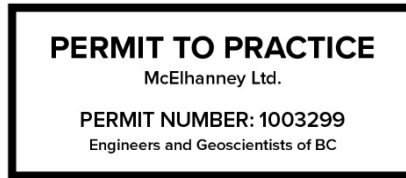


Alex McBride, P.Eng.
amcbride@mcelhanney.com

2023-11-06

Attachments:

- Limitations
- Site Plan SK-01
- Site Survey Plan
- Appendix I: Flood Assurance Statement



Revision History

Date	Status	Revision	Author
November 6, 2023	Final	0	ER



APPENDIX A

Statement of Limitations

Statement of Limitations

Use of this Document. This document was prepared by McElhanney Ltd. ("**McElhanney**") for the particular site, design objective, development and purpose (the "**Project**") described in this document and for the exclusive use of the client identified in this report (the "**Client**"). The data, interpretations and recommendations pertain to the Project and are not applicable to any other project or site location and this document may not be reproduced, used or relied upon, in whole or in part, by a party other than the Client, without the prior written consent of McElhanney. The Client may provide copies of this document to its affiliates, contractors, subcontractors and regulatory authorities for use in relation to and in connection with the Project provided that any reliance, unauthorized use, and/or decisions made based on the information contained within this document are at the sole risk of such parties. McElhanney will not be responsible for the use of this document on projects other than the Project, where this document or the contents hereof have been modified without McElhanney's consent, to the extent that the content is in the nature of an opinion, and if the document is preliminary or draft. This is a technical document and is not a legal representation or interpretation of laws, rules, regulations, or policies of governmental agencies.

Standard of Care and Disclaimer of Warranties. This document was prepared with the degree of care, skill, and diligence as would reasonably be expected from a qualified member of the same profession, providing a similar document for similar projects, and under similar circumstances, and in accordance with generally accepted engineering and scientific judgments, principles and practices. McElhanney expressly disclaims any and all warranties in connection with this document.

Information from Client and Third Parties. McElhanney has relied in good faith on information provided by the Client and third parties noted in this document and has assumed such information to be accurate, complete, reliable, non-fringing, and fit for the intended purpose without independent verification. McElhanney accepts no responsibility for any deficiency, misstatements or inaccuracy contained in this report as a result of omissions or errors in information provided by third parties or for omissions, misstatements or fraudulent acts of persons interviewed.

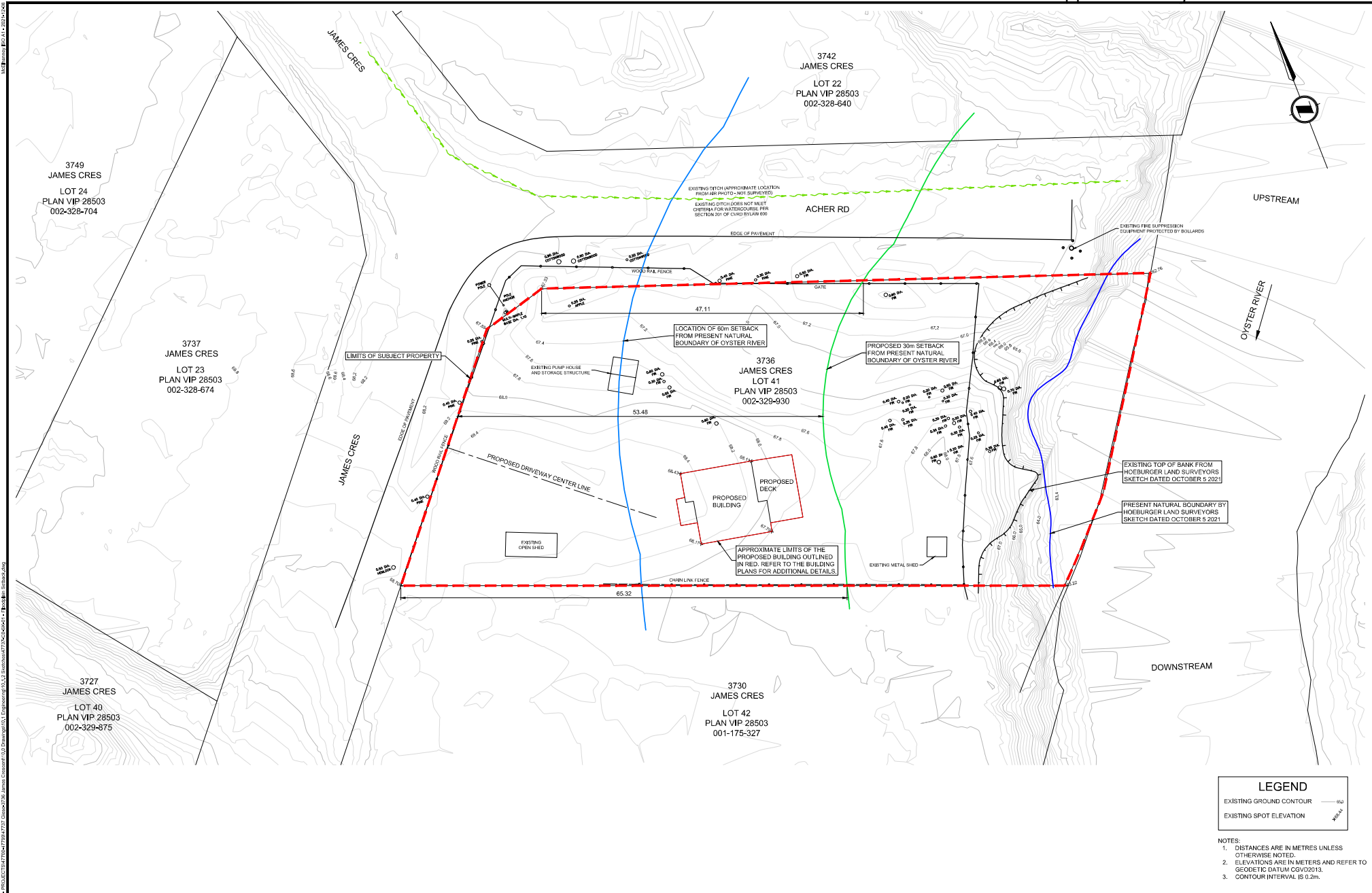
Effect of Changes. All evaluations and conclusions stated in this document are based on facts, observations, site-specific details, legislation and regulations as they existed at the time of the site assessment and report preparation. Some conditions are subject to change over time and the Client recognizes that the passage of time, natural occurrences, and direct or indirect human intervention at or near the site may substantially alter such evaluations and conclusions. Construction activities can significantly alter soil, rock and other geologic conditions on the site. McElhanney should be requested to re-evaluate the conclusions of this report and to provide amendments as required prior to any reliance upon the information presented herein upon any of the following events: a) any changes (or possible changes) as to the site, purpose, or development plans upon which this document was based, b) any changes to applicable laws subsequent to the issuance of the report, c) new information is discovered in the future during site excavations, construction, building demolition or other activities, or d) additional subsurface assessments or testing conducted by others.

Independent Judgments. McElhanney will not be responsible for the independent conclusions, interpretations, interpolations and/or decisions of the Client, or others, who may come into possession of this report, or any part thereof. This restriction of liability includes decisions made to purchase, finance or sell land or with respect to public offerings for the sale of securities.



APPENDIX B

Site Plans – SK-01 and Site Survey Plan



LEGEND

EXISTING GROUND CONTOUR	
EXISTING SPOT ELEVATION	

- NOTES:**
- DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
 - ELEVATIONS ARE IN METERS AND REFER TO GEODETIC DATUM CGVD2013.
 - CONTOUR INTERVAL IS 0.2m.

1	2023-08-21	ISSUED FOR REVIEW	ER	ER	AM
Rev	Date	Description	Drawn	Design	Appr

THE DRAWING AND DESIGN IS THE PROPERTY OF McELHANNAY AND SHALL NOT BE USED, REPRODUCED OR REFERENCED WITHOUT THE CONSENT OF McELHANNAY. McELHANNAY WILL NOT BE HELD RESPONSIBLE FOR THE IMPROPER OR UNAUTHORIZED USE OF THIS DRAWING AND DESIGN.

THIS DRAWING AND DESIGN HAS BEEN PREPARED FOR THE CLIENT'S PURPOSES. TO MEET THE REQUIREMENTS AND REGULATIONS OF THE JURISDICTION IN WHICH IT IS USED. THE CLIENT SHALL BE RESPONSIBLE FOR ANY CHANGES OR OTHER CONSIDERATIONS RESULTING FROM THE USE OF THIS DRAWING FOR ANY OTHER PURPOSES. THE CLIENT SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS, APPROVALS, AND REGULATORY REQUIREMENTS. THE CLIENT SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS, APPROVALS, AND REGULATORY REQUIREMENTS. THE CLIENT SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS, APPROVALS, AND REGULATORY REQUIREMENTS.

INFORMATION ON EXISTING UNDERGROUND FACILITIES MAY NOT BE COMPLETE OR ACCURATE. McELHANNAY, ITS EMPLOYEES AND SUBCONTRACTORS ARE NOT RESPONSIBLE FOR THE LOCATION OF ANY UNDERGROUND FACILITIES. PLEASE CALL ON OR OFF FACILITIES WITH THE BROWN OR WHITE HOTLINE. PLEASE CONTACT THE BROWN OR WHITE HOTLINE TO OBTAIN THE BROWN OR WHITE HOTLINE. PLEASE CONTACT THE BROWN OR WHITE HOTLINE TO OBTAIN THE BROWN OR WHITE HOTLINE.

McElhannay

1211 Ryan Road
Courtenay BC
Canada V9R 3R8
T 250 338 5495

1:250

ORIGINAL DIMS (SP): A1 (594 x 841mm)

**PRELIMINARY
NOT FOR
CONSTRUCTION**

THIS DRAWING HAS NOT BEEN APPROVED AND MAY CONTAIN ERRORS AND OMISSIONS.

JENNIFER GIESE
4325 488 STREET, DELTA, BC V4K 2R3

3736 JAMES CRES
SITE PLAN FOR FLOODPLAIN SETBACK

Project Number: 2211-47737-00

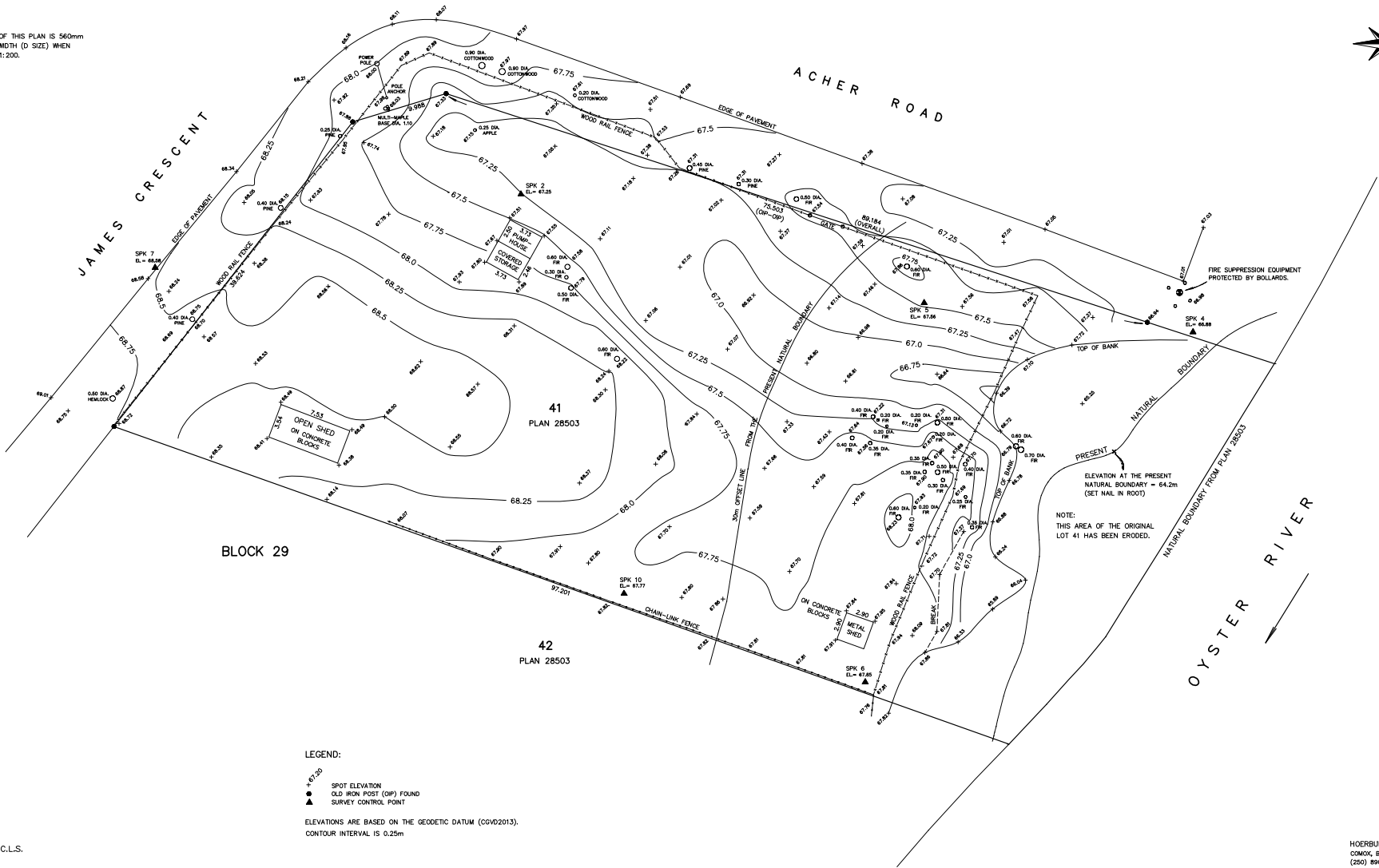
Rev: 1

SK-01

TOPOGRAPHIC SURVEY PLAN OF LOT 41, BLOCK 29,
COMOX DISTRICT, PLAN 28503.

3736 JAMES CRESCENT, BLACK CREEK
SCALE 1 : 200 (METRIC)

THE INTENDED PLOT SIZE OF THIS PLAN IS 560mm
IN HEIGHT BY 849mm IN WIDTH (D SIZE) WHEN
PLOTTED AT A SCALE OF 1:200.



APPENDIX C

Appendix I: Flood Assurance Statement

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
770 Harmston Ave, Courtenay, BC, V9N 0G8
 Jurisdiction and address

Date: August 22, 2023

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”):

LOT 41 BLOCK 29 PLAN VIP28503 LAND DISTRICT 15, PID 002-329-930; 3736 James Crescent, Black Creek, BC

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]

- 1. Consulted with representatives of the following government organizations:
Comox Valley Regional District
- 2. Collected and reviewed appropriate background information
- 3. Reviewed the Proposed Development on the Property
- 4. Investigated the presence of Covenants on the Property, and reported any relevant information
- 5. Conducted field work on and, if required, beyond the Property
- 6. Reported on the results of the field work on and, if required, beyond the Property
- 7. Considered any changed conditions on and, if required, beyond the Property
- 8. For a Flood Hazard analysis I have:
 - 8.1 Reviewed and characterized, if appropriate, Flood Hazard that may affect the Property
 - 8.2 Estimated the Flood Hazard on the Property
 - 8.3 Considered (if appropriate) the effects of climate change and land use change
 - 8.4 Relied on a previous Flood Hazard Assessment (FHA) by others
 - 8.5 Identified any potential hazards that are not addressed by the Flood Assessment Report
- 9. For a Flood Risk analysis I have:
 - 9.1 Estimated the Flood Risk on the Property
 - 9.2 Identified existing and anticipated future Elements at Risk on and, if required, beyond the Property
 - 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
- 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:

- 11.1 Made a finding on the level of Flood Hazard or Flood Risk on the Property
- 11.2 Compared the level of Flood Hazard or Flood Risk tolerance adopted by the Approving Authority with my findings
- 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 or 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

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

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.

August 22, 2023

Date

McElhanney Ltd.

Prepared by

Emma Rose, EIT

Name (print)

ERose

Signature

1211 Ryan Roac. Courtenay, BC V9N 3R6

Address

250-338-5495

Telephone

amcbride@mcelhanney.com

Email

McElhanney Ltd.

Reviewed by

Alex McBride, P.Eng.

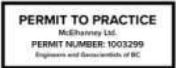
Name (print)

Alex McBride

Signature



2023-08-22



(Affix PROFESSIONAL SEAL here)

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

I am a member of the firm McElhanney Ltd.

and I sign this letter on behalf of the firm.

(Name of firm)