

April 19, 2022

File No.: 2022.007.001

Sage Environmental Consulting
8-3101 29th Street
Vernon, BC V1T 5A8

Attention: Matthew Davidson BSc., P.Ag., EP

Reference: 7 Nerie Road Floodplain Setback Variance | Issued for Use

1. Introduction

Watershed Engineering Ltd. was retained by Sage Environmental Consulting to review the property located at 7 Nerie Road, Vernon, BC for the suitability of a floodplain setback variance for a proposed new residence. The original house was lost in the White Rock Lake wildfire in 2021. The property is located 42 km north of West Kelowna, BC and is bordered by Okanagan Lake to the east on the land legally described as Lot 1, District Lot 3329, Osoyoos Division of Yale Land District, Plan 20203. The scope of the assessment includes a review of the Regional District of Central Okanagan Zoning Bylaw, a site visit and review of survey for the site, review of the Okanagan Basin Water Board (OBWB) Okanagan Mainstem floodplain mapping report and development of recommendations for the project. A site plan of the property is provided in Figure 1.0.

2. Site Description and Inspection

A site inspection was completed by Caleb W. Pomeroy, P.Eng. on April 6, 2022 to review existing site conditions, review the shoreline bathymetry, and note any concerns with the proposed layout relative to the flood hazard from Okanagan Lake for the building location shown in Figure 2.0. A summary of the observations is provided below:

- The property is located near the toe of the slope that continues up to Westside Road to the west and appears to partially consist of fill to create the building area which the previous structure was located on. A retaining wall and stairs that lead to the Okanagan Lake shoreline are all that remains of the previous structure.
- A proposed site flood construction level (FCL) of 345.16 m (CGVD1928) is currently proposed for the new structure (Sage Environmental 2022, personal communication February, 18).
- The entire property was impacted by the 2021 White Rock Lake wildfire, however some vegetation located below the staked present natural boundary remains in place.
- The buildable area is significantly confined by the steep slopes (70%) to the west and the natural boundary of Okanagan Lake.
- The high-water elevation is defined at the toe of the existing slope and is demarcated by 0.3 m high grouted boulder wall.
- The shoreline slope below the high-water mark was measured at 3 degrees from horizontal using a Leica DISTO X4 laser distance meter.
- The property rises from the high-water mark at a 30% gradient to the upper bench where the proposed house will be constructed.
- The horizontal extent of floodplain of Okanagan Lake is limited on the property due to the steep gradient rising west from the natural boundary.

3. Floodplain Regulation and Flood Mapping

The RDCO Zoning Bylaw No. 871 Section 3.28 Part 2.1 specifies that the floodplain setback of 15.0 metres (49.2 ft.) from the natural boundary of Okanagan Lake must be maintained (**Regional District of Central Okanagan, 2021**) and in Part 3 it specifies that an exception can be made if the property can be demonstrated to be safe for the intended use by a qualified professional. The purpose of the floodplain setback is to prevent the flood hazard and erosion caused by the proximity of the watercourse from impacting the proposed development.

The OBWB Okanagan Mainstem Floodplain Mapping project was initiated following the record-setting high flows in the Okanagan Valley in 2017 and included mid-century (2040-2070) and end-of-century (2070-2100) climate change predictions to guide long-term planning. This project provides the latest information based on available hydrologic records and applies the latest information on climate change science and its influence on flooding on Okanagan Lake.

The OBWB 2020 flood mapping design event on Okanagan Lake uses the flood of record (2017) adjusted to mid-century for climate change. The CVGD1928 calculated flood construction level is 344.3 m (**Northwest Hydraulic Consultants Ltd., 2020**) which includes 0.6 m of freeboard above the calculated water surface elevation during the design event. In addition to the water surface elevation, the lake shoreline flood construction level zone, which is defined as the area where wave setup and run up must be considered in the development of FCLs, was mapped. The proposed building is outside the recommended shoreline flood construction zone identified in the 2020 OBWB Floodplain Mapping Study, so wave effects do not need to be considered. See Figure 3.0.

The recent floodplain mapping is based on the latest hydrological models and analysis, but there are limitations to the analysis as the project is regionally based and does not consider site-specific details. A site verification was completed to confirm that the results of the Okanagan Lake shoreline wave effects floodplain extents were appropriate. The site topography rises from the high-water mark at about 30%, a milder slope than the generalized 40% assumed in the OBWB (2020) report, implying that the estimated wave effect extent would be conservative for this location.

4. Conclusions and Recommendations

The technical and site review completed in this study show that although flood risk is present, the property can be safely developed for its intended use provided the following recommendations are implemented. Elevations are provided in CGVD1928 vertical datum for establishing of benchmarks and elevation control for FCLs. The following recommendations are for the flood hazard relative to Okanagan Lake only.

1. Any inhabitable space must be located outside the 15 m Stream Protection and Enhancement Area (SPEA) setback, which removes the building from the shoreline floodplain zone as established in the 2020 OBWB Floodplain Mapping Study.
2. The Flood Construction Level (FCL), which is defined as the design flood level plus an allowance for freeboard, determines the minimum habitable floor level of a structure or infrastructure that could be damaged by flood waters and is 344.3 m (CGVD1928) for this site according to the 2020 OBWB study. It applies to the underside of a wooden flooring system or the top side of a concrete floor. An FCL of 345.16 m is currently proposed by the designer.
3. As the proposed building footprint is outside the shoreline flood construction zone, with an FCL above the required elevation of 344.3 m, the floodplain setback can be reduced from 15 m to 10.32 m on the subject property (see Figure 2.0).
4. A geotechnical engineer should be consulted to verify the suitability of the soils for foundation design and slope stability to the west of the proposed residence.

We trust this memo meets your requirements. Should you have any questions, please contact the undersigned.

Sincerely,

Watershed Engineering Ltd.

Prepared by:

Reviewed by:



Caleb W. Pomeroy, P.Eng., PMP
Principal Engineer
Direct Line: 250.803.1150
caleb.pomeroy@watershedengineering.ca
Permit to Practice No: 1000852

Adrian G. Chantler, Ph.D., P.Eng.
Consulting Hydrotechnical Engineer
Cell: 604.377.9864
agchantler@gmail.com
Permit to Practice No: 1000910

List of Figures

Figure 1.0 – 7 Nerie Road Site Plan and Sections
Figure 2.0 – Proposed Building Layout
Figure 3.0 – OBWB 2020 Floodplain Mapping for 7 Nerie Road

List of Appendices

Appendix A – Photo Log

References

EGBC. (2018). *Legislated Flood Assessments in a Changing Climate in BC*.

iMapBC. (2022, 01 28). *Geographic Data & Services*. Retrieved from iMapBC: <https://maps.gov.bc.ca/ess/hm/imap4m/>

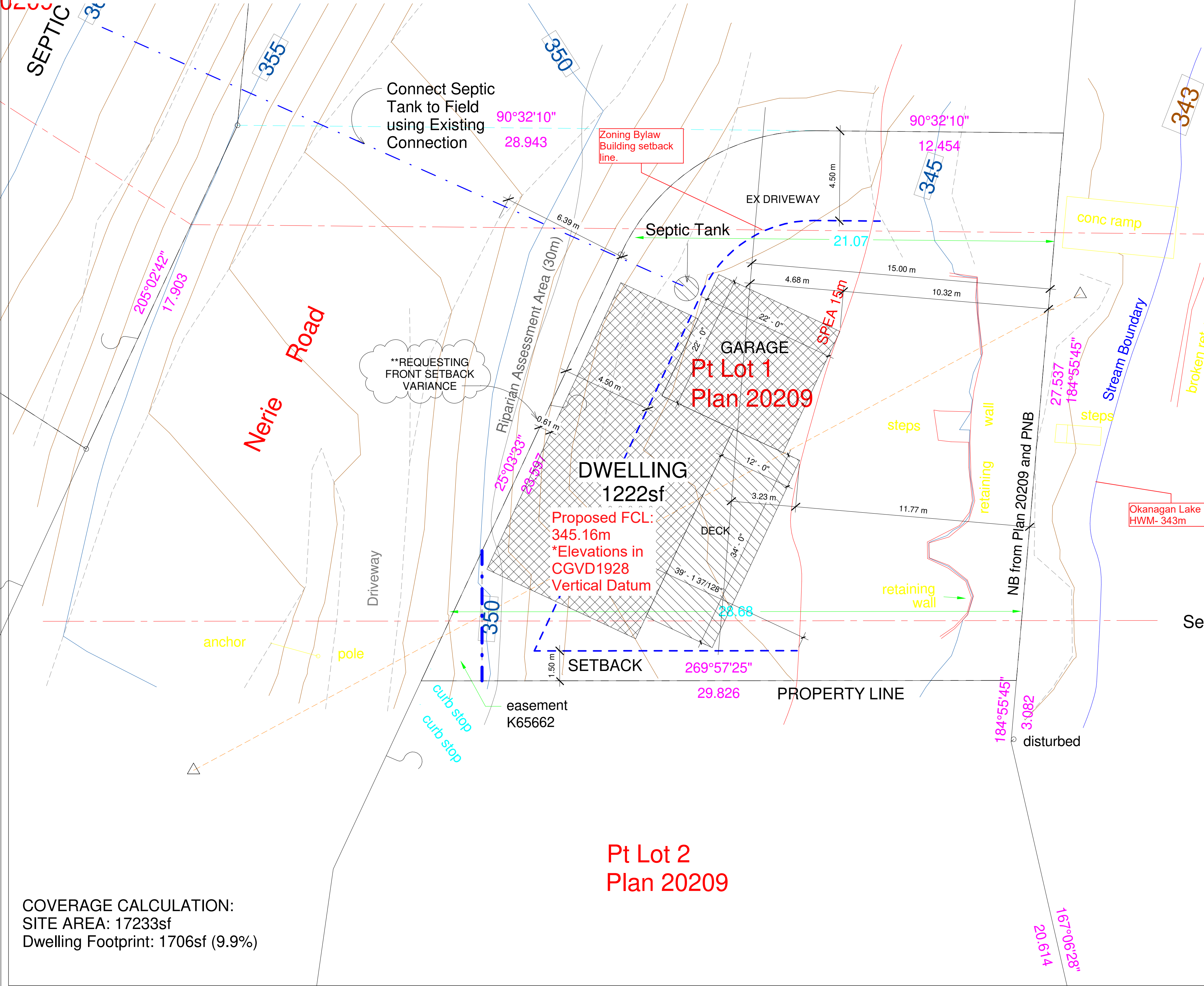
Northwest Hydraulic Consultants Ltd. (2020). *Okanagan Mainstem Floodplain Mapping*.

Regional District of Central Okanagan. (2021). *Zoning Bylaw No.871*.

F.B. 1366 p4

Figure 2.0: Proposed Site Plan - 7 Nerie Road

*Notes in RED added by Watershed Engineering Ltd. 2022 04 19



COVERAGE CALCULATION:
SITE AREA: 17233sf
Dwelling Footprint: 1706sf (9.9%)

Pt Lot 2
Plan 20209



250.307.6818-925RDesign.com

No.	Description	Date
-----	-------------	------

Section 2

Ex. Dock

Okanagan Lake

Section 3

Sprout
Residence
#7 Nerie Rd

Site

Date	Mar 8 2022
------	------------

Drawn by	ML
----------	----

Project No.	925RDi 22041
-------------	--------------

Scale	1" = 10'-0"
-------	-------------

A1

3/8/2022 11:33:14 AM

Figure 3.0: Okanagan Basin Water Board 2020 Floodplain Mapping for 7 Nerie Road



Appendix A - Photo Log

April 6, 2022 Site Visit Photo Log



Photo 1: Looking west towards 7 Nerie Road



Photo 2: Looking south at entrance to 7 Nerie Road

April 6, 2022 Site Visit Photo Log



Photo 3: Looking east from Nerie Road across proposed building location



Photo 4: Looking north along Okanagan lake HWM