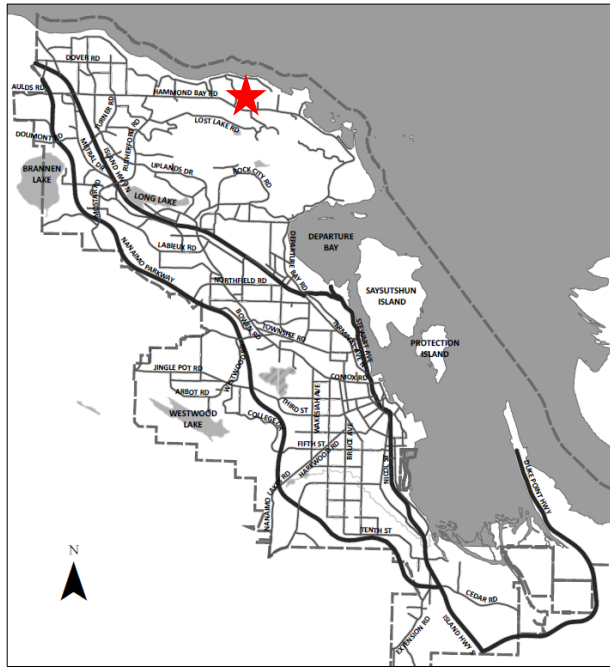


DATE July 31, 2026

AUTHORED BY CAMERON SALISBURY, PLANNER, CURRENT PLANNING

SUBJECT DEVELOPMENT PERMIT APPLICATION NO. DP1384 – 4951
DENFORD PLACE



Proposal:

A 32-unit multi-family townhouse development

Zoning:

R6 – Low Density Residential

City Plan Land Use Designation:

Suburban Neighbourhood

Development Permit Area:

DPA5 – Wildfire Hazard

DPA 6 – Steep Slope

DPA8 – Form & Character

Lot Area:

13,911m²

DP



OVERVIEW

Purpose of Report

To present for delegated approval, a development permit application for a multi-family residential development at 4951 Denford Place.

Recommendation

That Development Permit No. DP1384 be issued for a 32-unit multi-family development at 4951 Denford Place with variances as outlined in the “Proposed Variances” section of the Delegated Approval Report dated 2026-JUL-31.

BACKGROUND

A development permit application, DP1384, was received from Glenn Hill of dHKarchitects, on behalf of Race Rock Development Corp., for a 32-unit, multi-family townhouse residential development in eight separate buildings at 4951 Denford Place. The property is located within multiple Development Permit Areas (DPAs) and the design guidelines apply for:

- Wildfire Hazard (DPA5)
- Steep Slopes (DPA6); and
- Form & Character (DPA8).

Subject Property & Site Context

The subject property is located in the Rocky Point Neighbourhood at the west end of Denford Place between Currie Place and Walley Creek Trail Park. The property is vacant and is heavily treed. The parcel has a variable topography and generally slopes down approximately 20m from north to south across the site.

The surrounding neighbourhood consists of predominantly multi-family, townhouse, and single-family developments. Nearby amenities include Walley Creek Trail Park approximately 60m to the south, Harry Wipper Park approximately 200m to the southwest, Frank J. Ney Elementary School approximately 115m to the west, and a commercial plaza containing a pub and liquor store approximately 600m to the southeast.

DISCUSSION

Proposed Development

The applicant is proposing a 32-unit multi-family townhouse development in eight separate buildings. The proposed gross floor area is 5,693 m² with a total Floor Area Ratio (FAR) of 0.41, which is consistent with the maximum permitted FAR of 0.45 in the R6 zone. The unit composition includes 30 – three-bedroom units and 2 – four-bedroom units. The applicant has provided a number of technical reports to support the design and address the applicable development permit area requirements including:

- Geotechnical Hazard Assessment;
- Wildfire Hazard Assessment; and
- Bio-Inventory Report.

Site Design

The site is organized with all vehicle access from Denford Place at the southeast end of the property. Eight buildings are arranged generally around the perimeter of the site, framing internal drive aisles and a centrally located shared amenity space. This layout supports an orderly internal pattern of development, reduces the visual prominence of parking and circulation areas from adjacent properties, and responds to the sloping condition of the site by distributing building mass across separate townhouse blocks rather than concentrating it in one continuous form. The 3-storey townhouse buildings along the steep slope at the southwest property line are set back and designed to mitigate potential slope hazards in accordance with the Steep Slope Development Permit Area Guidelines (DPA6).

Parking is primarily provided within unit garages, with limited driveway parking and visitor, accessible, and EV charging spaces distributed throughout the site. A total of 69 parking spaces are proposed, exceeding the bylaw requirement of 66 spaces. The internal road network is designed to support safe and efficient circulation, while a connected pedestrian pathway system separated from vehicle travel by a flat curb improves pedestrian safety and links building entrances, parking areas, and common spaces. The centrally located shared amenity space provides a focal point for residents, while long-term bicycle parking and waste storage are integrated within unit garages.

The applicant has demonstrated how the proposed development substantially meets the intent of the applicable Steep Slope Development Permit Area Guidelines by:

- clustering buildings and stepping them with the grade to reduce the appearance of continuous built form on the slope;
- designing buildings to reflect the sloped character of the site and to reduce visual massing when viewed from adjacent properties and public vantage points;
- incorporating retaining walls and grading measures intended to limit slope disturbance and support safe development of the site; and
- using natural materials, textures, landscape buffering, and replacement planting to soften the built form and reinforce the hillside setting.

The development has been reviewed with consideration for the site's sloping topography, treed setting, and visual relationship to adjacent properties. The proposal is arranged in separate townhouse buildings, avoids a single continuous building form across the slope, and incorporates setbacks, articulated massing, landscape buffering, and replacement planting to help soften the built form and maintain a compatible transition to the surrounding neighbourhood. Staff are satisfied that the proposal generally meets the intent of the applicable steep slope guidelines.

It is also noted that the proposed site coverage is 29%, compared with the maximum allowable coverage of 40%. The reduced coverage supports the overall site planning approach by limiting the extent of building footprint and allowing greater opportunity for landscape treatment and open space.

Building Design

The proposed townhouse development is composed of contemporary residential forms that respond to the surrounding neighbourhood context and the site's natural topography. Massing is broken into eight separate buildings with articulated elevations, which helps reduce visual bulk, provide an appropriate transition to adjacent development, and support a more refined residential character.

Design measures are incorporated to minimize overlook and shadow impacts while enhancing privacy for residents and neighbouring properties to the north, east, and west. Sloped and varied rooflines add visual interest, help define individual units, and reinforce the project's ground-oriented character, while architectural detailing and projections contribute to a finer-grained streetscape within the development.

The exterior finishes include a cohesive palette of fibre-cement panel siding, fascia elements, and horizontal wood-look plank siding, which introduce texture and contrast while maintaining a consistent overall appearance. The project utilizes fire resistant building materials which address the Wildfire Hazard Development Permit Area Guidelines (DPA5).

Landscape Design

Landscaping is provided throughout the development with a mix of trees, shrubs, groundcovers, grasses, and ferns that help soften the built form and contribute to a cohesive residential setting. The selection of a low density of fire-resistant plants and shrubs and the removal of a significant amount of trees to reduce the overall fuel load of the site is in accordance with the Wildfire Hazard Development Permit Area Guidelines (DPA5).

Landscape buffers are provided around the perimeter of the site to screen adjacent properties and create a softer transition to surrounding development, while tree planting is incorporated along internal drive aisles and within open spaces to enhance the site's tree canopy and overall visual character. A fire-smart corrugated metal fence is proposed around the site to provide privacy between the development and adjacent properties while creating a fire break along the south property line. Each unit includes a private deck and/or patio as individual outdoor amenity space.

A continuous, clearly demarcated pedestrian pathway is provided through the site by way of a pedestrian zone on the internal road, separated from the vehicular lane by a rollover/flat curb that also functions as a traffic calming measure. The centrally located amenity area has been designed as a shared outdoor space that integrates a pocket park and stormwater management

features with informal recreation and family-oriented play opportunities, including permeable surfaces and seating areas.

Additional seating areas and a promontory are proposed along the southern lot line. The promontory is designed as a wooden deck affixed to the retaining wall and is intended to form the future start of a staircase to be constructed at the time of development of the adjacent parcel, forming part of an existing covenanted public access trail. The location of the promontory aligns with the proposed sanitary right-of-way.

Summary

Overall, the proposed site, building, and landscape design responds to the property's sloping, treed context while supporting a compact townhouse form consistent with the R6 zone. The layout provides safe internal circulation, usable outdoor amenity space, landscape buffering, and stormwater features, while the separated building forms, articulated elevations, and fire-resistant materials help reduce visual massing, support neighbourhood compatibility, and address wildfire hazard considerations. Subject to implementation of the accepted technical reports and landscape plans, these design elements are consistent with the intent of the applicable development permit area design guidelines for Wildfire Hazard, Steep Slopes, and Form and Character.

Design Advisory Panel

The Design Advisory Panel (DAP), at its meeting held on 2025-MAY-08, accepted DP1384 as presented and provided the following recommendations:

- Consider options to introduce more colours into the building façades;
- Consider partial fencing between units in the backyards;
- Consider options to retain more trees on-site and increase outdoor amenity space;
- Consider options to retain the rocky outcrop in the northeast portion of the site;
- Consider using bird friendly glazing for patio spaces;
- Consider using a style of bicycle rack with two points of contact; and
- Consider the potential future pathway to the school.

Following the DAP meeting, the applicant made the following revisions to the proposal:

- The light grey exterior finish was replaced with white to increase façade contrast.
- Rear patio privacy is addressed through building articulation and landscape screening.
- Tree retention was reviewed and some additional trees were identified for protection on the perimeter of the site, and replanting is proposed throughout the site.
- Outdoor amenity space includes a central amenity area, private patios and decks, and additional seating along the southern lot line.
- The rocky outcrop was retained where feasible, subject to grading, servicing, and building siting requirements.
- Patio glazing was revised from clear to frosted glass.

- The proposed bicycle rack provides two points of contact.
- A future pathway connection is anticipated to connect beyond the proposed promontory along the southern lot line.

Conditions of Development Permit

As a condition of the development permit, the proposed development will need to be constructed in accordance with the recommendations of the Wildfire and Steep Slope Hazard technical reports completed and submitted. Staff have reviewed and accepted the reports which demonstrate that the site can be developed safely and in accordance with the applicable development permit area guidelines.

Proposed Variances

Maximum Building Height

The maximum permitted height for a principal building with a sloped roof in the R6 zone is 10.5m. The applicant is requesting variances for portions of Buildings 5 and 6 to permit a maximum building height up to 11.25m.

The table below shows a comparison of the permitted building heights in the R6 zone and the proposed building heights:

Building	R6 Permitted Height	Proposed Height	Variance (m)
5	10.50m	10.80m	+0.30m
6	10.50m	11.25m	+0.75m

The proposed height variances are requested to accommodate the architectural rooflines and a coordinated building form across the development given the sloping topography of the site. The additional height is minor in scale and is not expected to negatively impact adjacent properties, given the building placement, site grading, and design measures incorporated to address privacy and overlook.

Staff support the variances to facilitate a cohesive townhouse development with a building form and massing that is complementary to the site and surrounding neighbourhood context.

SUMMARY POINTS

- Development Permit application No. DP1384 is for a 32-unit multi-family townhouse development at 4951 Denford Place.
- The proposed site, building, and landscape design supports a residential form consistent with the applicable development permit area design guidelines.
- Variances are requested to increase the maximum permitted building height for two of the proposed buildings.

ATTACHMENTS

- ATTACHMENT A: Permit Terms and Conditions
- ATTACHMENT B: Subject Property Map
- ATTACHMENT C: Site and Parking Plan
- ATTACHMENT D: Building Elevations and Details
- ATTACHMENT E: Landscape Plan and Details
- ATTACHMENT F: Geotechnical Hazard Assessment
- ATTACHMENT G: Wildfire Hazard Assessment

ATTACHMENT A

PERMIT TERMS AND CONDITIONS

PERMIT TERMS

The “City of Nanaimo Zoning Bylaw 2011 No. 4500” is varied as follows:

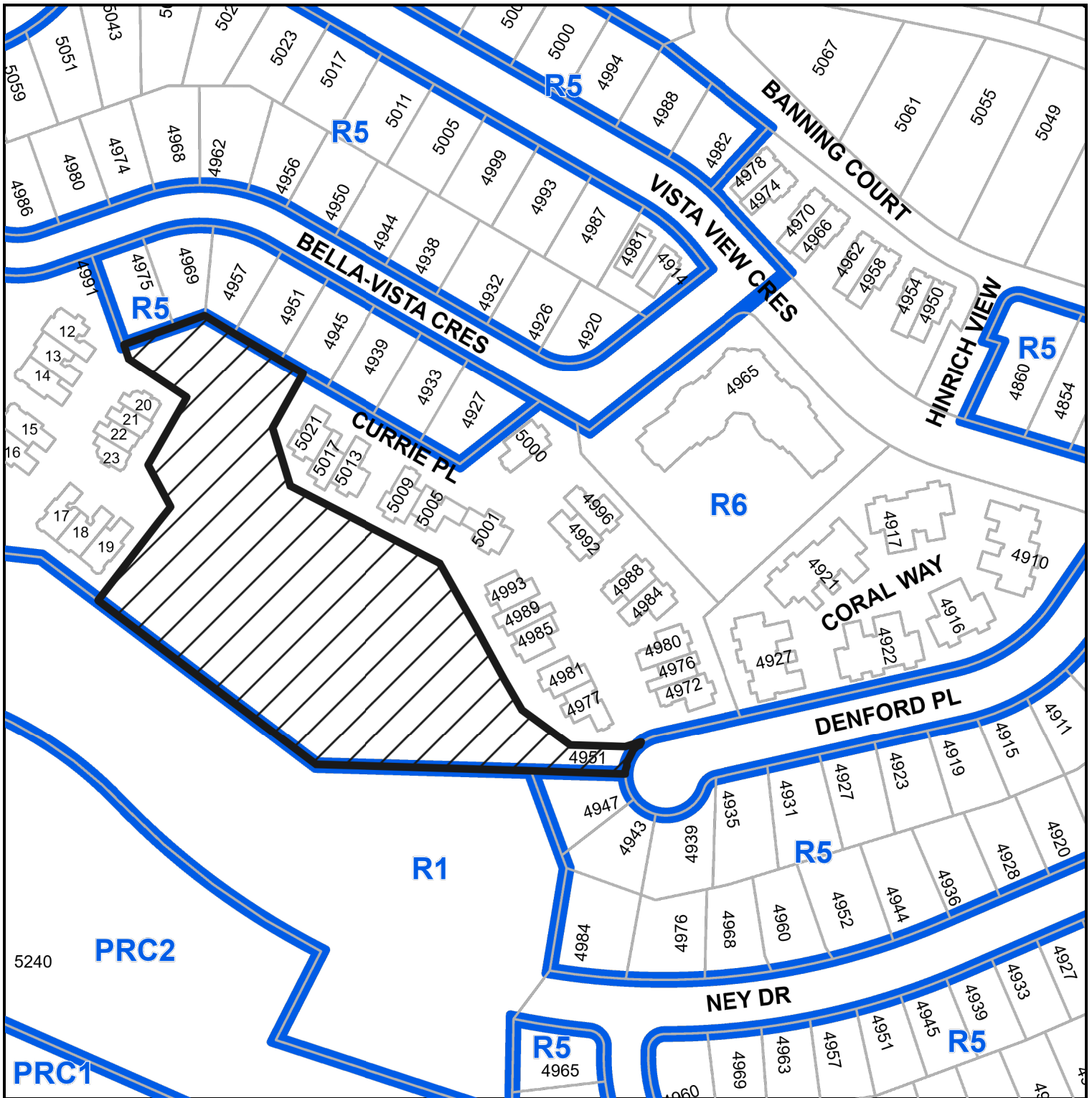
1. *Section 7.6.1 Size of Buildings* – to increase the maximum permitted height of a principal building as follows and shown on Attachment D:

Building	Permitted Height	Proposed Height
5	10.50m	10.80m
6	10.50m	11.25m

CONDITIONS OF PERMIT

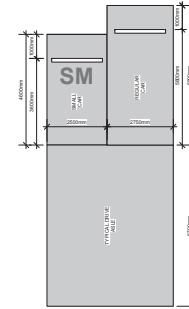
1. The subject property shall be developed generally in accordance with the Site and Parking Plan prepared by dHKarchitects, dated 2026-MAY-28, as shown on Attachment C.
2. The subject property shall be developed in substantial compliance with the Building Elevations and Details, prepared by dHKarchitects, dated 2026-MAY-28, as shown on Attachment D.
3. The subject property shall be developed in substantial compliance with the Landscape Plans and Details prepared by Kinship Design Art Ecology, dated 2026-JUL-22, as shown on Attachment E.
4. The subject property shall be developed in substantial compliance with the Geotechnical Hazard Assessment prepared by Lewkowich Engineering Associates Ltd., dated 2025-FEB-19, as shown on Attachment E.
5. The subject property shall be developed in substantial compliance with the Wildfire Hazard Assessment prepared by Strathcona Forestry Consulting, dated 2023-JUL-07, as shown on Attachment E.

ATTACHMENT B
SUBJECT PROPERTY MAP



4951 DENFORD PLACE

ATTACHMENT C SITE AND PARKING PLAN



PROJECT DATA

-CIVIC ADDRESS:
- 4951 DENFORD PLACE, NANAIMO, B.C.

LEGAL DESCRIPTION:
- LOT 2, DISTRICT LOT 54, WELLINGTON LAND DISTRICT,
PLAN: EPP62212
PID: 020-898-692

ZONING: R6 LOW DENSITY RESIDENTIAL

SITE AREA: 13911.23 m²

RESIDENTIAL DENSITY:
PROPOSED: 32 ALLOWABLE (MAX FLOOR AREA RATIO = 0.45): 35

FAR: PROPOSED: 0.41 (5692.74m²) ALLOWABLE: 0.45 (6260.1 m²)

PROPOSED SITE COVERAGE:

PROPOSED: 29% [4084.71m²]
ALLOWABLE: 40% [5,564.5 m²]

SETBACKS: PROPOSED: ALLOWABLE:
FRONT: 3.0m
FLANKING: 2.5m
REAR: 7.5m
SIDE: 3.0m

GFA CALCULATION:

UNIT TYPE	GFA	AMOUNT OF UNITS
A	197 m ²	3
B	234.3 m ²	2
D	169.7 m ²	12
E	180.3 m ²	6
F	168.3 m ²	9

32 UNITS - 61 276.25 sq ft (5692.74m²) TOTAL

OFF STREET PARKING

REQUIRED		
32 DWELLING UNITS X 2 SPACES (AREA 1)	64	STALLS
VISITOR: SPACES / 22	2.90	STALLS
H/C STALLS	2	STALLS

SMALL CAR STALLS ALLOWABLE - 40% - 25.6 STALLS (44 FULL SIZE STALL MIN)
ELEC. VEHICLE STALLS AS PER SECTION 7.7. OF PARKING BYLAW
(A minimum of 25% of all required off-street parking spaces)

PROVIDED		
32 DWELLING UNITS X 2 SPACES (AREA 1)	64	STALLS
VISITOR: SPACES / 22	3	STALLS
H/C STALLS	2	STALLS
TOTAL	69	STALLS

SMALL CAR - 15 STALLS
FULL SIZE - 54 STALLS
H/C STALLS - 2 STALLS

EV:
Level 1: An electric outlet box wired to a separate branch circuit capable of supplying power for the installation of a Level 1 Electric Vehicle (EV) Charge Receptacle, provided in the garage for each unit.
Level 2: One Electric Vehicle (EV) Charge Receptacle provided as per Section 7.7(i), with the remaining common (undesignated) parking spaces wired to support the future installation of Level 2 EV Charge Receptacles.

BICYCLE PARKING

SHORT TERM	32 DWELLING UNITS X 0.1 SPACES	3.2	SPACES
LONG TERM	32 DWELLING UNITS X 0.5 SPACES	16	SPACES REQUIRED
		32	SPACES PROVIDED

PROPOSED VARIANCES

R6 HEIGHT OF PRINCIPAL BUILDING - SLOPED ROOF (> 4:12 PITCH)
BUILDING 5 VARIANCE REQUEST OF 0.3m TO COMPLETE ARCHITECTURAL ROOF LINES
BUILDING 6 VARIANCE REQUEST OF 0.75m TO COMPLETE ARCHITECTURAL ROOF LINES



MATERIAL PALETTE

- | | | |
|---|--|---|
| 1 FIBRE CEMENT PANEL SIDING, IN IRON GREY
WITH ALUMINIUM FLASHING, COLOUR MATCHED TO IRON GREY | 5 ASPHALT SHINGLES, IN DARK GREY | 13 FASCIA BOARD, IN WHITE |
| 2 FIBRE CEMENT PANEL SIDING, IN GREY SLATE
WITH ALUMINIUM FLASHING, COLOUR MATCHED TO GREY SLATE | 7 FROSTED TEMPERED GLASS GUARDRAILS WITH ALUMINIUM FRAME, IN IRON GREY | 14 VINYL FRAME WINDOW, IN IRON GREY |
| 3 FIBRE CEMENT PANEL SIDING, IN WHITE
WITH ALUMINIUM FLASHING, COLOUR MATCHED TO WHITE | 8 ALUMINIUM CAP AND TRIM FLASHING, IN IRON GREY | 15 VINYL SWING DOOR IN IRON GREY WITH SIDE LIGHT |
| 4 WOOD LOOK PLANK SIDING, LIGHT WOOD GRAIN FINISH | 9 ALUMINIUM CAP AND TRIM FLASHING, IN GREY SLATE | 16 VINYL SWING DOOR IN IRON GREY WITH TEMPERED GLASS: PANEL AND TRANSOM |
| | 10 ALUMINIUM CAP AND TRIM FLASHING, IN WHITE | 17 VINYL SWING DOOR IN IRON GREY WITH TEMPERED GLASS PANEL |
| | 11 FASCIA BOARD, IN IRON GREY | 18 3 PANEL, VINYL, SLIDING TEMPERED GLASS DOOR, IN IRON GREY |
| | 12 FASCIA BOARD, IN GREY SLATE | 19 4 PANEL, VINYL, SLIDING TEMPERED GLASS DOOR, IN IRON GREY |
| | | 20 2 PANEL, VINYL, SLIDING TEMPERED GLASS DOOR, IN IRON GREY |
| | | 21 OVERHEAD GARAGE DOOR, IN GREY SLATE |

Proposed Height
Variance 0.3m

Proposed Height
Variance 0.3m

Proposed Height
Variance 0.75m

Proposed Height
Variance 0.75m

MATERIAL PALETTE

- 1 FIBRE CEMENT PANEL SIDING, IN IRON GREY
WITH ALUMINIUM FLASHING, COLOUR MATCHED TO IRON GREY
- 2 FIBRE CEMENT PANEL SIDING, IN GREY SLATE
WITH ALUMINIUM FLASHING, COLOUR MATCHED TO GREY SLATE
- 3 FIBRE CEMENT PANEL SIDING, IN WHITE
WITH ALUMINIUM FLASHING, COLOUR MATCHED TO WHITE
- 4 WOOD LOOK PLANK SIDING, LIGHT WOOD GRAIN FINISH
- 5 ASPHALT SHINGLES, IN DARK GREY
- 6 FROSTED TEMPERED GLASS GUARDRAILS WITH ALUMINIUM FRAME, IN IRON GREY
- 7 ALUMINIUM CAP AND TRIM FLASHING, IN IRON GREY
- 8 ALUMINIUM CAP AND TRIM FLASHING, IN GREY SLATE
- 9 ALUMINIUM CAP AND TRIM FLASHING, IN WHITE
- 10 FASCIA BOARD, IN IRON GREY
- 11 FASCIA BOARD, IN GREY SLATE
- 12 FASCIA BOARD, IN WHITE
- 13 VINYL FRAME WINDOW, IN IRON GREY
- 14 VINYL SWING DOOR IN IRON GREY WITH SIDE LIGHT
- 15 VINYL SWING DOOR IN IRON GREY WITH TEMPERED GLASS PANEL
- 16 VINYL SWING DOOR IN IRON GREY WITH TEMPERED GLASS PANEL
- 17 3 PANEL, VINYL, SLIDING TEMPERED GLASS DOOR, IN IRON GREY
- 18 4 PANEL, VINYL, SLIDING TEMPERED GLASS DOOR, IN IRON GREY
- 19 2 PANEL, VINYL, SLIDING TEMPERED GLASS DOOR, IN IRON GREY
- 20 OVERHEAD GARAGE DOOR, IN GREY SLATE

RECEIVED
DP-1384
2026-MAY-29
COUNCIL SERVICES



MATERIAL PALETTE

- | | | |
|--|---|--|
| <p>1 FIBRE CEMENT PANEL SIDING, IN IRON GREY
WITH ALUMINIUM FLASHING, COLOUR MATCHED TO IRON GREY</p> <p>2 FIBRE CEMENT PANEL SIDING, IN GREY SLATE
WITH ALUMINIUM FLASHING, COLOUR MATCHED TO GREY SLATE</p> <p>3 FIBRE CEMENT PANEL SIDING, IN WHITE
WITH ALUMINIUM FLASHING, COLOUR MATCHED TO WHITE</p> <p>4 WOOD LOOK PLANK SIDING, LIGHT WOOD GRAIN FINISH</p> | <p>5 ASPHALT SHINGLES, IN DARK GREY</p> <p>7 FROSTED TEMPERED GLASS GUARDRAILS WITH ALUMINIUM FRAME, IN IRON GREY</p> <p>8 ALUMINIUM CAP AND TRIM FLASHING, IN IRON GREY</p> <p>9 ALUMINIUM CAP AND TRIM FLASHING, IN GREY SLATE</p> <p>10 ALUMINIUM CAP AND TRIM FLASHING, IN WHITE</p> <p>11 FASCIA BOARD, IN IRON GREY</p> <p>12 FASCIA BOARD, IN GREY SLATE</p> | <p>13 FASCIA BOARD, IN WHITE</p> <p>14 VINYL FRAME WINDOW, IN IRON GREY</p> <p>15 VINYL SWING DOOR IN IRON GREY WITH SIDE LIGHT</p> <p>16 VINYL SWING DOOR IN IRON GREY WITH TEMPERED GLASS: PANEL AND TRANSOM</p> <p>17 VINYL SWING DOOR IN IRON GREY WITH TEMPERED GLASS PANEL</p> <p>18 3 PANEL, VINYL, SLIDING TEMPERED GLASS DOOR, IN IRON GREY</p> <p>19 4 PANEL, VINYL, SLIDING TEMPERED GLASS DOOR, IN IRON GREY</p> <p>20 2 PANEL, VINYL, SLIDING TEMPERED GLASS DOOR, IN IRON GREY</p> <p>21 OVERHEAD GARAGE DOOR, IN GREY SLATE</p> |
|--|---|--|

DENFORD PLACE MULTI-FAMILY

4951 DENFORD PLACE, NANAIMO, BC

LANDSCAPE ARCHITECTURAL DRAWINGS

REISSUED FOR DEVELOPMENT PERMIT - NOVEMBER 21, 2025

DRAWING SCHEDULE

- L0.00 Cover Page

L1.01 Landscape Context Plan

L1.02 Landscape Plan North

L1.03 Landscape Plan South

L1.04 Landscape Details

1. Recessed Wall Lighting

2. Bollard Lighting

3. Street Lighting

4. Timber Bench

5. Bicycle Rack

L1.05 Landscape Details

6. Corrugated Metal Perimeter Fence

7. Wall Mounted Guardrail

8. Promontory Character Detail
- L2.01 Planting Plan North

L2.02 Planting Plan Centre-West

L2.03 Planting Plan Centre-East

L2.04 Planting Plan Southwest

L2.05 Planting Plan Southeast

L2.06 Plant List & Planting Notes

DESIGN RATIONALE

The landscape design for the multi-family residential project proposed for 4951 Denford Place in Nanaimo, BC draws inspiration from the dramatic natural landscape that characterizes the site. Across the parcel, rocky slopes and outcrops create striking topographic variations that provide contrasting experiences of expansive overviews of the landscape and immersion within a forest environment.

The underlying historic plant community is comprised of arbutus and bigleaf maple trees that punctuate mossy outcroppings within a forest dominated by Douglas fir. The historic plant community reflects an archetypal hillside rainshadow ecosystem, and offers an important reference guide for the proposed planting design. Partially located within a moderate wildfire risk area, the proposed planting adheres to Fire Smart principles by prioritizing deciduous trees over conifers, and maintaining a lush green understorey, open meadow ecosystem or rock outcrops adjacent to structures.

Also fundamental to the landscape design is the integration of gathering spaces that provide a social hub and a green heart for the development linked by a continuous network of trails that meander through the site.

As the entry road diverges, a small human-scale amphitheatre offers a social 'pocket park' space for people to come together.

At the centre of the community, a forest commons provides a quieter space with opportunities for sitting immersed in a forested landscape.

A simple gravel path with stairs field fit among trees, rocks and boulder walls provides an internal trail network across the development. Along the roads, a textured paving treatment delineates a pedestrian walkway.

Natural boulder walls and planted terraces moderate significant grade changes, and add character and visual interest. Sitting walls formed from native rock provide a direct connection back to the natural landscape.

To add character and comfort at the human scale, creative wayfinding and signage direct people through the site, and tasteful, contemporary lighting illuminates the streetscape and key trails while preserving the night sky.

KEY PLAN



DESIGN PRECEDENTS



01 Forest integrated into built open spaces



02 Modular and flexible landscape stairs, trails through wildflower meadow



03 Rocky outcrops as Fire Smart landscape



04 Layered mix of ornamental and indigenous perennials and grasses around garden patios offers a diverse, low maintenance landscape



05 Black metal picket fences mounted to concrete and rock walls delineate semi-private spaces



06 Small scale, dark sky compliant streetlighting

NOT FOR CONSTRUCTION



- 1 MEADOW WALK**
(an immersive walk through a landscape inspired by the iconic Garry Oak meadow; offers an annual profusion of wildflowers; allows for seating and expansive views over the broader landscape, adapted to drought and well-suited to a fire smart landscape)
- 2 POCKET PARK**
(a small urban amphitheatre provides a space for gathering for all ages; centred around a rocky outcropping with Garry oak trees and a lush, layered indigenous understorey)
- 3 CENTRAL COMMONS**
(the green heart of the community, with opportunities for seating on rock stack seat walls; a transitional ecosystem where open meadows shift to an upland deciduous woodland; dramatic grade changes are moderated by generously planted terraces providing a quiet, shady space for residents)
- 4 FRONT YARDS**
(front yards reference the local forest understorey ecosystem with lush layers of indigenous planting and suitable complementary ornamental plants; rocky outcroppings are retained or recreated where possible to further emphasise the dramatic local landscape and as fire smart features)
- 5 FOREST UNDERSTOREY**
(areas disturbed by construction and tree removal will be replanted with a Coastal Douglas fir understorey and replacement trees planted wherever possible; based on a parcel area of 1.39ha, 139 replacement trees are required, 109 trees are shown here)
- 6 INTERNAL TRAIL NETWORK**
(connects the different spaces of the site, creates a continuous walking loop moving up and down the slope; immerses user in the diverse landscapes on the site; stairs, trails and promontory are field filled to feel naturally situated in the environment)
- 7 WAYFINDING**
(creative wayfinding & signage, directs people through the site connecting walking trails and amenity spaces, recessed wall and landscape lighting is used to illuminate portions of trails for safety and security)
- 8 MODERATE WILDFIRE HAZARD**
(the southern portion of the site, shown in yellow, lies in the 'Moderate Wildfire Hazard Development Permit Area; trees are primarily deciduous; landscaping includes fire smart strategies such as low meadow plantings, retaining rocky outcroppings and irrigated indigenous understorey plantings; paths, roads and trails that function as firebreaks)

LANDSCAPE CONTEXT LEGEND

- WILDFLOWER MEADOW**
Area: 872m²
Soil Depth Varies: 0-150mm
- FOREST UNDERSTOREY**
Area: 4567m²
Soil Depth Varies: 0-450mm
- FRONT YARDS**
Area: 303m²
Soil Depth Varies: 450mm
- MODERATE WILDFIRE HAZARD DPA**
Area: 4500m²
Soil Depth Varies: 0-450mm
- 1.5m LANDSCAPE BUFFER**

Refer to **Sheet L1.02** for Landscape Plan North
Refer to **Sheet L1.03** for Landscape Plan South

NOT FOR CONSTRUCTION

LANDSCAPE CONTEXT PLAN
SCALE 1:400



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CLIENT
RACE ROCK DEVELOPMENT CORPORATION

NO.	DATE	ISSUE
1	2024-12-27	DP SUBMISSION
2	2025-11-21	DP RESUBMISSION

NO.	DATE	REVISION
1	2026-07-22	FENCES & QUARRALS

RECEIVED
DP1384
2026-JUL-23
Current Planning

PROJECT 24002
DENFORD MULTI-FAMILY
4951 DENFORD PLACE
NANAIMO, BC

LANDSCAPE CONTEXT PLAN

CITY FILE NO. DP1384
SCALE 1:400
START DATE 2024-01-16
DB CM **CB** KS

L1.01



MATCH LINE SEE SHEET L1.02 FOR LANDSCAPE PLAN NORTH



BEGA Recessed Wall Luminaire 24060 (or eq.)
Quantity: 7

Specifications:
Asymmetrical Forward Throw

Operating Voltage 120-277V AC
Luminaire Lumens 848 Lumens (3000K)
Height 5" (127mm)
Width 13" (330mm)
Depth 5-1/2" (139mm)
Finish Powder Coated Bronze Matte 3mil thickness



1 Recessed Wall Lighting
L1.04 Scale: NTS

BEGA Exterior Bollard Light 99558 (or eq.)
Quantity: 6

Specifications:
Surface Mount
(B79817 Anchorage kit)

Operating Voltage 120-277V AC
Luminaire Lumens 1662 Lumens (3000K)
Height 43-3/8" (1101mm)
Width 9-7/8" (251mm)
Depth 5-1/2" (140mm)
Finish Powder Coated Bronze Matte 3mil thickness



2 Bollard Lighting
L1.04 Scale: NTS

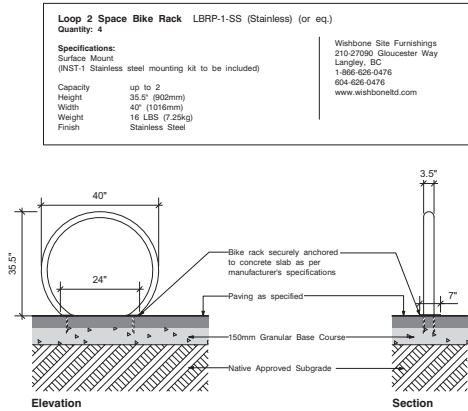
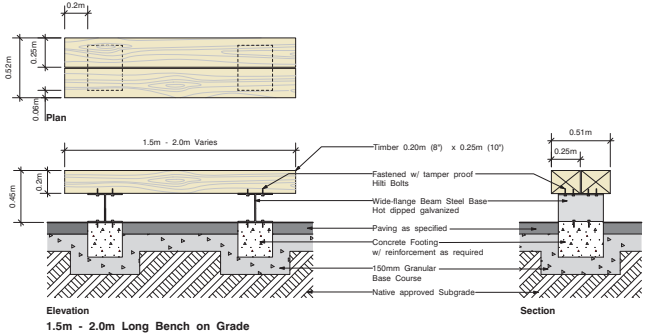
BEGA 84 252 K3 - Pole top luminaire (or eq.)
Quantity: 25

Specifications:
Installation as per manufacturers specifications.

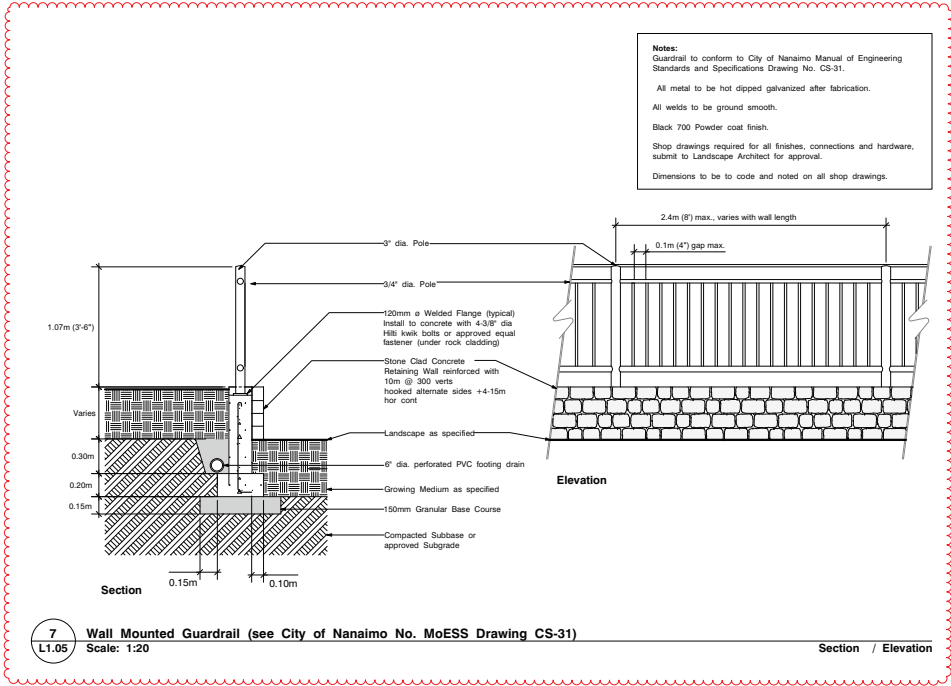
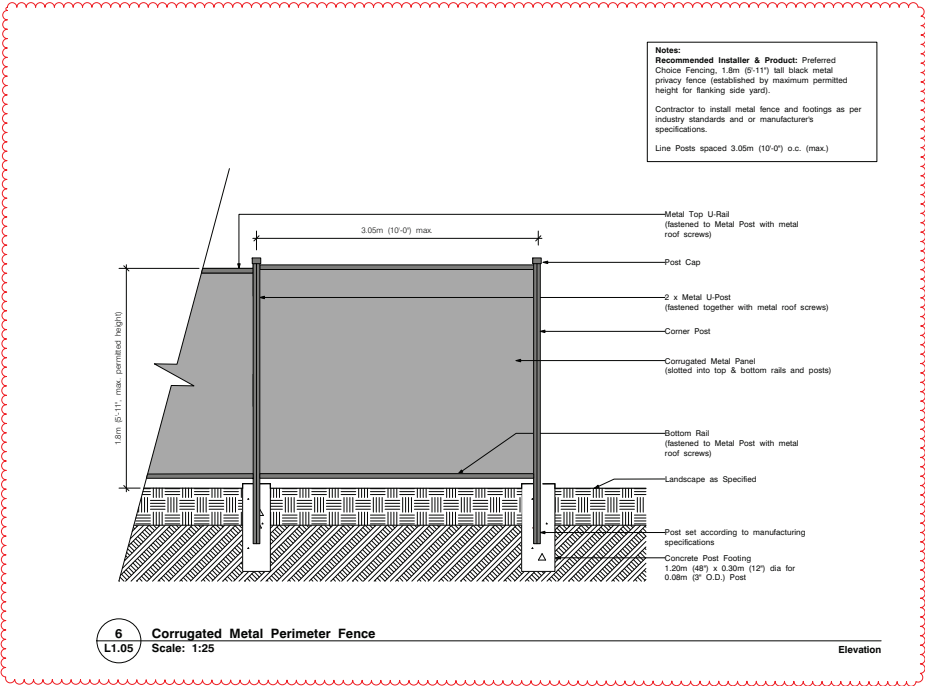
Operating Voltage 220-240 AC/DC
Luminaire Lumens 1662 Lumens (3000K)
Height 14-9" (4500mm)
Finish Black



3 Street Lighting
L1.04 Scale: NTS



NOT FOR CONSTRUCTION



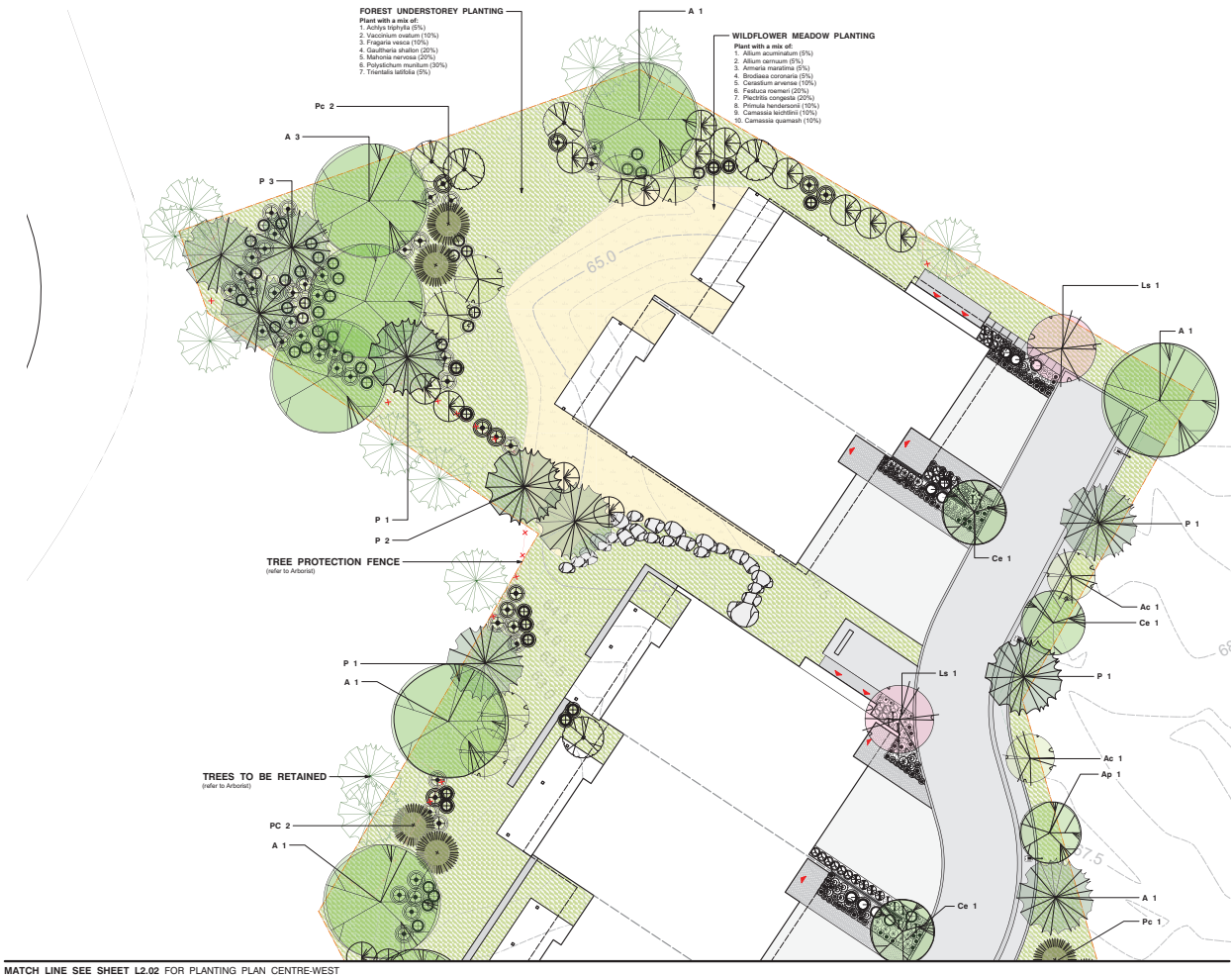
Notes:
Promontory to be constructed as an elevated deck affixed to retaining wall that forms the edge of Road 'B', providing views over adjacent valley and to the ocean beyond.
The Promontory will become the start of a staircase to be constructed at the time of development of the adjacent parcel, forming part of a covenanted public access trail. The location of the Promontory to align with proposed sanitary right-of-way (see Civil).
The Promontory is to be constructed of cedar decking and rails, creating the character of a natural park-like trail head. Detail design to be completed at the time of Building Permit.
All wood to be selected tight knot cedar. No checks, splits, warps or wanes. All cut ends to be properly sealed.
All metal fasteners to be hot dipped galvanized.



8 Promontory Character Detail
L1.05 Scale: 1:20

Form & Character Image

NOT FOR CONSTRUCTION



PLANTING PLAN NORTH
SCALE 1:150



Refer to **Sheet L2.02** for Planting Plan Centre-West
Refer to **Sheet L2.03** for Planting Plan Centre-East
Refer to **Sheet L2.04** for Planting Plan Southwest
Refer to **Sheet L2.05** for Planting Plan Southeast
Refer to **Sheet L2.06** for Plant List & Planting Notes

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MATCH LINE SEE SHEET L2.01 FOR PLANTING PLAN NORTH



MATCH LINE SEE SHEET L2.04 FOR PLANTING PLAN SOUTHWEST

PLANTING PLAN CENTRE-WEST SCALE 1:150



Refer to **Sheet L2.01** for Planting Plan North
Refer to **Sheet L2.03** for Planting Plan Centre-East
Refer to **Sheet L2.04** for Planting Plan Southwest
Refer to **Sheet L2.05** for Planting Plan Southeast
Refer to **Sheet L2.06** for Plant List & Planting Notes

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1	2026-07-22	FENCES & QUADRANTS
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PROJECT 24002
DENFORD MULTI-FAMILY
4951 DENFORD PLACE
NANAIMO, BC

PLANTING PLAN
CENTRE-WEST

CITY FILE NO. DP01384

SCALE 1:150

START DATE 2024-01-16

DB CM **CB** KS

L2.02



PLANTING PLAN CENTRE-EAST

SCALE 1:150



Refer to **Sheet L2.01** for Planting Plan North
Refer to **Sheet L2.02** for Planting Plan Centre-West
Refer to **Sheet L2.04** for Planting Plan Southwest
Refer to **Sheet L2.05** for Planting Plan Southeast
Refer to **Sheet L2.06** for Plant List & Planting Notes

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PROJECT 24002

DENFORD MULTI-FAMILY
4951 DENFORD PLACE
NANAIMO, BC

PLANTING PLAN CENTRE-EAST

CITY FILE NO. DP01384

SCALE 1:150

START DATE	2024-01-16
-------------------	------------

DB CM CB KS

L2.03

MATCH LINE SEE SHEET L2.02 FOR PLANTING PLAN CENTRE-WEST



Refer to **Sheet L2.01** for Planting Plan North
Refer to **Sheet L2.02** for Planting Plan Centre-West
Refer to **Sheet L2.03** for Planting Plan Centre-East
Refer to **Sheet L2.05** for Planting Plan Southeast
Refer to **Sheet L2.06** for Plant List & Planting Notes

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PLANTING PLAN SOUTHWEST
SCALE 1:150



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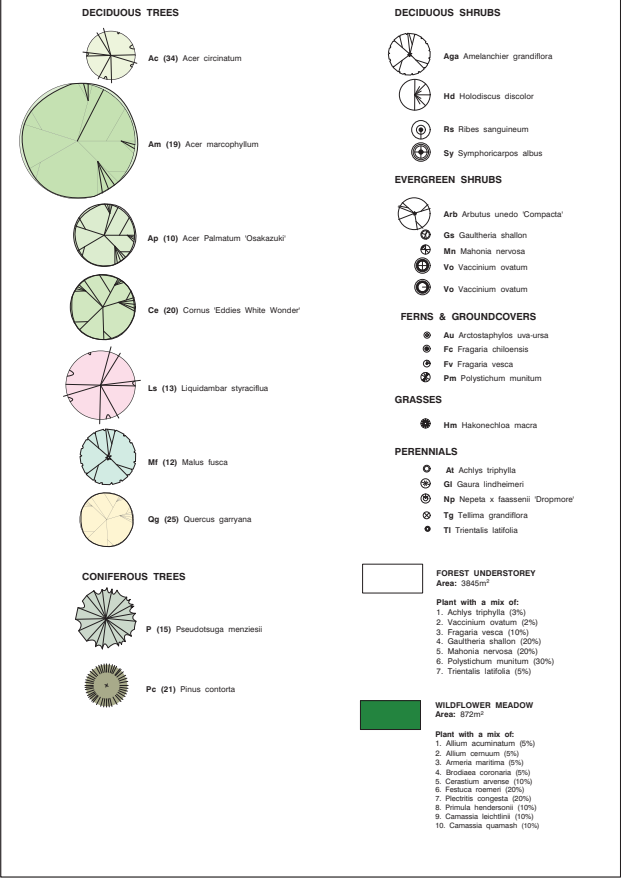
L2.04



PLANTING PLAN SOUTHEAST
SCALE 1:150

NOT FOR CONSTRUCTION

TREE + PLANT LEGEND



PLANT LIST

Key	Qty	Botanical Name	Common Name	Pot Size	Spacing
Coniferous Trees					
Pc	21	Pinus contorta var. contorta	Shore Pine	2.5m ht	6m o.c. avg.
P	15	Pseudotsuga menziesii	Douglas Fir	#15	6m o.c. avg.
Deciduous Trees					
Ac	34	Acer circinatum	Vine Maple	#7	Multistem
A	19	Acer macrophyllum	Big Leaf Maple	#20	6m o.c. avg.
Ap	10	Acer palmatum 'Osakazuki'	Japanese Maple	1.5m br ht	6m o.c. avg.
Ce	20	Cornus 'Eddies White Wonder'	White Flowering Dogwood	#20	6m o.c. avg.
Ls	13	Liquidambar styraciflua	Sweetgum	#20	6m o.c. avg.
Ml	12	Malus fusca	Pacific Crabapple	#7	6m o.c. avg.
Og	25	Quercus garryana	Garry Oak	#7	6m o.c. avg.
Evergreen Shrubs					
Ag	24	Amelanchier grandiflora 'Autumn Brilliance'	Service Berry	#7	2m o.c.
Ar	21	Arbutus unedo 'Compact'	Compact Strawberry Tree	#7	2m o.c.
Gs	2357	Gaultheria shallon	Sail	#1	60cm o.c.
Mn	2203	Mahonia nervosa	Dull Oregon Grape	#1	60cm o.c.
Vo	1236	Vaccinium ovatum	Evergreen Huckleberry	#1	1.0m o.c.
Deciduous Shrubs					
Hd	102	Holodiscus discolor	Ocean Spray	#2	1.0m o.c.
Ri	75	Ribes sanguineum	Red Flowering Currant	#1	1.0m o.c.
Sa	163	Symphoricarpos albus	Snowberry	#1	1.0m o.c.
Vp	24	Vaccinium (mix varieties)	Blueberry	#1	1.0m o.c.
Grasses					
Hm	21	Hakonechloa macro	Japanese Forest Grass	#1	1.0m o.c.
Groundcovers, Perennials, Ferns					
Au	486	Androstaphylos uva-ursi	Kinnikinnick	10cm	45cm o.c.
Fc	310	Fragaria chiloensis	Coastal Strawberry	10cm	45cm o.c.
Fv	2357	Fragaria vesca	Woodland Strawberry	10cm	45cm o.c.
Gl	77	Gaura lindheimeri 'Bantam White Improved'	Bee Bloom	#1	60cm o.c.
Np	69	Nepeta x faassenii	Calmint	#1	60cm o.c.
Pm	3455	Polystichum munium	Sword Fern	#1	60cm o.c.
Tg	34	Tellima grandiflora	Fringecup	#1	60cm o.c.
Tl	35	Trientalis latifolia	Western Starflower	#1	60cm o.c.

Please contact the Landscape Architect for approval of any plant substitutions:

KINSHIP DESIGN ART ECOLOGY

Kate Stefuk, BCSLA

T: 250-753-8093

E: kate.stefuk@kinshipdesign.ca

No substitutions will be accepted without prior written approval of the Landscape Architect.

PLANTING NOTES

1. All landscape construction to be in accordance with the **City of Nanaimo Engineering Standards and Specifications**.
2. All landscape installation and maintenance to meet or exceed the current edition of the **Canadian Landscape Standards** as a minimal acceptable standard.
3. Growing medium to meet or exceed the properties outlined in the Canadian Landscape Standard per Section 6 Growing Medium, Table T-6.3.5.3. Properties of Growing Media Level 2 "Groomed" - 2P.
4. Growing Medium Depths (unless otherwise specified):
 - Tree Planting Areas: 1 cu. m. per tree
 - Shrub & Ground Cover Areas: 450mm (18") depth
 - Seeded Areas: 150mm (6") depth
5. Mulch to be Compost per Section 10 Mulching of the Canadian Landscape Standard. Mulch depth to be 50mm minimum depth over all tree, shrub, and groundcover planted areas.
6. Plant material quality, transport and handling shall comply with the CNLA standards for Nursery Stock.
7. All plant material shall match type and species as indicated on the planting plan. **Contact the Landscape Architect for approval of substitutions.** No substitutions will be accepted without prior written approval of the Landscape Architect.
8. Check for locations of water lines and other underground services prior to digging tree pits. Excavated plant pits shall have positive drainage. Plant pits when fully flooded with water shall drain within one hour after filling.
9. No plants requiring pruning of major branches due to disease, damage or poor form will be accepted.
10. All tree, shrub, groundcover and lawn areas shall be watered via an underground automatic irrigation system utilizing "Smart" (ET/Weather-based) irrigation control. Irrigation emission devices to be high efficiency low volume rotary nozzles or drip irrigation equipment.

Refer to **Sheet L2.01** for Planting Plan North
Refer to **Sheet L2.02** for Planting Plan Centre-West
Refer to **Sheet L2.03** for Planting Plan Centre-East
Refer to **Sheet L2.04** for Planting Plan Southwest
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DENFORD MULTI-FAMILY
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NANAIMO, BC

PLANT LIST & PLANTING NOTES

CITY FILE NO. DP1384

SCALE

START DATE 2024-01-16

DB CM

CB KS

L2.06

GEOTECHNICAL HAZARD ASSESSMENT

32 Unit Residential Development

4951 Denford Place, Nanaimo, BC

Legal Addresses:

Lot 2, District Lot 54, Wellington District,
Plan EPP62212
PID: 029-898-692

Prepared For:

Race Rock Developments Ltd.
2178 Lancashire Avenue
Nanaimo, BC, V9S 5P5

Attention:

Todd Wood

Toddw@knappettindustries.com

February 19, 2025



File No.: E4094.01
Revision No.: 00
Prepared by:
Stuart Crossfield, P.Geo., P.L.Eng.
Reviewed by:
Chris Hudec, M.A.Sc., P.Eng.

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250-756-3831 (Fax)
www.lewkowich.com
geotech@lewkowich.com
Permit to Practice Number: 1001802



DISCLAIMER, ACKNOWLEDGMENTS AND LIMITATIONS

1. Lewkowich Engineering Associates Ltd. (LEA) acknowledges that this report, from this point forward referred to as “the Report”, and notwithstanding any other statement in this report, this report may be relied upon by the City of Nanaimo in: considering a development permit application under the *Local Government Act* for lands within DPA 6, Steep Slope Development, and considering a building permit application under section 56 of the *Community Charter*.
2. This Report has been prepared in accordance with standard geotechnical engineering practice solely for and at the expense of Race Rock Development Ltd. We have not acted for or as an agent of the CoN in the preparation of this Report.
3. The conclusions and recommendations submitted in this Report are based upon information from relevant publications, a visual site-assessment of the property, anticipated and observed subsurface soil conditions, current construction techniques, and generally accepted engineering practices. No other warrantee, expressed or implied, is made. If unanticipated conditions become known during construction or other information pertinent to the development becomes available, the recommendations may be altered or modified in writing by the undersigned.
4. This Report was authored, to the best of our knowledge at the time of issuance, with considerations for local requirements specific to the Authority Having Jurisdiction (AHJ) and their standards for the preparation of such reports, the 2024 British Columbia Building Code (BCBC), and current engineering standards. Updates to municipal bylaws, policies, or requirements of the AHJ, or updates to the BCBC and/or professional practice guidelines may impact the validity of this Report.
5. This Report has been prepared by Mr. Stuart Crossfield, P.Geo., P.L.Eng., and reviewed by Mr. Chris Hudec, M.A.Sc., P.Eng. Messrs. Crossfield and Hudec are both adequately experienced and are also members in good standing with the Engineers and Geoscientists of British Columbia (EGBC).

EXECUTIVE SUMMARY

1. The following is a brief synopsis of the property, assessment methods, and findings presented in the Report. The reader must read the Report in its entirety; the reader shall not rely solely on the information provided in this summary.
2. The subject property, 4951 Denford Place, Nanaimo, BC, from this point forward referred to as “the Property,” is located in on the east coast of Vancouver Island within the jurisdictional boundaries of the CoN. The proposed development for the Property at the time of this Report consists of a residential development consisting of 32 units, with a mix of two- and three-story townhomes built using conventional construction methods.
3. A hazard assessment was conducted to identify potential geotechnical hazards for the Property. Our assessment determined that there are limited steep slope hazards associated with a ridge in the south portion of the Property. The proposed three-storey townhomes are proposed to be constructed on and over the slope with a rear foundation wall which will mitigate any future steep slope hazards.
4. No additional steep hazardous slopes are noted.
5. The findings confirm the land may be used safely for the use intended provided the recommendations in this Report are followed, and subject to a further, more detailed review.

List of Abbreviations Used in the Report

Abbreviation	Title
AHJ	Authority Having Jurisdiction
BCBC	British Columbia Building Code
CoN	City of Nanaimo
DPA	Development Permit Area
EGBC	Engineers and Geoscientists of British Columbia
LEA	Lewkowich Engineering Associates Ltd.
SLS	Service Limit State
ULS	Ultimate Limit State

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1.0 INTRODUCTION

1.1 General

- a. As requested, LEA has carried out a Geotechnical Hazard Assessment of the subject Property with respect to the development proposed at 4951 Denford Place in Nanaimo, BC. This Report provides a summary of our findings and recommendations.

1.2 Background

- a. We understand the proposed project consists of a 32 Unit residential development comprised of a mix of two- and three-story townhomes, to be built using conventional construction methods. The proposed development is shown in the attached Site Plan drawing A101 by dHKarchitects.
- b. We understand the proposed buildings will be constructed utilizing cast-in-place foundations, with slab-on-grade and/or wood-framed (crawl space) type flooring systems with a wood framed superstructure.
- c. We understand the proposed development will include the installation of associated on and off site (if applicable) civil works and services, including private on-site roadways and paved surface parking.

1.3 Assessment Methodology

- a. This assessment included a desktop review of relevant background information, including available development plans, registered covenants on title, aerial photographs, and published geology, topography, and floodplain mapping (if any). Please refer to the list of references at the end of this Report.
- b. A subsurface geotechnical investigation was not carried out as part of our assessment.
- c. A site reconnaissance was completed on January 17, 2024, and included a visual assessment of the proposed development area, rock outcrop assessment, limited soil exposures and an overview of slope hazards (if any).
- d. This assessment was prepared with consideration of the referenced EGBC, *Guidelines for Landslide Assessments In British Columbia Columbia*¹. Please see the attached EGBC assurance statement.
- e. This assessment was prepared with consideration of the CoN, *Guidelines for the Completion of Geotechnical Reports*.

2.0 SITE CONDITIONS

2.1 Physical Setting

- a. The subject Property is located in the Linley Valley Neighbourhood within the jurisdictional limits of the CoN. The Property is identified with the following civic and legal address:
 - i. 4951 Denford Place; Lot 2, District Lot 54, Wellington District, Plan EPP62212 ; PID: 029-898-692.
- b. The Property is large, approximately 3.4 acres in size with a complex shape based on its border with neighbouring properties.
- c. The Property is zoned as Townhouse Residential (R6) and is immediately bordered in the west and east by similar zoned properties and in the north and south by Three and Four Unit Residential (R5). Refer to Figure 2.1 below.

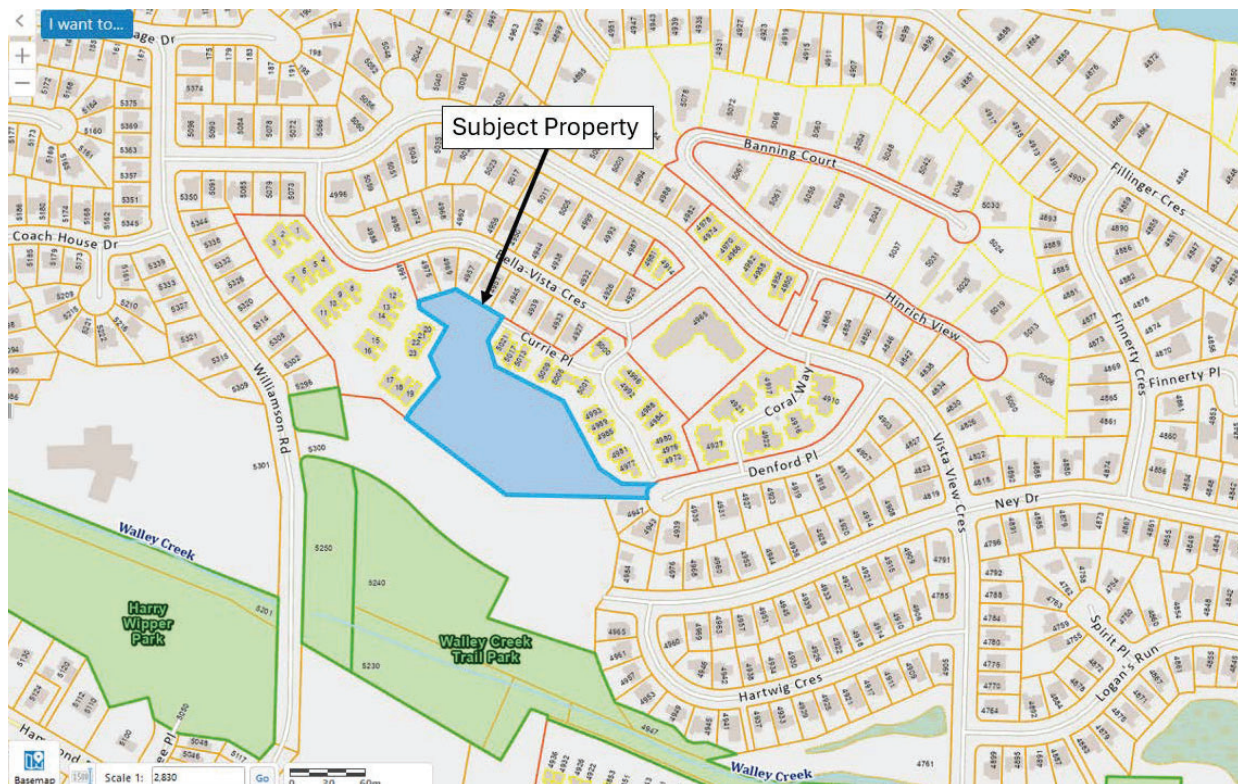


Figure 2.1 – Location Plan of Subject Property²

- d. Based on the CoN mapping, the Property is within two development permit areas including DPA 5 – Wildfire Hazards, and DPA 6 – Steep Slope Development.
- e. At the time of our field investigation the entire Property is undeveloped and naturally forested. Based on our review the Property has never been developed.

2.2 Terrain and Features

- a. The terrain of the Property is complex given the overall size, however, can be summarized as being comprised of surficial bedrock controlled knobs and benches, comprised of a consistent overall gentle to moderate slope surfaces (5° to 20°) inclined down from north to south.
- b. Total relief across the Property is roughly 15m (65m to 50 m GD) through a horizontal distance of 118m from the northwest corner to the southwest boundary.
- c. Localized steep rock outcrops up to near vertical to 45° are noted generally along the ridge in the south (east to west alignment), a few localized low height outcrops in the west and a near vertical rock outcrop below the access panhandle adjacent to Denford cul-de-sac. Localized loose bedrock and evidence of previously failed boulders were noted near the west end of the ridge.
- d. Figure 2.2.1 below shows the contours and overall terrain of the Property from the CoN webmap.

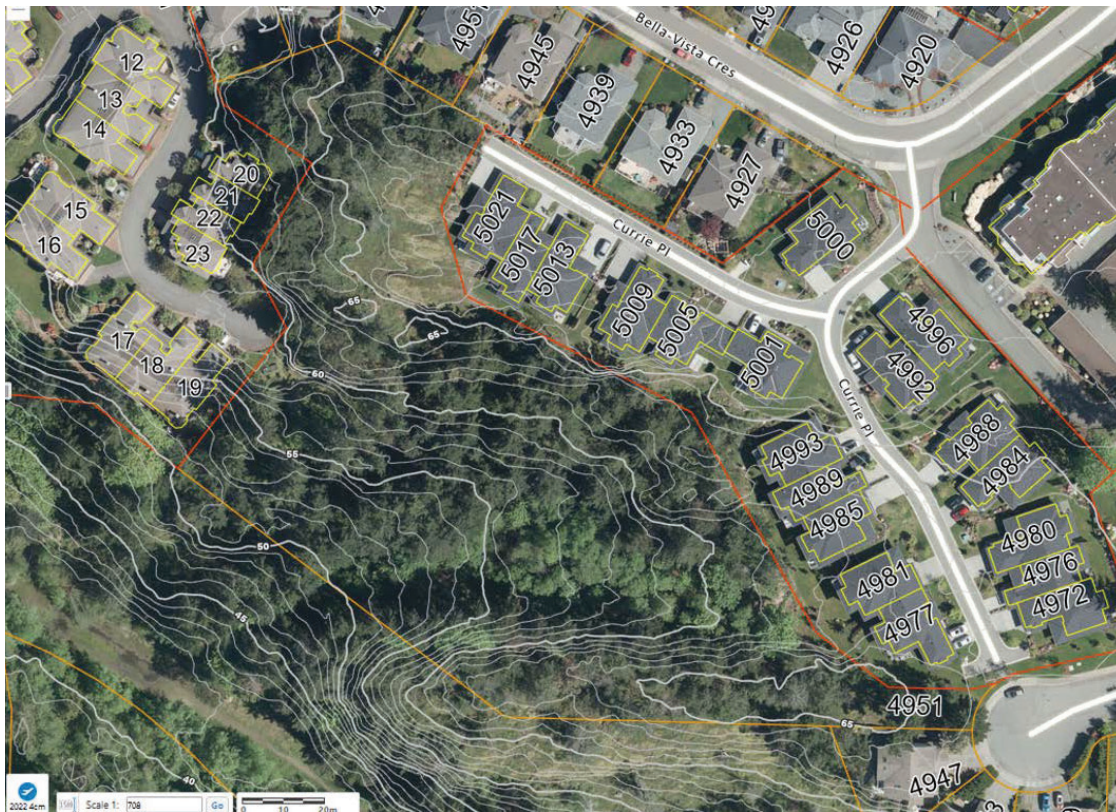


Figure 2.2.1 – Site Terrain²

- e. Vegetation consists of a moderate growth of mature deciduous and evergreen trees and underbrush interrupted frequently by rock outcrops covered with moss.
- f. The nearest watercourse is Walley Creek approximately 150m south of the Property.



Figure 2.2.2 – Southern ridge near Unit 20 to Unit 24, looking south.



Figure 2.2.3 – Panhandle slope below entrance road, looking east.

2.3 Regional Published Geology

- a. Surficial geology for the area³ is classified as having thin veneer of glaciomarine deposits, typically consisting of sand and gravels, overlying moraine till deposits of lenses of gravel, sand and silt, overlying bedrock, which may include pockets of colluvium or perched glaciofluvial sediments.
- b. Bedrock geology for the area⁴ is classified as being part of the Karmutsen Formation, generally comprised of Basaltic volcanic rocks from the Triassic period.

2.4 Soil and Rock Conditions

- a. A subsurface investigation was not completed as part of this assessment. The site review allowed for observations of rock outcrops and minor soil exposures within the Property.
- b. Observed soil conditions were generally consistent with published mapping with the exception that surface bedrock may be considered more prevalent. We anticipate that variations in soil thickness exist across the Property and are roughly correlated to the amount of vegetative cover and or topographic relief. Steeper areas generally have less soil, while flatter areas generally have more soil.
- c. Subgrade conditions within this phase of development include extensive exposures of bedrock. This bedrock consists of a volcanic rock type of Jurassic to Triassic geologic age. Based on observations at this site weathering into the bedrock surface is typically limited to localized zones or isolated shear zones only, however surficial loose detached rock blocks are noted. The rock is typically slightly weathered and has strong to very strong rock strength characteristics beyond the weathered zone. Jointing is moderate to highly fractured.
- d. Based on the results of a site reconnaissance, the soil conditions will likely include veneers of topsoil, sand and gravel alluvial (water laid) soils, and dense to very dense glacial till soils. This latter material is comprised of a heterogeneous mixture of silt, sand and gravel with frequent cobbles and boulders. Bedrock is commonly located at or near surface throughout the Property.

2.5 Groundwater Conditions

- a. Given the encountered conditions, specifically the very dense fine-grained soil and bedrock subgrades, we expect that a shallow “perched” groundwater table is present seasonally. We expect that the groundwater flows associated with this perched condition would be related directly to the volume and frequency of storm events.
- b. Groundwater levels can be expected to fluctuate seasonally with cycles of precipitation. Groundwater conditions at other times and locations can differ from those observed at the time of our assessment.
- c. If groundwater flows or conditions are different than those encountered during the assessment, additional measures may be required during construction. Contact our office immediately if unanticipated conditions

are encountered at any point during construction.

2.6 Covenant Review

- a. As part of our assessment, we have reviewed the Property title relative to any restrictive covenants that may be registered. At the time of this assessment there are no covenants registered against the title of the Property with geotechnical considerations.

3.0 DESIGN PHASE

3.1 Steep Slopes

- a. In general, steep rocky slopes can present a potentially hazardous situation to residential structures both from a slope stability and a rockfall hazard perspective. Naturally occurring, surficially loose and detached blocks may have the potential to fail or slide along pre-existing joints or structural defects in the rock which are inclined at unfavourable angles with respect to the slope face. These events are typically triggered by natural factors such as prolonged periods of rain, freeze-thaw, root jacking, and/or seismic events. These instabilities could be hazardous to residential structures built at the top or bottom of slopes and therefore have been assessed.
- b. Based on our terrain analysis and assessment, the subject Property contains only one area of concern regarding steep rocky slopes which is along the ridge running east to west in the south end. Based on the drawings provided, the ridges south side is being proposed for three storey Units 15 through to Unit 24. The ridge and corresponding slope is typically lower and shallower in the east near Unit 15 to Unit 19 with heights of around 3m or 4m in height and not of concern. Units 20 to Unit 24 are within slope portions which are typically steeper and higher at up to 9m, with evidence of instability, loose rock and rock fall debris. However, given the proposed Units are to be constructed into the slope with a rear retaining walls designed to support the slope, we therefore assess the risk of rock fall or slope instability to be low and structurally mitigated.
- c. We do expect the excavations within Units 20 to Unit 24 to be geotechnically reviewed to ensure temporary and permanent stability. More detailed rock conditions with respect to foundation loads will be required on the excavated face. This would involve clearing and grubbing including blow piping/pressure washing to remove moss and overburden which may obstruct visible review. The potential for additional slope reinforcement or stabilization measures may be instructed upon the results of the excavation review. Additional slope stabilization measures may include rock removal, scaling, rock bolts or dowels, and or buttressing, for example, where required.
- d. No additional hazardous steep slopes were noted, and in general the development works well with the

terrain of the Property.

3.2 Seismic Criteria

- a. No compressible or liquefiable soils were encountered during the course of our assessment, nor are any expected to be encountered during construction.
- b. Based on the 2024 British Columbia Building Code, Division B, Part 4, Table 4.1.8.4.B, "Site Classes, S, for Site Designation Xs" the soils and strata encountered during the investigation would be "Site Class C" (very dense soil or soft rock).

3.3 Foundation Design

- a. The development site generally includes shallow bedrock throughout, so bearing conditions for roadways, utilities and building structures are generally favourable. However, given the large area of the site and local site topography, we anticipate that the proposed development will likely include combination of subgrades including lots excavated into bedrock, lots that will at least locally include fill and lots that will be founded on dense, naturally deposited, inorganic subgrade.
- b. Prior to construction, the foundation areas should be stripped to remove all unsuitable materials to provide an undisturbed natural subgrade for the footing support.
- c. Foundation loads should be supported on natural undisturbed material approved for use as a bearing stratum by our office or structural fill and may be designed using the following values.
 - i. For foundations constructed on dense, naturally deposited, inorganic subgrade, an SLS bearing pressure of 150 kPa, and a ULS of 200 kPa may be used for design purposes.
 - ii. For foundations constructed on structural fill, as outlined in Section 4.3, an SLS bearing pressure of 150 kPa, and a ULS bearing pressure of 200 kPa may be used for design purposes.
 - iii. For foundations constructed on up to 300mm of structural fill levelling course over strong, intact, basalt bedrock, an SLS bearing pressure of 350 kPa, and a ULS bearing pressure of 500 kPa may be used for design purposes.
- d. Exterior footings should be provided with a minimum 0.45m depth of ground cover for frost protection purposes.
- e. For planning purposes, any foundations bearing on intact bedrock that is inclined at 10 ° but less than 30 ° from horizontal, shall include 15M rebar rock pins that are grouted a minimum of 0.40m into intact bedrock. Weathered or fractured bedrock will require deeper and/or additional pins, which would be determined once the bedrock bearing surface is exposed. Pins shall be placed at all corners of the foundation, and with maximum 0.60m spacing. A minimum of 2 to 4 pins are recommended for individual column or post loads. Pins shall be corrosion-protected, and secured with high strength, non-shrink grout.

The holes must be cleaned of dirt, dust and debris prior to installation of grout and rebar pins, and shall be reviewed prior to installation.

- f. The Geotechnical Engineer should evaluate the subsurface conditions at the time of construction to confirm that soil and/or groundwater conditions do not materially differ to those observed and inferred during the site reconnaissance and that footings are based on appropriate and properly prepared founding material.

4.0 CONSTRUCTION PHASE

4.1 General Excavation – Future Building Sites

- a. Prior to construction, all unsuitable materials within the proposed building envelopes should be removed to provide a suitable base of support. Unsuitable materials include any non-mineral material such as vegetation, topsoil, peat, fill or other materials containing organic matter, as well as any soft, loose, or disturbed soils.
- b. Groundwater ingressing into any excavations should be controlled with a perimeter ditch located just outside of the building areas, connected to positive drainage.
- c. Prior to placement of concrete footings, any bearing soils that have been softened, loosened, or otherwise disturbed during the course of construction should be removed, or else compacted following our recommendations for structural fill. Compaction will only be feasible if the soil has suitable moisture content and if there is access to heavy compaction equipment. If no structural fill is placed, a smooth-bladed clean up bucket should be used to finish the excavation.
- d. Fill derived from glacial till soil, which is expected to comprise some of the veneer of soil cover at this site, may not be practicable for re-use as structural fill during rainy periods because of its silty nature and typically requires more compaction effort and moisture control. Freely draining sand and gravel such as crushed rock or import granular fill should be considered as an alternate material if on site soil use is impractical.
- e. Where blasting or rock-breaking is required to manipulate the existing terrain, measures are required to ensure that any “over-blast” or “over-break” materials are removed from areas of structural support. Over-blast/break materials are defined as any rock or material that is disturbed as a result of blasting or breaking. Any disturbed material shall be removed as required and replaced with competent engineered fill materials.
- f. The Geotechnical Engineer is to confirm the removal of unsuitable materials and approve the exposed competent inorganic subgrade, prior to placement of any structural fill.

4.2 Rock Excavation and Re-use

- a. Basalt rocks are common to the Nanaimo area and are readily blasted and broken out with a hydraulic rock breaker. However, these rock types sometimes present as heavily jointed or weathered, which can impact blasting efficiency. Breaking can also be problematic, particularly as the hydraulic breaker will sometimes hammer holes in the softer parts of the rock, rather than breaking the rock. These are local conditions that are managed regularly by local contractors, however the potential for blasting/breaking inefficiencies should be considered.
- b. Controlled blasting techniques are recommended for roads and adjacent to permanent slopes to prevent damage to the face and provide wall control to minimize overbreak. Controlled blasting is defined by the accuracy and precision of the drilled holes, the spacing of holes in the backline or final face, charges decoupled from the backline, charges are loaded lightly, detonated in specified sequence for example.
- c. All excavated slopes should be sufficiently scaled such that no loose rock remains on the slope.
- d. We don't expect any significant concerns with blasting and crushing these rock types for reuse as bulk structural fill. The crushed products would be suitable for trench fills, building foundation support, and subgrade fills in roadway areas. There is the possibility the rock could be crushed for use as subbase gravel, and possibly base course, however this may require a program of durability testing of the rock to confirm suitability.

4.3 Structural Fill

- a. Where fill is required to raise areas that will support buildings, slabs, or pavements, structural fill should be used. The Geotechnical Engineer should first approve the exposed subgrade in fill areas, to confirm the removal of all unsuitable materials.
- b. Sloping terrain shall first be benched, and structural fill shall only be placed on a level surface.
- c. Structural fill should be inorganic sand and gravel. If structural fill placement is to be carried out in the wet season, material with a fines content limited to 5% passing the 75µm sieve should be used, as such a material will not be overly sensitive to moisture, allowing compaction during rainy periods of weather.
- d. Structural fill should be compacted to a minimum of 95% of Modified Proctor maximum dry density (ASTM D1557) in foundation and floor slab areas.
- e. Structural fills under foundations should include the zone defined by a plane extending down and outward a minimum 0.5m from the outer edge of the foundation at an angle of 45 ° from horizontal to ensure adequate subjacent support. This support zone is shown in Figure 4.3 below.

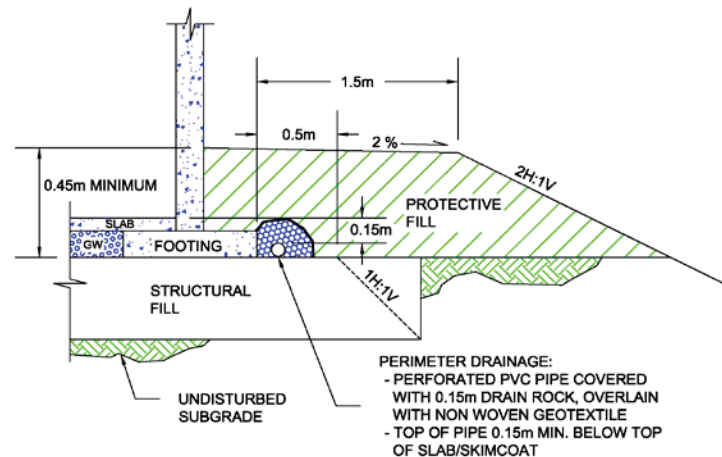


Figure 4.3 – Typical Section, Structural Fill

- f. Compaction of fill should include moisture conditioning as needed to bring the soils to the optimum moisture content and compacted using vibratory compaction equipment in lift thicknesses appropriate for the size and type of compaction equipment used.
- g. A general guideline for maximum lift thickness is no more than 100mm for light hand equipment such as a “jumping-jack,” 200mm for a small roller and 300mm for a large roller or heavy (>500 kg) vibratory plate compactor or a backhoe mounted hoe-pac or a large excavator mounted hoe-pac, as measured loose.
- h. It should be emphasized that the long-term performance of buildings and slabs is highly dependent on the correct placement and compaction of underlying structural fills. Consequently, we recommend that structural fills be observed and approved by the Geotechnical Engineer. This would include approval of the proposed fill materials and performing a suitable program of compaction testing during construction.

4.4 Foundation Drainage

- a. Our assessment did not identify any abnormal groundwater conditions that would necessitate special foundation drainage measures. Conventional requirements of the 2024 BCBC pertaining to building drainage are considered suitable at this site.
- b. We assume the installed foundation and site drainage measures will be inspected and approved by Others (i.e. the Plumbing Inspector for the AHJ, or Mechanical Engineer/Consultant) during construction.

4.5 Stormwater and Erosional Control

- a. As part of the preparation of this Report, we have given consideration to subgrade conditions with respect to the on site infiltration and disposal of stormwater.
- b. In general, subgrade soil conditions are anticipated to consist of thin layer of silty sand and gravel overlying bedrock at shallow depths. It is the opinion of LEA that site conditions are not conducive to the installation of stormwater infiltration systems.

- c. Site conditions may be conducive to the installation of storm water detention measures. The type and location(s) of any proposed detention measures shall be reviewed by the Geotechnical Engineer to determine if the design method(s) and/or location(s) pose a hazard to the subject Property or any adjacent or adjoining properties.
- d. Erosion control is expected to be an issue of significance within the construction phase of the development. Overland storm water controls should take into account the potential impact of concentrated runoff as it may impact sensitive environmental areas. The erosion control plan will need to address the potential for turbid water runoff with a plan that would include temporary sediment control berms, and other control measures.

4.6 Permanent Slopes

- a. For preliminary purposes, slopes cut through strong, slightly weathered, moderately fractured, Basalt should be cut at an angle according to the following guidelines:
 - i. Vertical for rock slopes between 0m to 2m in height.
 - ii. 0.25H to 1V (76°) for slopes between 2m and 6m in height. We do not expect any cuts greater than 6m in height. The Geotechnical Engineer shall provide final review of bedrock cuts for stability purposes.
- b. Overburden above rock cuts should be removed at least 1.0m behind the crest and then slope at an angle of 2H:1V.
- c. We recommend any permanent fill or cut soil slopes shall be graded no steeper than 2H to 1V for provision of low maintenance slopes, assuming no impact from groundwater seepage.
- d. A healthy vegetation cover shall be maintained on any exposed permanent soil slope.
- e. Natural soil slopes shall not be undercut at the toe without subsequent support by permanent retaining walls designed and constructed to support the slope face. Any proposed retaining walls greater than 1.2m in height, or terraced walls with step-back distances (distances between successive walls when used in a series) less than the wall height, must be reviewed and designed by a qualified professional.
- f. It is important that water does not pond near the crest of slopes. Surface water flow across slopes from precipitation events, collected stormwater or any other drainage system must be prevented from flowing in a concentrated manner down the slopes. The concentrated discharge of collected stormwater can lead to erosion, earth movement, or slope failure.

4.7 Pavement Design – Private Works

- a. Any organic or deleterious material should be removed from beneath the designated roadway, driveway, or parking areas prior to subgrade preparation. If fill is required to bring the subgrade up to the desired

elevation, structural fill should be used.

- b. The subgrade should be proof rolled after final compaction and any areas showing visible deflections should be inspected and repaired. The Geotechnical Engineer shall review the parking lot and roadway subgrade conditions during the course of excavation.
- c. The parking lot subgrade and pavement should be sloped to provide adequate drainage as per the design and direction of the civil consultant.
- d. An estimated soaked California bearing ratio of 30% and a 20-year design life have been used in the calculating pavement designs. See Tables 4.7.1 and 4.7.2 below.

Table 4.7.1 – Pavement Design Recommendations for Light Traffic/Low Volume Areas

Areas Subject to Cars and Small Trucks	
Estimated Equivalent Single-Axle Load: 2×10^4	
Asphaltic Concrete Pavement	50mm
19mm Well-Graded Granular Base Course	100mm
75mm Select Granular Subbase (SGSB)	250mm

Table 4.7.2 – Pavement Design Recommendations for Heavy Traffic/High Volume Areas

Areas Subject to Large Trucks	
Estimated Equivalent Single-Axle Load: 2×10^5	
Asphaltic Concrete Pavement	75mm
19mm Well-Graded Granular Base Course	150mm
75mm Select Granular Subbase (SGSB)	300mm

- e. It is recommended that a reinforced concrete slab be utilized where garbage dumpsters are located. The slab should be large enough to contain the disposal unit and front tires of the garbage truck during disposal operations.
- f. The above recommendations for general stripping, granular and pavement structure are in accordance with current best-practices. If the recommendations provided here prove cost-prohibitive or restrictive, alternative options may be considered through a balance of reduced preparation efforts, with a corresponding reduction in pavement design life.

5.0 CONCLUSIONS

5.1 Local Government Conformance Statement

- a. From a geotechnical point of view, and provided the recommendations in this Report are followed, the land is considered safe for the use intended (defined for the purposes of this Report as 32 unit residential

development), with the probability of a geotechnical failure resulting in property damage of less than:

- i. 2% in 50 years for geotechnical hazards due to seismic events, including slope stability; and,
- ii. 10% in 50 years for all other geotechnical hazards.

5.2 Geotechnical and Quality Assurance Statement

- a. The 2024 BCBC requires that a geotechnical engineer be retained to provide Geotechnical Assurance services for the construction of buildings that are outside of Part 9 of the BCBC. Geotechnical Assurance services include review of the geotechnical components of the plans and supporting documents, and responsibility for field reviews of these components during construction.

5.3 Acknowledgements

- a. LEA acknowledges that this Report may be requested by the building inspector (or equivalent) of the CoN as a precondition to the issuance of a building or development permit. It is acknowledged that the Approving Officers and Building Officials may rely on this Report when making a decision on application for development of the land. We acknowledge that this Report has been prepared solely for, and at the expense of Race Rock Development Ltd.
- b. We have not acted for or as an agent of the CoN in the preparation of this Report. We acknowledge the CoN and the Approving Officer(s) are authorized users of this Report. We acknowledge that this Report may be registered against the title of the Property as a restrictive covenant.

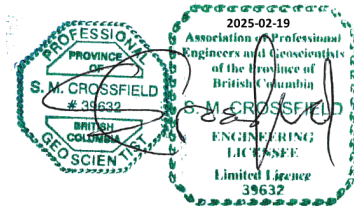
5.4 Limitations

- a. The conclusions and recommendations submitted in this Report are based upon a visual site reconnaissance and desktop study including current construction techniques, and generally accepted engineering practices. The nature and extent of variations in geological deposits may not become evident until construction or further investigation. If unanticipated conditions become known during construction or other information pertinent to the development become available, the recommendations may be altered or modified in writing by the undersigned.

6.0 CLOSURE

- a. LEA appreciates the opportunity to be of service on this project. If you have any comments, or additional requirements at this time, please contact us at your convenience.

Respectfully Submitted,
Lewkowich Engineering Associates Ltd.



Stuart Crossfield, P.Geo., P.L.Eng.
Engineering Geologist

February 19, 2025

Chris Hudec, M.A.Sc., P.Eng.
Senior Project Engineer

7.0 ATTACHMENTS

1. dHKA Architects, Drawing A101, titled "Site Plan; Project Data" for 4951 Denford Place.
2. EGBC, Appendix D: Landslide Assessment Assurance Statement

8.0 REFERENCES

1. EGBC Professional Practice Guidelines for Landslide Assessments in British Columbia, Version 4.1, dated March 1, 2023.
2. CoN Online GIS Mapping System.
3. BC Ministry of Environment, Soils of South Vancouver Island British Columbia, Soil Survey Report No. 44, Sheet 3, 1986.
4. BC Ministry of Energy and Mines, Geological Survey Branch "Geology of the Nanaimo Harbour Area, Nanaimo Coalfield, British Columbia" Open File 1998-07, Sheet 2 of 6. C.G. Cathyl-Bickford, G.L. Hoffman.



PROJECT DATA

-CIVIC ADDRESS: - 4951 DENFORD PLACE, NANAIMO, B.C.	
LEGAL DESCRIPTION: - LOT 2, DISTRICT LOT 54, WELLINGTON LAND DISTRICT, PLAN: EPP62212 PID: 029-898-692	
ZONING: R6 LOW DENSITY RESIDENTIAL	
SITE AREA:	13911.23 m ²
RESIDENTIAL DENSITY: PROPOSED: 32	ALLOWABLE (MAX FLOOR AREA RATIO = 0.45): 35
FAR:	PROPOSED: 0.41(5692.74m ²) ALLOWABLE: 0.45 (6260.1 m ²)
PROPOSED SITE COVERAGE:	
PROPOSED:	29% [4084.71m ²]
ALLOWABLE:	40% [5,564.5 m ²]
SETBACKS: PROPOSED: ALLOWABLE:	
FRONT:	3.0m
FLANKING:	2.5 m
REAR:	7.5 m
SIDE:	3.0 m
GFA CALCULATION:	
UNIT TYPE	GFA AMOUNT OF UNITS
A	197 m ² 3
B	234.3 m ² 2
D	169.7 m ² 12
E	180.3 m ² 6
F	168.3 m ² 9
32 UNITS - 61 276.25 sq ft (5692.74m ²) TOTAL	
OFF STREET PARKING	
REQUIRED	
32 DWELLING UNITS X 2 SPACES (AREA 1)	64 STALLS
VISITOR: SPACES / 22	2.90 STALLS
H/C STALLS	2 STALLS
SMALL CAR STALLS ALLOWABLE: 40% - 25.6STALLS (44 FULL SIZE STALL MIN)	
ELEC. VEHICLE STALLS AS PER SECTION 7.7. OF PARKING BYLAW	
(A minimum of 25% of all required off-street parking spaces)	
PROVIDED	
32 DWELLING UNITS X 2 SPACES (AREA 1)	64 STALLS
VISITOR: SPACES / 22	4 STALLS
H/C STALLS	2 STALLS
TOTAL	
70 STALLS	
SMALL CAR - 3 STALLS	
FULL SIZE - 64 STALLS	
H/C STALLS - 2 STALLS	
BICYCLE PARKING	
SHORT TERM	
32 DWELLING UNITS X 0.1 SPACES	3.2 SPACES
LONG TERM	
32 DWELLING UNITS X 0.5 SPACES	16 SPACES REQUIRED
	32 SPACES PROVIDED

PROPOSED VARIANCES

R6 HEIGHT OF PRINCIPAL BUILDING - SLOPED ROOF (> 4:12 PITCH)	
BUILDING 1	VARIANCE REQUEST OF 1.0m TO COMPLETE ARCHITECTURAL ROOF LINES
BUILDING 3	VARIANCE REQUEST OF 1.0m TO COMPLETE ARCHITECTURAL ROOF LINES
BUILDING 5	VARIANCE REQUEST OF 1.0m TO COMPLETE ARCHITECTURAL ROOF LINES
BUILDING 6	VARIANCE REQUEST OF 1.0m TO COMPLETE ARCHITECTURAL ROOF LINES
BUILDING 8	VARIANCE REQUEST OF 1.0m TO COMPLETE ARCHITECTURAL ROOF LINES

LANDSLIDE ASSESSMENT ASSURANCE STATEMENT

Notes: This statement is to be read and completed in conjunction with the Engineers and Geoscientists BC *Professional Practice Guidelines – Landslide Assessments in British Columbia* (“the guidelines”) and the current *BC Building Code (BCBC)*, and is to be provided for Landslide Assessments (not floods or flood controls), particularly those produced for the purposes of the *Land Title Act*, *Community Charter*, or *Local Government Act*. Some jurisdictions (e.g., the Fraser Valley Regional District or the Cowichan Valley Regional District) have developed more comprehensive assurance statements in collaboration with Engineers and Geoscientists BC. Where those exist, the Qualified Professional is to fill out the local version only. Defined terms are capitalized; see the Defined Terms section of the guidelines for definitions.

To: The Approving Authority (or Client)

File No.: E4094

City of Nanaimo

Date: January 24, 2025

455 Wallace Street, Nanaimo, BC, V9R 5J6

Jurisdiction/name and address

With reference to (CHECK ONE):

- ☐ A. *Land Title Act* (Section 86) – Subdivision Approval
- ☒ B. *Local Government Act* (Sections 919.1 and 920) – Development Permit
- ☒ C. *Community Charter* (Section 56) – Building Permit
- ☐ D. Non-legislated assessment

For the following property (the “Property”):

4951 Denford Place, Nanaimo, BC

Civic address of the Property

The undersigned hereby gives assurance that they are a Qualified Professional and a professional engineer or professional geoscientist who fulfils the education, training, and experience requirements as outlined in the guidelines.

I have signed, authenticated, and dated, and thereby certified, the attached Landslide Assessment Report on the Property in accordance with the guidelines. That report must be read in conjunction this statement.

In preparing that report I have:

[CHECK TO THE LEFT OF APPLICABLE ITEMS]

- ☒ 1. Collected and reviewed appropriate background information
- ☒ 2. Reviewed the proposed Residential Development or other development on the Property
- ☒ 3. Conducted field work on and, if required, beyond the Property
- ☒ 4. Reported on the results of the field work on and, if required, beyond the Property
- ☒ 5. Considered any changed conditions on and, if required, beyond the Property
- 6. For a Landslide Hazard analysis or Landslide Risk analysis, I have:
 - ☒ 6.1 reviewed and characterized, if appropriate, any Landslide that may affect the Property
 - ☒ 6.2 estimated the Landslide Hazard
 - ☒ 6.3 identified existing and anticipated future Elements at Risk on and, if required, beyond the Property
 - ☒ 6.4 estimated the potential Consequences to those Elements at Risk
- 7. Where the Approving Authority has adopted a Level of Landslide Safety, I have:
 - ☐ 7.1 compared the Level of Landslide Safety adopted by the Approving Authority with the findings of my investigation
 - ☐ 7.2 made a finding on the Level of Landslide Safety on the Property based on the comparison
 - ☐ 7.3 made recommendations to reduce Landslide Hazards and/or Landslide Risks

LANDSLIDE ASSESSMENT ASSURANCE STATEMENT

8. Where the Approving Authority has **not** adopted a Level of Landslide Safety, or where the Landslide Assessment is not produced in response to a legislated requirement, I have:

- ☒ 8.1 described the method of Landslide Hazard analysis or Landslide Risk analysis used
- ☒ 8.2 referred to an appropriate and identified provincial, national, or international guideline for Level of Landslide Safety
- ☒ 8.3 compared those guidelines (per item 8.2) with the findings of my investigation
- ☒ 8.4 made a finding on the Level of Landslide Safety on the Property based on the comparison
- ☒ 8.5 made recommendations to reduce Landslide Hazards and/or Landslide Risks

- ☒ 9. Reported on the requirements for future inspections of the Property and recommended who should conduct those inspections

Based on my comparison between:

[CHECK ONE]

- ☐ the findings from the investigation and the adopted Level of Landslide Safety (item 7.2 above)
- ☒ the appropriate and identified provincial, national, or international guideline for Level of Landslide Safety (item 8.4 above)

Where the Landslide Assessment is not produced in response to a legislated requirement, I hereby give my assurance that, based on the conditions¹ contained in the attached Landslide Assessment Report:

A. SUBDIVISION APPROVAL

- ☐ For subdivision approval, as required by the *Land Title Act* (Section 86), "the land may be used safely for the use intended"
- [CHECK ONE]
- ☐ with one or more recommended additional registered Covenants
 - ☐ without an additional registered Covenant(s)

B. DEVELOPMENT PERMIT

- ☒ For a development permit, as required by the *Local Government Act* (Sections 488 and 491), my report will "assist the local government in determining what conditions or requirements it will impose under subsection (2) of [Section 491]"
- [CHECK ONE]
- ☒ with one or more recommended additional registered Covenants
 - ☐ without an additional registered Covenant(s)

C. BUILDING PERMIT

- ☒ 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 additional registered Covenants
 - ☐ without any additional registered Covenant(s)

¹ When seismic slope stability assessments are involved, Level of Landslide Safety is considered to be a "life safety" criteria, as described in Commentary JJJ of the *National Building Code of Canada (NBC) 2015*, Structural Commentaries (User's Guide – NBC 2015: part 4 of division B). This states:

"The primary objective of seismic design is to provide an acceptable level of safety for building occupants and the general public as the building responds to strong ground motion; in other words, to minimize loss of life. This implies that, although there will likely be extensive structural and non-structural damage, during the DGM (design ground motion), there is a reasonable degree of confidence that the building will not collapse, nor will its attachments break off and fall on people near the building. This performance level is termed 'extensive damage' because, although the structure may be heavily damaged and may have lost a substantial amount of its initial strength and stiffness, it retains some margin of resistance against collapse."

LANDSLIDE ASSESSMENT ASSURANCE STATEMENT

Stuart Crossfield, P.Geo., P.L.Eng.

Name (print)

January 24, 2025

Date

1900 Boxwood Road

Address

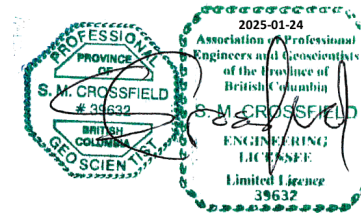
Nanaimo, BC

250-756-0355

Telephone

scrossfield@lewkowich.com

Email



(Affix PROFESSIONAL SEAL and signature here)

The Qualified Professional, as a registrant on the roster of a registrant firm, must complete the following:

I am a member of the firm Lewkowich Engineering Associates Ltd.

(Print name of firm)

with Permit to Practice Number 1001802

(Print permit to practice number)

and I sign this letter on behalf of the firm.

ATTACHMENT G WILDFIRE HAZARD ASSESSMENT



Strathcona Forestry Consulting



4951 Denford Place – Residential development

Wildfire Hazard Assessment

Prepared for: Rocky Ostaffy P.Eng. GSC
Projects Administrator
Knappett Industries
Attn: Glenn Hill architect gth@dhk.ca

Prepared by: Strathcona Forestry Consulting
PO Box 387 Stn Mn
Duncan BC V9L 3X5
strathcona.fc@shaw.ca

7 July 2023

Executive Summary

In accordance with the City of Nanaimo's guidelines for development in the wildfire interface zone, Knappett Industries retained Strathcona Forestry Consulting to conduct a wildfire hazard assessment of property at 4951 Denford Place proposed for multi-family residential development.

Assessment determined that the wildfire threat at the subject property is currently Moderate (to High). Chief contributing factors include: fuel loading (forest and brush vegetation) at and extending away from the site, topography (steep southwest aspect immediately south of the proposal), and intermix (> 1 structure/ha). Under the provincial Wildfire Threat Rating system, ratings must be moderate or less to be considered acceptable.

Living in a fire-prone ecosystem involves taking the necessary steps to protect homes, property, and community from wildfire. Development standards play a significant role in reducing the potential impact a wildfire will have on a community (FireSmartCanada.ca; FireSmartBC.ca). FireSmart strategies for wildfire prevention and preparedness have proven effective at reducing risk related losses to wildfire.

Removal of forest cover in conjunction with development will reduce fuel loading. Care should be taken during development – and post-development – to minimize disturbance at a sloping, sensitive ecosystem south of the proposal; this will help to reduce the wildfire threat.

In my professional opinion, if the recommendations contained in this report are followed through design planning and construction – and continue after buildout, the risk of wildfire (and windthrow) can be reduced to a level acceptable to ensure the safety and resiliency of the intended development.

Fire prevention and protection in the interface zone are ongoing processes. Long-term implementation of FireSmart mitigation is essential to ensure protection for life, property, and ecological processes in Nanaimo's wildland interface.

Introduction

In accordance with the City of Nanaimo's DPA 5 guidelines for new development, Knappett Industries retained Strathcona Forestry Consulting to conduct a wildfire hazard assessment of property proposed for multi-family residential development at 4951 Denford Place.

The interface (wildland urban interface/wildland residential interface) describes any area where combustible wildland fuels are found adjacent to homes or other buildings. Under Section 919.1(1) (a) of the Local Government Act, development permits may be designated where protection of Natural Hazard Lands is justified. Natural hazards, including wildfires, may put life and property, and local biodiversity, at risk if development is inappropriately situated and not well planned. Areas assigned at high or extreme risk from wildfire are designated in a Development Permit Area (DPA). The objective of the DPA is to properly manage the risks associated with the hazard (interface wildfires).

Hazard Assessment

This report describes the vegetation, terrain, and infrastructure on and around the subject property, and provides recommendations to reduce the risk of wildfire. Assessment criteria are based on Rating Interface Wildfire Threats in British Columbia (<https://www2.gov.bc.ca/>), FireSmart (FireSmart, Protecting Your Community From Wildfire (Second Edition. Partners in Protection, 2003 (<https://www.firesmartcanada.ca/>), and the Home Owners FireSmart Manual (BC Edition (<https://www2.gov.bc.ca/assets/gov/public-safety-and.../homeowner-firesmart.pdf>)). Fire behavior modeling is standardized after the Canadian Forest Fire Danger Rating System (CFFDRS). Fuel Types listed in this assessment are customized from the CFFDRS Fuel Type list for applicability in south coastal BC. Wildfire threat assessment was conducted through an analysis of fuel threats in and adjacent to the proposed development, as described in the 2020 Wildfire Threat Assessment Guide and Worksheets (MFLNRO, 2020). This process, used by qualified environmental professionals, employs physical and biophysical factors, combined with fuel hazards, to determine the wildfire threat (low, moderate, high, or extreme). Fire risk is based on four classes: low, moderate, high, and extreme. Recommendations in this report

conform to BC Building Code standards and fire hazard planning authorized by Section 3(2) of the BC Fire Services Act.

Field Inspection: Strathcona Forestry Consulting conducted fieldwork in June 2023. Field investigation entailed an analysis of the interface fire hazard that the land is exposed to, from the perspective of the general area, local site, and proposed and existing structures in the general vicinity, up to 100+ m from property boundaries, where feasible.

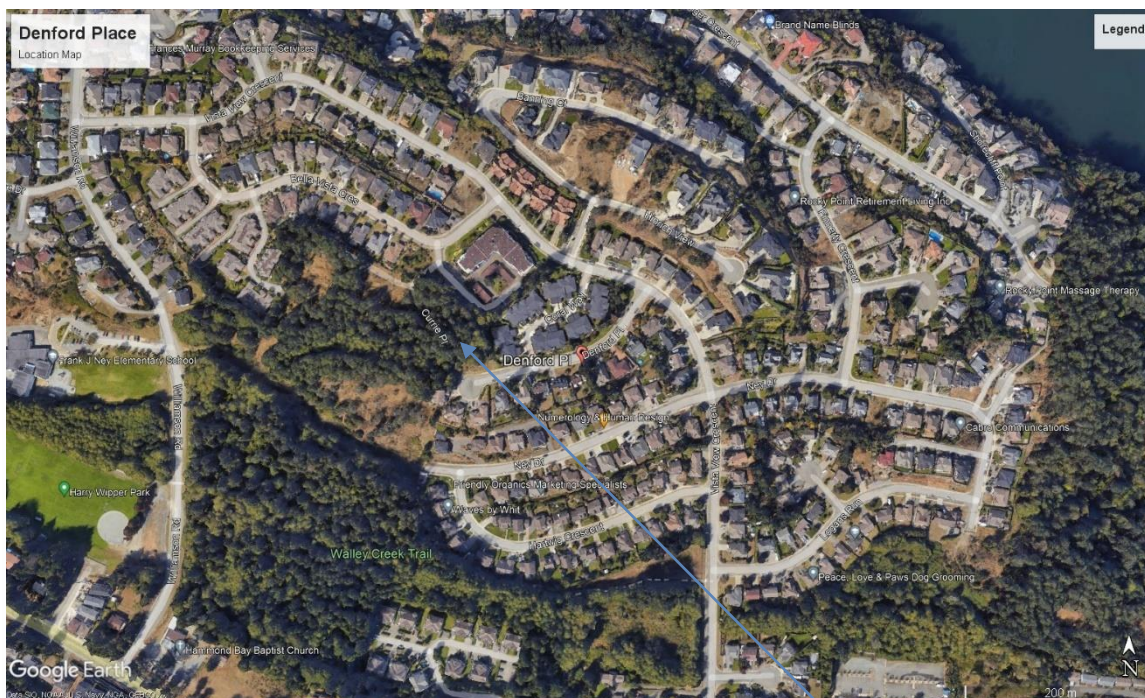
Location and Description of Proposal: The subject property is located at the distal (western) portion of Denford Place (a small cul-de-sac on the west side of Vista View Crescent). The subject property, which is approximately 1.4 ha, curves northward from Denford Place around residential strata at Currie Place. Proposed development consists of 35 units (see map pg. 5). Access to the development site will be from Denford Place. There are currently no structures on the site, which is occupied by a second-growth coniferous forest stand.

South of the subject proposal is a south sloping hillside (Terrestrial Herbaceous ecosystem). Coniferous forest stands extend further south to Williamson Road and west to a residential neighbourhood on Bella Vista Crescent.

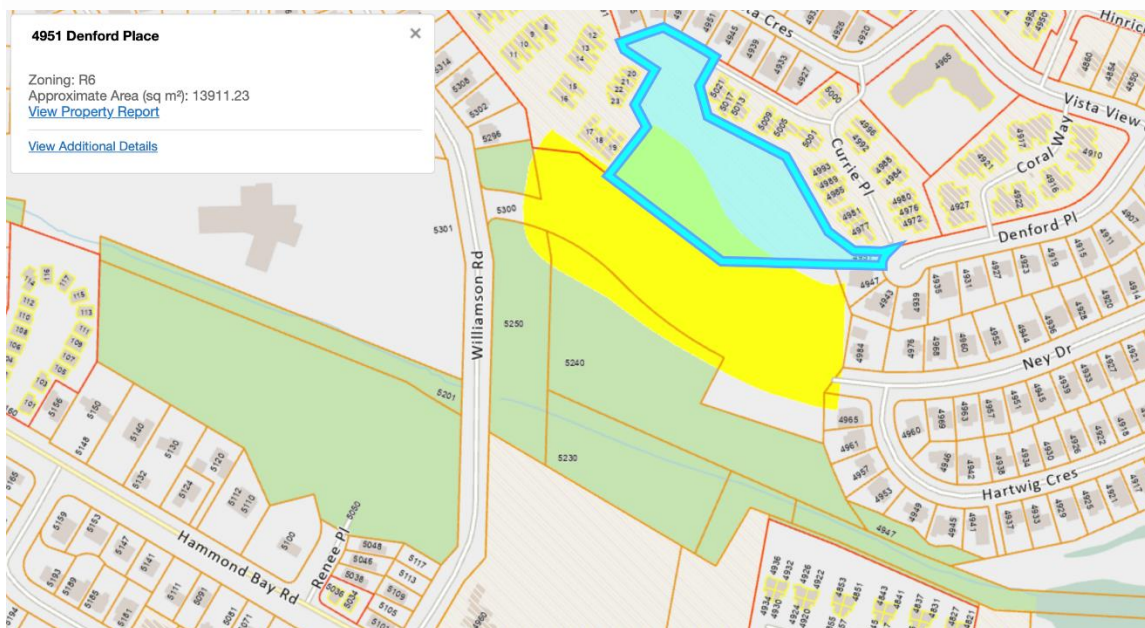
The proposal will be hydranted.



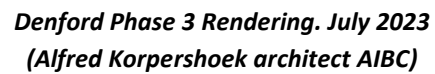
Top: forest cover at subject proposal. Bottom L: Denford Place; bottom R: steep slope TE polygon.



Location Map. Arrow indicates subject proposal.



4951 Denford Place: Subject proposal outlined in blue.



Wildfire Hazard and Risk

Wildfire hazard is a process, a phenomenon or a human activity that may cause loss of life, injury, or other health impacts, property damage, social and economic disruption or environmental degradation. Wildfire hazard can be described qualitatively as a fire environment—fuel, weather, topography, and ignitions.

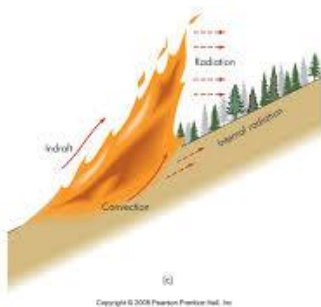
Risk assessment for wildfire and its impacts to communities considers both the likelihood of a wildfire and the potential consequence associated with that likelihood. For example, if the fuel (i.e. the hazard) ignites and the fire spreads towards the community (probability), the wildfire can become a threat to life and property (consequence) with an associated risk of loss.

Determination of the wildfire hazard and risk involves a detailed assessment of potential fire behaviour, field reviewed fuel characteristics, proximity of fuel to the community, local fire spread patterns, topographical considerations and local factors.

Fire Behaviour. Fire behaviour has three components: weather, topography, and fuel. Fire behavior predicts how forest and wildland vegetation (fuel) will burn under different conditions. Weather and topography cannot be changed; alteration of fuels across the landscape is the only way to lower fire intensity and change fire behaviour.

Biogeoclimatic Classification. The subject proposal, a drier ecosystem Association, is designated in the moist maritime Coastal Douglas-fir moist maritime (CDFmm) biogeoclimatic subzone. Summers are warm and dry, while winters are moist and mild. Growing seasons are long, and often feature pronounced water deficits on zonal (average) and drier sites. Fire Danger Ratings (i.e., the risk of a fire starting) tend to reach High and Extreme for extended periods during the fire season.

Topography. Physical site characteristics impact fire behavior by affecting ignition potential and the rate of fire spread. Potential wildfire behavior tends to be exacerbated by steep slopes. The subject proposal occupies a gentle slope with a southwest aspect. To the south a steep slope with a southwest aspect extends to Williamson Road and Ney Drive.



Wildfires typically burn uphill. Warmer aspects tend to burn “hotter.”

Vegetation. Fire behavior predicts how forest and wildland fuels (vegetation) will burn under different conditions. Fuel hazard means the potential fire behaviour, without regard to the state of weather or topography, based on the physical fuel characteristics, including fuel arrangement, fuel load, condition of herbaceous vegetation and the presence of ladder fuels.

Benchmark vegetative fuel types developed by the Canadian Forest Fire Danger Rating System Fire Behavior System (CFFDRS) are used to forecast how a wildfire will react (cwfis.cfs.nrcan.gc.ca) (refer to Appendix 2).

The subject proposal is occupied by moderately dense, second-growth coniferous forest, which extends westward to Bella Vista Crescent. A steep, grassed slope immediately south of the subject proposal is generally excluded from development.

Major Fuel Types at subject proposal:

Fuel Types	Description	Forest Floor & Surface Fuels	Ladder Fuels	Wildfire Behaviour (why and how a fire spreads)
C-5 /(M-2(Coniferous forest – Mainly S portion	Coniferous 2nd-growth forest dominated by Douglas-fir	Discontinuous needle litter. Scattered understorey. Moderate levels of woody surface/ground fuels	Discontinuous vertical CF continuity; moderate localized high ladder fuels (understorey dead/dying)	Fire start during warm, dry windy weather would result in elevated potential for Crown Fire Initiation Component
0-1/2 with C-2/C-3 Grass, scattered shrubs	Steep grassy slope immediately south of subject proposal.	Moderate surface fuel loading (exacerbated when grass is dry and cured).	N/A	Fire start during warm dry weather could result in rapid rate of spread due to sloping terrain and dry, cured grass.

Risk of Ignition. Risk of ignition represents the potential for fire starts. Risk of ignition could come from property owners in the general area, and/or construction activities when development commences at the subject site. Below the steep slope to the south, the Walley Creek trail is a fairly popular route for hikers/dog walkers. Risk of ignition is currently rated moderate.

Fire Spread and Intensity. Head fire intensity is a numerical ranking of difficulty of control for specific fuel types. Flame length is a main visual manifestation. Head fire intensity is a major determinant of certain fire effects and difficulty of control. Numerically, it is equal to the product of the net heat of combustion, quantity of fuel consumed in the flaming front, and the linear rate of spread. Under warm, dry

conditions, there is currently sufficient continuity of surface and ladder fuels to enable a fire to spread relatively quickly. Dry, windy conditions would increase the rate of spread.

The goal of Wildfire Risk Reduction (WRR) is to reduce HeadFire Intensity to less than 2000 kW/m (< 3, HFI column Moderate) (see chart following).

Fire Weather Indices

Hazard Rating	FFMC Fine Fuel Moisture Code	DMC Duff Moisture Code	DC Drought Code	ISI Initial Spread Index	BUI Build Up Index	FWI Fire Weather Index	HFI Head Fire Intensity
Low	0-76	0-21	0-79	0-1.5	0-24	0-4.5	1-2
Moderate	77-84	22-27	80-189	2-4	25-40	4.5-10.5	3
High	85-88	28-40	190-299	5-8	41-60	10.5-18.5	4
Very High	89-91	41-60	300-424	9-15	61-89	18.5-29.5	5
Extreme	92+	61+	425+	16+	90+	29.5+	6

Spotting Potential. Spotting is a fire behavior characteristic in which sparks or embers are carried up by the wind and/or convective column and fall into other downwind fuels to ignite additional fires beyond the zone of direct ignition by the main fire (Firewise.org). Fire spotting is one of the major ways that fires spread and homes are ignited and destroyed in wildland/urban interface fires. Firebrands can come down on and ignite combustible roofs, combustible items stored adjacent to homes, and other nearby combustible fuels. The resulting spot fires may go unnoticed and thus unsuppressed when an area has been evacuated of residents, when firefighters are spread too thin, or when spot fires are too numerous.

The maximum spotting distance in a particular fire varies according to several factors, including overall fire intensity, wind speed, fuel type, initial size of the ember when lofted up, and how rapidly it is burning (Firewise.org). If a fire start occurred during very warm dry, weather (High/Extreme Fire Danger Ratings), there is a high possibility of spotting in the general area.

Fire Protection. The subject site is located within the service area of Nanaimo Fire Rescue. Response times can vary depending on time of day or year.

Fire department intervention time is crucial in determining the consequences of a fire in terms of deaths, injuries, and loss of property and damage to the environment. An early aggressive and offensive primary interior attack on a working fire is usually the most effective strategy to reduce the loss of lives and property damage.

Mutual Aid. Fire Departments within the NRD operate under a mutual aid agreement with other fire departments within (and outside) the region. In the case of a serious fire, mutual aid from adjoining fire departments can benefit fire suppression by pooling manpower and resources (water supply, water tenders, etc.,). Mutual aid, however, may not always be available.

Wildfires. Nanaimo Fire Rescue automatically responds to structure fires and small, easily accessible bush fires inside the fire service protection area (FPA). The Wildfire Management Branch generally responds to forested areas outside a FPA.

Water Supply. The proposal will be serviced.

Access. Safe access increases safety for both residents and firefighters, and also facilitates quick response by firefighters. The subject proposal will be accessed via a one-way-in/ one-way-out drive from Denford Place.

Wildfire Threat Assessment Results

Scoring from the FireSmart assessment and fire behavior analyses determined the subject proposal currently has a Moderate (to somewhat High) Fuel Assessment rating (see chart next page), and a Moderate (to somewhat High Local Wildfire Threat Rating (below). Factors contributing to the current rating include: continuity of fuel loading in the area (drier forest stands); elevated HeadFire intensity; and intermix >1 structure/ha. Threat ratings must be low/moderate to ensure an area and/or structure(s) are safe. Post-development, the Threat rating is projected to be moderate or lower.

LOCAL WILDFIRE THREAT SUMMARY: 4951 Denford Place			
System:	Subcomponents	CURRENT ratings	Projected Ratings post-development*
MFLNRO Wildfire Threat Assessment	Fire Behaviour: Fuel, Weather, Topography	Fuel Assessment Class: Moderate (to somewhat High) (see chart next pg.)	Low to Moderate
	Structural (incl vicinity)	Moderate	Moderate
Overall Rating:		Moderate (to somewhat High)	Low to Moderate
HIRV Model	Hazard Impact Risk Vulnerability	Moderate High Moderate Moderately High	Low to Moderate Low to Moderate Moderate Moderate
Wildfire Risk	Likelihood Intensity Susceptibility	Moderate	Low to Moderate

*Projected ratings conditional upon compliance with recommendations contained in this report.



Wildfire risk triangle. (Scott et al. 2013).

Risk of wildfire is Moderate to High (refer to Appendix 3).

Generalized Descriptions of the “Fuel Assessment Rating” classes:

Low	Fires may start and spread slowly. There will be minimal involvement of deeper fuel layers or larger fuels.
Moderate	Forest fuels are drier and there is an increased risk of surface fires starting. There will be involvement of the organic layer but larger dead material will not readily combust.
High	Forest fuels are very dry, new fires may start easily, burn vigorously; aerial fuel will be engaged in the flaming front. Most fuel in the organic layer will be consumed and larger dead fuel will be consumed in the smoldering combustion.
Extreme	Extremely dry forest fuel, new fires will start easily, burn vigorously; all aerial fuel will be engaged in the flaming front. Most fuel in the organic layer will be consumed and larger dead fuel will be consumed in the smoldering combustion.

FMC (Fuel Moisture Content) 95% value based on 90th percentile drought conditions.

Fuel reduction targets should be sufficient to be effective to meet treatment objectives of reduced fire behaviour under 90th Percentile Fire Weather Index (FWI) Conditions (FFMC, ISI, BUI) from the BCWS weather network.

Recommendations

The following recommendations are based on the FireSmart program (<https://firesmartcanada.ca/>; <https://firesmartbc.ca/>), which aims to improve wildfire resiliency across BC. FireSmart is an all-encompassing program, extending from land development to the individual homeowner level to a landscape land management level. FireSmart principles have shown that they are effective at reducing the risk to life and property in the most extreme wildfire conditions. The FireSmart program is supported by field, laboratory and wildfire modelling research. FireSmart methods help reduce the risk of losses under even the most extreme fire conditions.

FireSmart techniques to minimize the risk of home ignition include selecting ignition-resistant building materials, positioning structures away from slopes, and careful landscaping around structures. Appropriate infrastructure (fireflow and access) is integral to wildfire resiliency.

The following FireSmart strategies are recommended to increase resiliency at the subject proposal.

Vegetation Management

General Precautions During Land Clearing and Construction

- Ensure any land clearing activities are conducted in compliance with BC's Wildfire Act local bylaws.
- As per the BC Wildfire Act, if a high risk activity (i.e., land clearing) is taking place between 1 April and 31 October, the operator must keep at the activity site fire fighting hand tools, in a combination and type to properly equip each person who works at the site with a minimum of one fire fighting hand tool, and an adequate fire suppression system (onsite portable water tanker and fire fighting tools – shovels, pulaskis, portable water backpacks). In addition, efforts must be made to maintain an adequate fire break between any high risk activity and areas of continuous forest to ensure a fire originating at the site does not escape the site.
- During landclearing, develop an Emergency Plan of Action, listing key contact information in case of fire and/or other emergency at the site.
- Hazard abatement (removal of slash/disposal of debris piles) must take place in compliance with local bylaws.
- Ensure construction workers are made aware of the risk of fire in the interface zone, especially during dry summer weather.

Hazard Tree Management

- *As per WorkSafe regulations, prior to commencement of work at the site, potentially hazardous trees proposed for retention should be assessed by a certified Danger Tree*

Assessor. Trees identified as Danger Trees will require treatment (removal / possible modification) from a certified tree service.

Where safely feasible, wildlife trees could be retained.

Bird Nesting Season (mid-March to end of July)

- *Vegetation clearing is likely to destroy birds' nests, so it should be done only when the nests are not occupied. To comply with Section 34(iii) of the BC Wildlife Act, clearing that must be done during the nesting season must be preceded by nest surveys to confirm that active nests will not be affected. A vegetation buffer must be retained around each active nest. The nest survey protocol should be developed and implemented by a qualified professional.*

FireSmart Zones – (see Appendix 1)

- **Immediate Zone 1a: 0-1.5 m**

A noncombustible surface should extend for 1.5 m around homes and accessory structures, and any attachments, such as decks. Avoid storing flammable outdoor items, such as wicker or wooden patio furniture, cushions, doormats, window boxes and planters, garbage cans without lids and BBQ propane tanks, which are all places where embers can land and start a fire, in this critical area adjacent to the home.

- Landscape with noncombustible landscaping materials, such as gravel, brick, or concrete
- Avoid woody shrubs, trees, or tree branches in this zone
- Create a noncombustible zone underneath and for 1.5 m around any RVs/vehicles
- Mitigate any auxiliary structures to same standards as those of home

- **FireSmart Intermediate Zone 1: 0-10 m**

Establish and maintain an environment around structures that will not support fire. Focus on fuel removal, conversion, and reduction.

- Plan on landscaping with a low density of fire resistant plants and shrubs. Avoid the use of cedar hedging.
- Maintain landscapes with regular irrigation, mowing, pruning, raking, weeding and dead plant removal.
- Create non-flammable hardscapes, such as rock, gravel, and water features, which, function as firebreaks by breaking up areas of fuel. Rock can provide a natural looking, low-maintenance and water-efficient mulch and as well as a fire-resistant buffer zone.
- Group fire resistant plant materials in islands. Group plants in islands surrounded by nonflammable materials, such as rock; employ landscape elements together to create breaks between fuels.
- Limb (prune) trees 1.5 to 2m from the ground. Create space between trees and shrubs – a general rule is twice the height of what the plant will be at maturity. Remove tree limbs closer than 15-feet from power lines and any touching the house or other structures.
- Avoid using woody debris, including bark mulch, as it provides potential places for fires to start

- Store items such as firewood piles, construction materials, patio furniture, tools and decorative pieces at least 10 m from the homes and any structures

- **FireSmart Extended Zone 2: 10-30 m**

Where feasible, extend the fuel modified area 10-30 m around structures. Conduct FireSmart thinning, pruning, and fuel reduction strategies in this zone to reduce fuel loading.

- Thin and prune evergreen trees to reduce hazard in this area
- Within 30 m of homes and any other structures, selectively remove evergreen trees to create at least 3 m of horizontal space between the single or grouped tree crowns, and remove all branches to a height of at least 2.5 m from the ground on the remaining evergreen trees. (For smaller evergreen trees; general rule of thumb is prune branches up to a third the height of the tree)
- Regularly clean up accumulations of fallen branches, any dry grass and leaves, and conifer needles from the ground to eliminate potential surface fires

- **FireSmart Zone 3: 30-100 m**

Where fuel modification in PZ1 and PZ2 is insufficient to protect structures and/or property, and where property boundaries permit, thin and prune trees in order to create an environment that will not support high-intensity crown fires.

- Look for opportunities to create a fire break by creating spaces between trees and other potentially flammable vegetation
- If possible, prune the trees located up to 100 m from homes
- Thin and prune overgrown trees to reduce hazard
- Regularly clean up accumulations of fallen branches, dry grass, and needles from the ground to eliminate potential surface fires

General Principles of FireSmart Landscaping

- Incorporate FireSmart landscaping by using fire-resistive, widely spaced trees, native shrubs and groundcover in combination with stone and/or water features and/or maintained lawn areas. See FireSmart Guide to Landscaping.
<https://www.firesmartcanada.ca/resources-library/firesmart-guide-to-landscaping>
- Promptly re-vegetate any areas of soil disturbed during clearing and construction with approved landscaping materials and/or native plant species to minimize spread of invasive plant species (i.e., Himalayan blackberry, broom, etc.).
- Powerlines should be clear of branches and other vegetation.

Construction

The roof is the most vulnerable component of a structure. Sparks and burning embers from a wildfire can travel long distances and quickly ignite flammable roofing material.

Siding material is also vulnerable to wildfire. Combustible debris can accumulate at the vents and openings on your home and be ignited by embers during a wildfire.

- Use fire-retardant roof covering assemblies rated Class A, B, or C (i.e., metal, tile, ULC-rated asphalt) and feature non-combustible siding materials (i.e., stucco, metal siding, brick, cement shingles or cementitious materials, poured concrete, or ULC-rated wood siding) on new structures. Metal, clay tile, and rated asphalt shingles are the most fire

resistant roofing materials. Siding materials such as stucco, metal, brick and concrete offer superior fire resistance to wildfire. Logs and heavy timbers are less effective, while wood and vinyl siding offer very little protection.

- Follow FireSmart guidelines for design, construction, and maintenance of window and door glazing, eaves and vents, and decking. Install noncombustible material for all vents (should be 3 mm screening or ASTM fire rated vents). Metal products are recommended for vents and vent flashing. <https://www.firesmartcanada.ca/>
- Ensure structures are equipped with working smoke alarm(s).
- Sheath in the base of decks, balconies and homes with fire-resistant material to reduce the risk of sparks and embers igniting the home. Use metal railings or tempered glass for decks and balconies. Select noncombustible patio furniture and decorations.
- If wood fences are installed, ensure at least a 1.5 m noncombustible break between the fence and a structure (i.e., a metal gate with a stone wall to break up combustible fence).

Maintenance

- Regularly inspect siding for locations where embers could accumulate and lodge.
- Maintain and remove combustible debris near exterior walls to reduce a building's vulnerability to ignition during a wildfire.
- Regularly remove debris from gutters – sparks and easily ignite these dry materials.
- Inspect vents and openings regularly to ensure vents are in good repair, and remove any accumulated combustible debris.

Water Supply / Fire Protection

- Ensure water main, fire hydrant capabilities and servicing meet City of Nanaimo Engineering specifications.

Access

- Ensure driveways meet BC Building Code and municipal Engineering requirements.
- Ensure address signage is clearly evident during the construction phase and at build-out. Letters, numbers, and symbols should be at least 10 cm high, with a 12 mm stroke, contrast with the background colour of the sign, and be reflective.
- Ensure new structures and on-site water storage are mapped on fire department “pre-org” (fire planning) maps.

Regulatory Provisions

- Conduct follow-up assessment (at building permit) to ensure appropriate mitigation measures have been implemented.

Appendix 1. FireSmart Interface Priority Zones

In interface areas, FireSmart advocates the establishment and maintenance of Fuel Management Zones* extending outward from structures and along access routes:

Immediate Zone 1 a (0-1.5m)

Intermediate Zone 1 (0-10 m).

Extended Zone 2 (10-30 m).

Zone 3 (30-100 m).

(FireSmart, 2003; updated 2018)

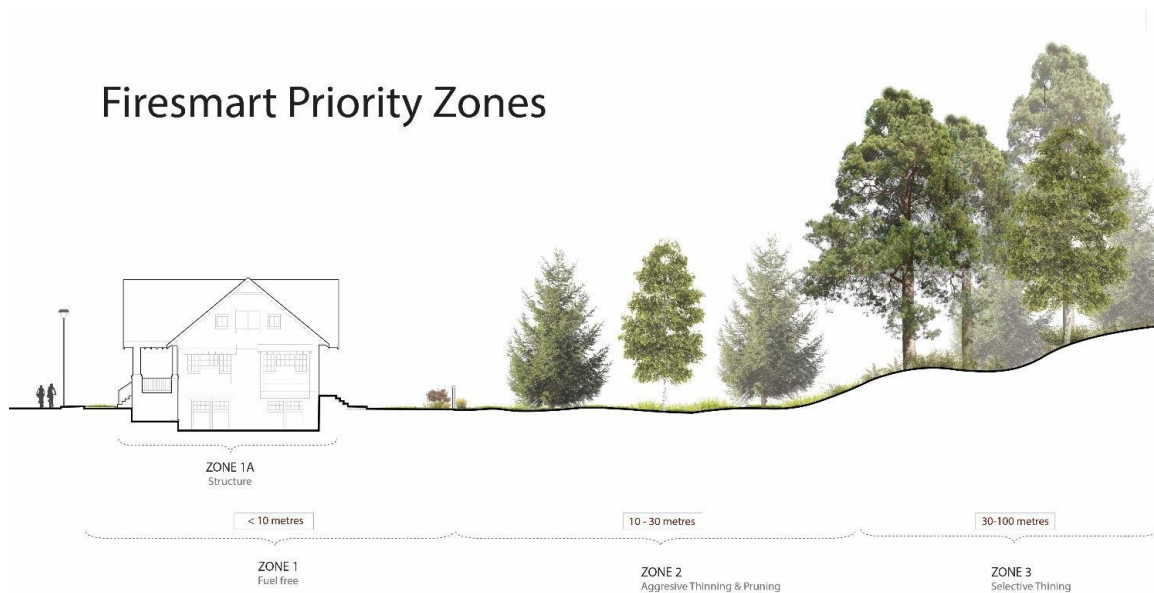
Zone 1a (0-1.5 m): This is the noncombustible zone, where it is very important not to have any combustibles next to buildings.

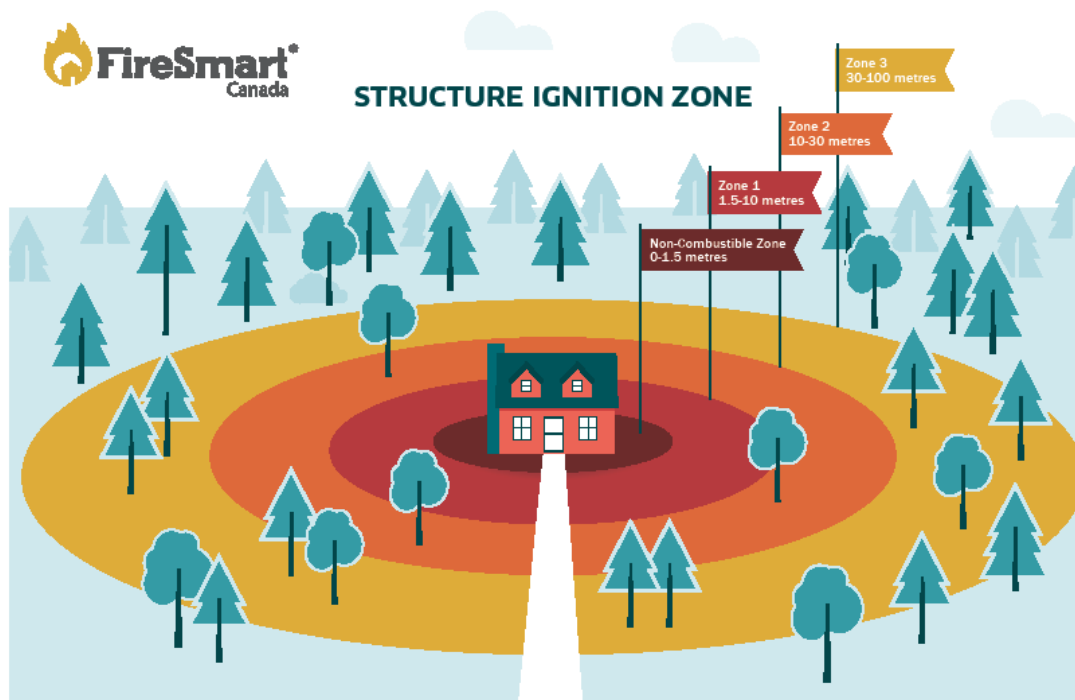
Zone 1 (0-10 m): The main objective of vegetation management is to create an environment that will not support fire. Vegetation management focuses on fuel removal, conversion, and reduction.

Zone 2 (10-30 m): Where treatment in PZ 1 is not sufficient to significantly reduce the fire hazard due to fuel loading, extend the fuel modified area with a variety of thinning and pruning actions.

Zone 3 (30-100 m): Where fuel modification in PZ1 and PZ2 is insufficient to protect structures and/or property, FireSmart advocates treatment in Priority Zone 3 with a variety of thinning and pruning actions in order to create an environment that will not support high-intensity crown fires.

*Setback Zone distances may be extended depending on aspect, slope, fuel loading, etc.





Work with your neighbours in any overlapping priority zones!

Non-combustible Zone (0-1.5 metres)	Reduce the chance of wind-blown embers igniting materials near your home. A non-combustible surface should extend around the entire home and any attachments, such as decks. Creating a non-combustible surface can be as easy clearing vegetation and combustible material down to mineral soil. To add to your landscape design, use non-combustible materials such as gravel, brick, or concrete in this critical area adjacent to your home. Woody shrubs, trees or tree branches should be avoided in this zone, any that are present should be properly mitigated.
Zone 1 (1.5-10 metres)	Create a landscape that will not easily transmit fire to the home. A FireSmart yard includes making smart choices for your plants, shrubs, grass and mulch. Selecting fire-resistant plants and materials can increase the likelihood of your home surviving a wildfire. Plant a low density of fire-resistant plants and shrubs. Avoid having any woody debris, including mulch, as it provides potential places for fires to start. Storing items such as firewood piles, construction materials, patio furniture, tools and decorative pieces against or near a house is a major fire hazard. Move firewood piles, trailers/ recreational vehicles, storage sheds and other combustible structures out of this zone and into Zone 2. If unable to move, store firewood inside your mitigated garage, shed or other ember resistant structures, create a non-combustible zone underneath and for 1.5 metres around trailers/ vehicles and mitigate sheds and other structures to the same standards as those of your home.
Zone 2 (10-30 metres)	If your property extends out to this zone, thin and prune evergreen trees to reduce hazard in this area. Within 30 metres of your home, selectively remove evergreen trees to create at least 3 metres of horizontal space between the single or grouped tree crowns and remove all branches to a height of 2 metres from the ground on the remaining evergreen trees. If possible, pruning trees up to 100 metres from your home (Zone 3) is recommended. Regularly clean up accumulations of fallen branches, dry grass and needles from on the ground to eliminate potential surface fuels. Consider seeking the guidance of a forest professional with wildland fire knowledge on appropriate management options for this zone.
Zone 3 (30-100 metres)	Taking FireSmart actions in Zone 3 on your property will influence how a wildfire approaches your home. You can change the dynamics of wildfire behaviour by managing vegetation within this zone. Look for opportunities to create a fire break by creating space between trees and other potentially flammable vegetation. Thinning and pruning is effective here as well. These actions will help reduce the intensity of a wildfire. Consider seeking the guidance of a forest professional with wildland fire knowledge on appropriate management options for this zone.

Appendix 2. Generic Fuel Types (adopted from CFFDRS).

Fuel Type	Description	Wildfire Behaviour Under High Wildfire Danger
Coniferous:		
C1	Terrestrial herbaceous ecosystem: mossy rock outcroppings	High potential for surface fire, especially if high moss/lichen
C2	Dense regeneration to pole-sapling (immature) forest with crowns almost to ground	High potential for crown fires; low to very high fire intensity and rate of spread
C3	Fully stocked, mature forest, crowns separated from ground; sparse understorey	Surface and crown fire, low to very high fire intensity and rate of spread
C4	Dense, pole-sapling (immature) forest, heavy standing dead and down, dead woody fuel; continuous needle litter; continuous vertical crown fuel continuity	High potential for crown fires, high to very high fire intensity and rate of spread
C5	Moderately well-stocked, mature forest, moderate dense understorey crowns well separated from ground; continuous needle litter	Low to moderately fast-spreading, low to moderate intensity surface fire
C6	Fully stocked conifer plantation; absent understorey; tree crowns separated from ground; continuous needle litter	Surface fire may spread rapidly to become high intensity fire with high rate of spread
C7	Open, mature coniferous stand; uneven-aged; discontinuous understorey; tree crowns mostly separated from ground	Surface, torching, rarely crowning (except on steeper slopes), moderate to high intensity and rate of spread
D (Deciduous)	Moderately well-stocked deciduous stands; moderate medium to tall shrubs and herb layers D-1 Leafless D-2 In leaf	Typically a surface fire; low to moderate rate of spread and fire intensity
M (Mixed Forest)	Moderately well-stocked mixed stand of conifers and deciduous tree species; moderate shrub understorey; conifer crowns extend nearly to ground M-1 Leafless M-2 In Leaf Slash from logging and land clearing	Surface, torching and crowning; moderate to very high intensity and spread rate (varies with slope and % vegetation cover) Fine fuel % and cedar foliage retention will result in faster ignition and spread
S (Slash)		Rapid spreading, moderate to high intensity surface fire
01-Long	Continuous standing grass – fuel loading is 0.3 kg/m ² ; scattered trees 01-a Matted 01-b Tall	The taller, and more cured the grass, the more rapid spread; low to moderate intensity surface fire
01-Short	Continuous human modified short grass	Typically low rate and spread and low fire intensity.

Appendix 3. Fire Risk Classes.

RELATIVE WILDFIRE RISK
Low
Moderate
High
Extreme

Fire Risk Classes

Low (Green): The combination of the local fuel hazard, weather influences, topography, proximity to the community, fuel position in relation to fire spread patterns, and known local wildfire threat factors make it a lower potential for threatening a community. These stands will support surface fires, single tree or small groups of conifer trees could torch/ candle in extreme fire weather conditions. Fuel type spot potential is very low, low risk to any values at risk.

Moderate (Yellow): The combination of the local fuel hazard, weather influences, topography, proximity to the community, fuel position in relation to fire spread patterns and known local wildfire threat factors make it possible that a wildfire in this area would threaten the community. Areas of matted grass, slash, conifer plantations, mature conifer stands with very high crown base height, and deciduous stands with 26 to 49% conifers. These stands will support surface fires, single tree or small groups of conifer trees could torch/ candle. Rates of spread would average between 2-5 meters/ minute. Forest stands would have potential to impact values in extreme weather conditions. Fuel type spot potential is unlikely to impact values at a long distance (<400m).

High (Orange): The combination of the local fuel hazard, weather influences, topography, proximity to the community, fuel position in relation to fire spread patterns, and known local wildfire threat factors make it likely that a wildfire in this area would threaten the community. This includes stands with continuous surface/ crown fuel that will support regular torching/ candling, intermittent crown and/or continuous crown fires. Rates of spread would average 6 -10 meters/ minute. Fuel type spot potential is likely to impact values at a long distance (400 -1 000m).

Extreme (Red): The combination of the local fuel hazard, weather influences, topography, proximity to the community, fuel position in relation to fire spread patterns, and known local wildfire threat factors make it very likely that a wildfire in this area would threaten the community. Stands with continuous surface/ crown fuel and fuel characteristics that tend to support the development of intermittent or continuous crown fires. Rates of spread would average >10 meters/ minute. Fuel type spot potential is probable to impact values at a long distance (400 -1 000m or greater). These forest stands have the greater potential to produce extreme fire behaviour (long range spotting, fire whirls and other fire behaviour phenomena).

Limitations

This report provides an assessment of site conditions. Evaluation is based on professional judgment. The investigation involved field observation. Recommended treatment pertains only to the particular site as disclosed at the time of inspection. The report was prepared considering site-specific circumstances and conditions. It is intended only for use by the client for the purpose for which it was commissioned and for use by local government regulating the activities to which it pertains.