

Project: Lot 17, Riverside Drive Access Options

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1. BACKGROUND

Lot 17 is approximately 15.1 acres and lies within the District of North Vancouver. The DNV GIS indicates 6.0982 ha which is 15.06 acres and is consistent with BC Assessment indicates 15.1 acres.

It is within the Riverside Neighbourhood and into East Blueridge. It is north of Mount Seymour Parkway and located between Berkley and Riverside Drive. It fronts partially at the southwest corner on the back of 954 to 925 Riverside Drive. From there, there is approximately 126 m of Riverside Drive direct frontage and ~168 m on the back of single-family homes from 1050 to 1192 Riverside. There is a ~10 m wide nonlinear panhandle that fronts onto Riverside immediately North of 1192 Riverside. The northern ~165 m fronts onto a dedicated but unopened extension of Carnation Road ROW. The Carnation ROW has a Metro Vancouver Watermain, overhead telecom and gas line. There is also a braided creek drainage that is picked up in a ~450 mm concrete sewer at Riverside Drive. There is a mapped DNV trail in the ROW which partially crosses into the subject Parcel.

The eastern portion abuts LOT 24 BLOCK H DISTRICT LOT 676 PLAN 21552 for approximately 336 m. This is Provincially owned land that is steeply sloped and undeveloped other than a DNV trail along the Eastern side and is zoned • NPL: NATURAL PARKLAND ZONE, PRK. The southern eastern portion abuts LOT 1 BLOCK H DISTRICT LOT 676 PLAN 12608. It is corporately owned and is currently undeveloped but zoned RS1: SINGLE-FAMILY RESIDENTIAL ONE ACRE ZONE (4000 SQ.M.), RS. The South boundary abuts approximately 94 m of LOT 2 BLOCK H DISTRICT LOT 676 PLAN 12608. This is DNV owned, undeveloped and zoned NPL: NATURAL PARKLAND ZONE,

The remainder of Riverside Drive is single family residential zoned mostly RS3: SINGLE-FAMILY RESIDENTIAL 7200 ZONE (660 SQ.M.), RS. There are some public open space areas that access the Seymour River to the west. Farther east from the site it is predominately single family residential with many zoned RS3: SINGLE-FAMILY RESIDENTIAL 7200 ZONE (660 SQ.M.), RS. There is the existing Berkley Terrace multi family development south and east of the site.



Figure 1: Context Plan

The property lies in an area known as the Berkley Landslide assessment area. This area has some risks due to steep slopes and hydraulic loading. This is dealt with further in section 6. The Property is subject to a Steep Slopes DP zone area in portions of the property.

The Seymour River is on the downstream side of the property on the west side of Riverside Drive and in portions adjacent to the southern part of the property and elsewhere immediately downstream of Riverside Drive. There are two meandering drainages in the Carnation Road Extension North of the property

2. EXISTING CONDITIONS

The property is currently undeveloped with no apparent buildings or improvements. The property is largely tree covered though has been logged historically. The trees may average 300 mm DBH though there are examples of more mature trees. There appears to be evidence of some earthworks on site with excavated trenches that are now overgrown.

A number of trails cross the site and tie into neighbouring trails in both Provincial lands to the east, Carnation Road extension to the north, private and DNV lands to the south.

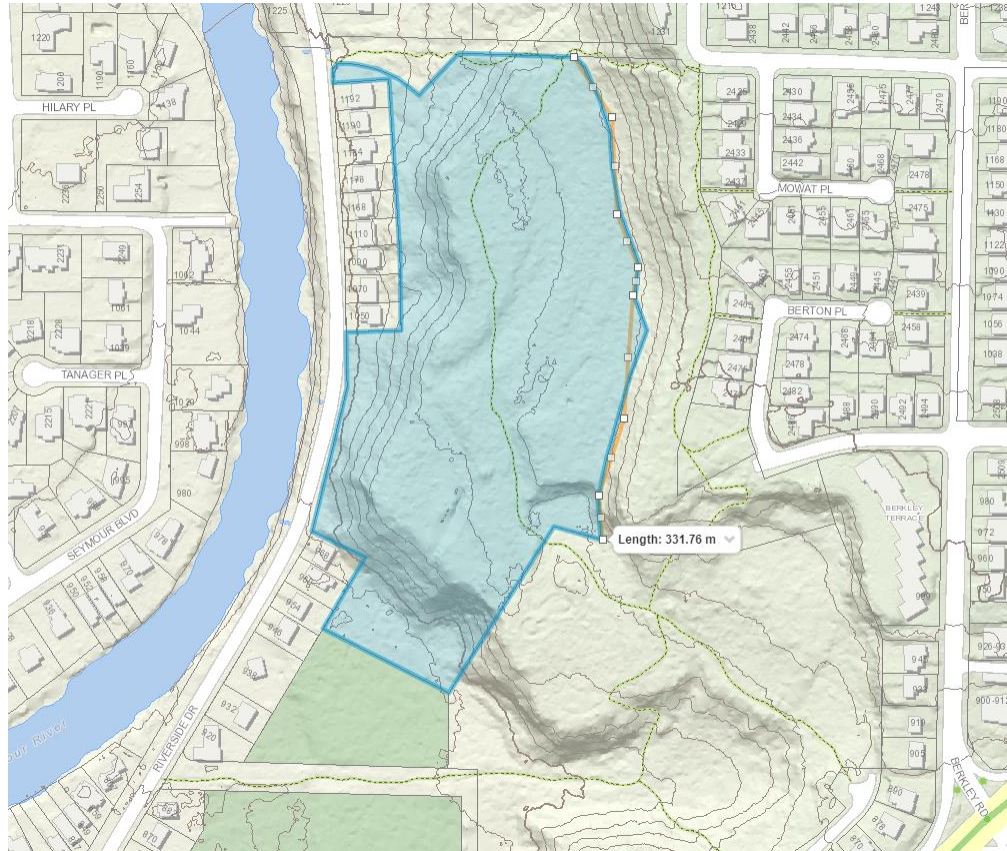


Figure 2: Local Trail (additional Trails exist on site)

The property slopes steeply at a grade of approximately 30% from Riverside drive to a plateau which is approximately 30 m above the road. The plateau ranges in grade from 50 m to 60 metres. The property to the east rises steeply from 60-80 m at grades over 30%. There is a cliff band wraps around the southern bank of the property which drops approximately 30 m to low lying lands that are isolated against the DNV wetlands.

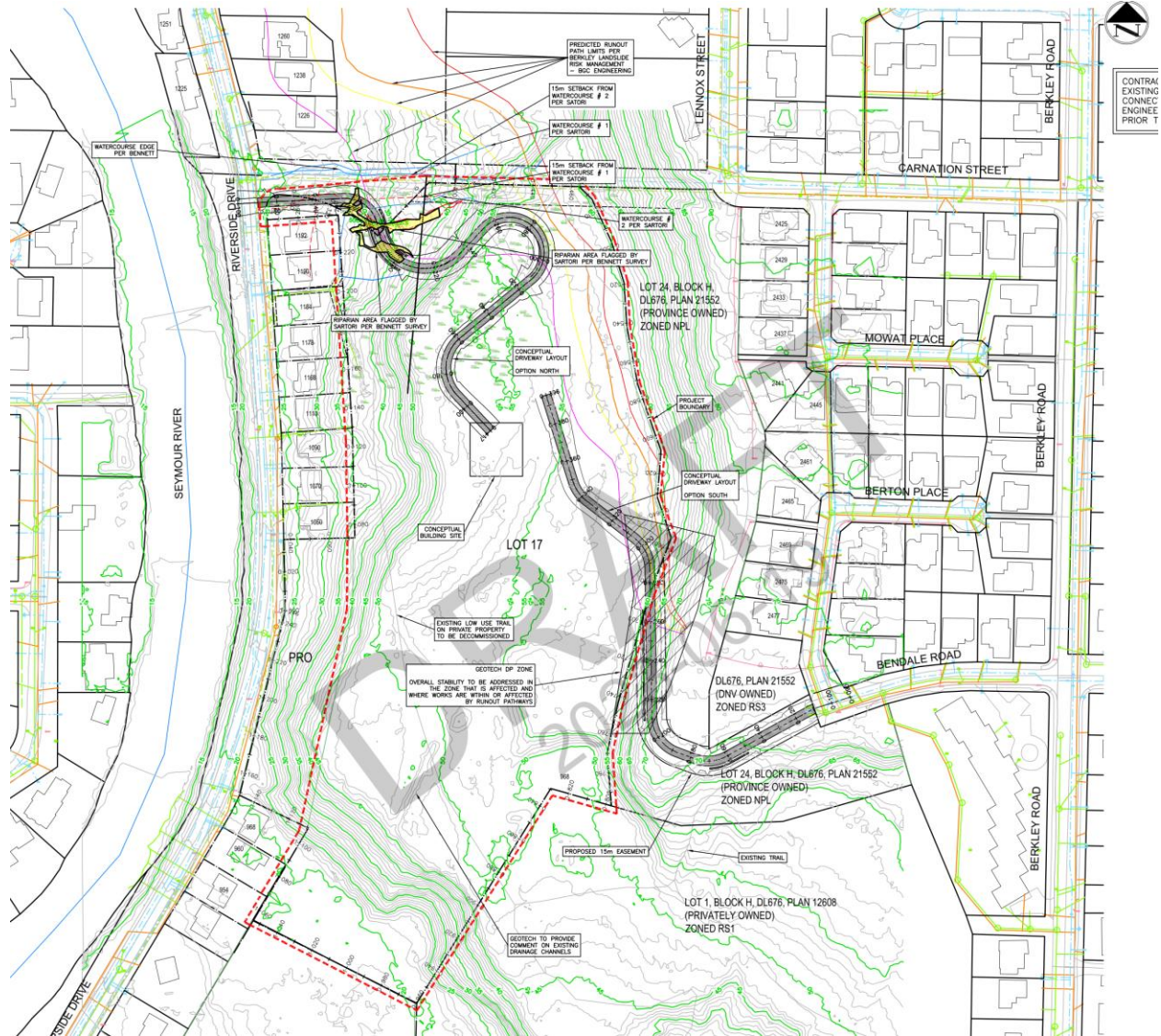


Figure 3: General Site Contours showing North and South Access Options

3. PROPERTY TITLE

The legal description of the property is LOT 17 EXCEPT PART IN PLAN 21459 BLOCK H DISTRICT LOT 676 PLAN 20696. A title search was done in Jan 2011, an updated search will be done. There is a copy of the Title Search included in Appendix 2.

The history of subdivision in the area includes

- Riverside Drive itself is based on the Statutory Right of Way from 1908 for water in the early years of the DNV.
- Carnation Street, the dedicated road, was dedicated prior to lot 17, and prior to VAP8946 in 1954. It has always been shown as “Road” which would be owned by the District. It was not subdivided as park or a District owned lot, it was subdivided as road.
-

- So lot 17 was approved by DNV as a residential lot based on the lot having viable frontage on either Riverside Drive or Carnation Street or originally Berkley and Bendale. The subdivision of lots on Mowat and Berton cut off access to Berkley but not Bendale or Riverside or Carnation. The frontage on Riverside and Carnation is unchanged from when Lot 17 was approved for subdivision by DNV. The frontage on Riverside connects to the main body of the lot via a projection that wraps around the east and north side of lot 16. Lot 16 is built on, with a single family home. The project narrows at the NE corner of lot 16 to approximately 3 metres. A drainage cut off ditch runs along the eastern boundary of lot 16 in that area.

The title has the following registrations and non-legal explanation in blue ‘

1. This Title May Be Affected by A Permit Under Part 29 Of the Municipal Act (See DF R105516):
2. Right of Way (ROW) F13411, 1978, Plan 13764 in favour of DNV This is a SROW for the purposes of storm conveyance behind 1050 to 1168 Riverside drive. This should not significantly affect the property; however, it should be reviewed to determine if there are any obligations for care or maintenance and is not negatively affected by the proposed works.
3. Statutory ROW (SROW) R106028, 1987 BC Hydro Plan 18356 transferred to GB111921: This was originally a BC Hydro ROW but transferred to BC Gas. It runs along the northern boundary of the property where it butts up against the Carnation Street extension and is not negatively affected by the proposed works.
4. SROW R111921, 1987, BC Hydro, BC Gas This was originally a BC Hydro ROW but transferred to BC Gas. It runs along the northern boundary of the property where it butts up against the Carnation Street extension and is not negatively affected by the proposed works.
5. Undersurface Rights CA2485692, (see CA2485692)

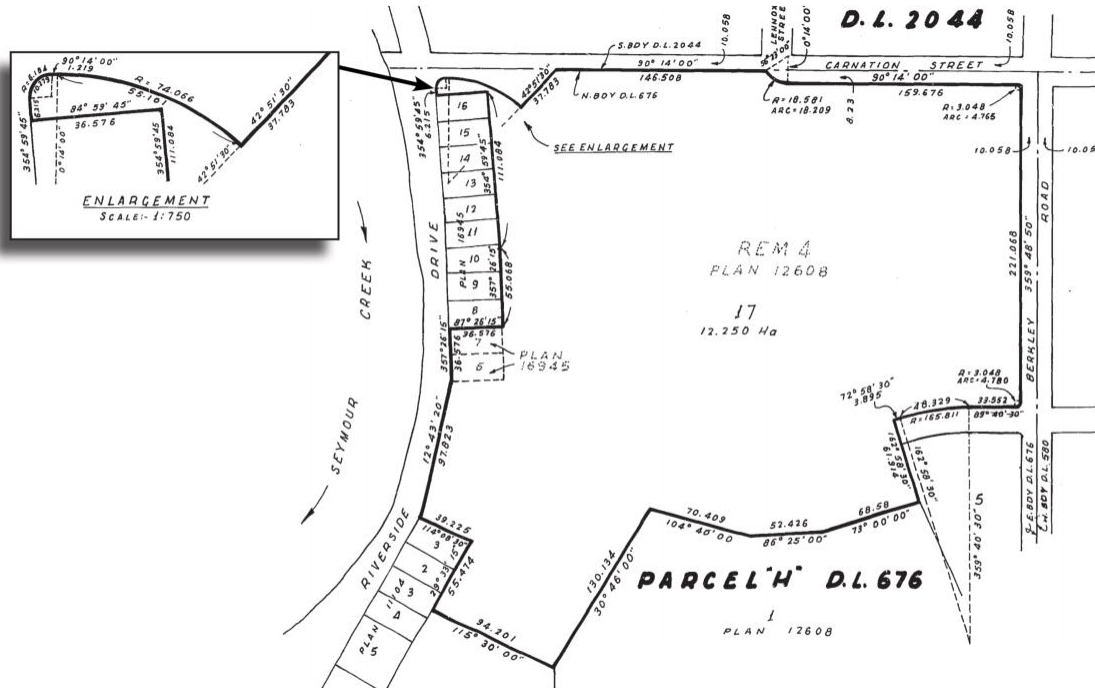


Figure 4: Original Lot Legal Plan

4. LAND USE

The property is Zoned RS1 (Single-Family Residential One Acre Zone) per Zoning bylaw 3210, updated to 2018. However, the portion front Riverside Drive is zoned the frontage on Riverside is zoned PRO, PRO: PARK, RECREATION AND OPEN SPACE ZONE, PR. This is between 968 and 1050 Riverside drive where the lot fronts onto Riverside on a 30-50% slope.

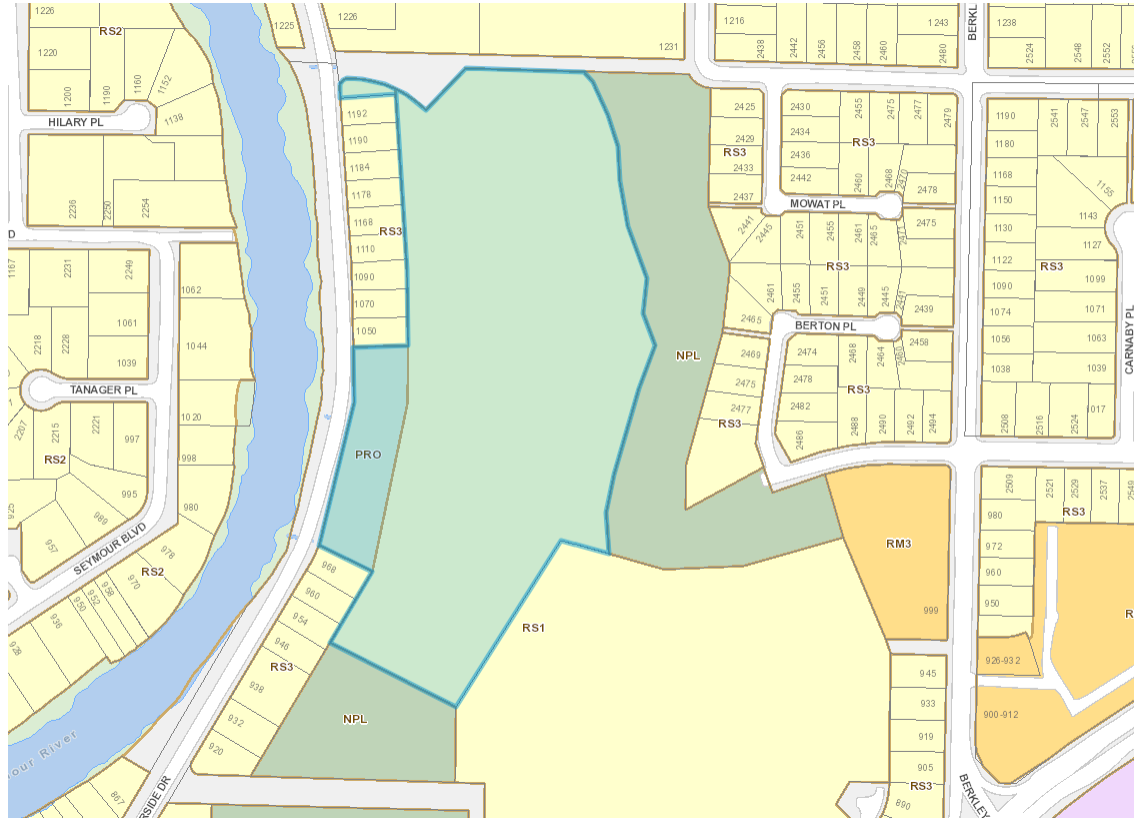


Figure 5: Area Zoning

309A Minimum Lot Size and Dimensions

Within each zone created under Section 301 of this Bylaw the minimum area, width and depth of lots to be created by subdivision shall be respectively as follows, unless otherwise provided in this Bylaw:

Zone	Short Form	Minimum Lot Area (square metres)	Minimum Lot Width (metres)	Minimum Lot Depth (metres)	Minimum Lot Width for corner lots (metres)
Single Family Zones - General (Bylaw 7618)					
Single-Family Residential One Acre Zone	RS1	4000	30	34	30
Single-Family Residential 12000 Zone	RS2	1100	24	34	24
Single Family Residential 7200 Zone	RS3	660	18	34	18
Single Family Residential 6000 Zone	RS4	550	15	34	15
Single Family Residential 4000 Zone	RS5	370	12	34	12
Single Family - Neighbourhood Zoning					
Single Family Residential Canyon Heights Zone	RSCH	660	18	34	21
Single Family Residential Delbrook Zone	RSD	743	21	34	21
Single Family Residential Edgemont West Zone	RSEW	660	18	34	21

No subdivision is contemplated, and as such Park Land Dedication Under s. 9412 of the Local Government Act is not required.

5. ENVIRONMENTAL

The site has been logged, however there are some significant trees on the site. Sartori Environmental has flagged and has surveyed a number of areas of the site, focusing on the North end. There is known drainage and wetland areas in the North. Unfortunately, some disturbance of these areas occurred as a part of geotechnical investigations that were carried out without permits. A number of investigations have been done on the property including.

- Stage 1 Preliminary Site Investigation by Cascade Environmental in February 2012
- Sartori Environmental Restoration Plan May 2022
- Sartori Environmental Setback Mapping March 2022

Environmental issues are discussed directly by Sartori Environmental, however Creus has been working closely with Sartori and Arya in review of options and design to date.

6. GEOTECHNICAL

There are a series of Geotechnical Studies in the area, which we have not fully had time to review.

[Berkley Landslide Risk Management: Phase 1 Risk Assessment](#)

by BGC Engineering (Slope 01-13-2006)

[Berkley Landslide Risk Management: Phase 2 Assessment of Risk Control Options](#)

by BGC Engineering (Slope 05-11-2006)

[Berkley Landslide Risk Management: Updated Landslide Risk Assessment Following Stage 1 Mitigation](#)

by BGC Engineering (Slope 01-16-2007)

[District of North Vancouver Community Wildfire Protection Plan](#)

by BA Blackwell (Wildfire 04-15-2007)

[A Collection of Maps for Berkley Landslide Risk Management](#)

by BGC Engineering (Slope 11-15-2006)

[Flood Assessment Study, North Vancouver: Final Report](#)

by Northwest Hydraulic Consultants (Flood 03-31-2010)

[District of North Vancouver Landslide Risk Summary: Final Report \(including Appendix A\)](#)

by BGC Engineering (Slope 11-12-2010)

[District of North Vancouver Landslide Risk Summary: Appendix H \(of Final Report\)](#)

by BGC Engineering (Slope 11-12-2010)

[When the Ground Shakes: Earthquake risk in the District of North Vancouver and what we can do about it](#)

by Uncover Editorial + Design (Slope 05-04-2015)

[A Profile of Earthquake Risk for the District of North Vancouver](#)

by Natural Resources Canada (Slope 05-04-2015)

[Creek Hydrology, Floodplain Mapping and Bridge Hydraulic Assessment - Final Report](#)

by Kerr Wood Leidal (Flood 10-24-2014)

Specific Reports for Lot 17 were done as follows.

- Phase 1 Geotechnical Study, Riverside Terrace Property, MOE, July 1995
- ARYA Engineering has been reviewing the site and proposed works since March 2022

There are two bands of steep slope that are mapped as DPA Slope Hazard within the site, shaded in light beige. There is a further DPA Creek Hazard that is mapped outside the property and is not expected to affect the site.

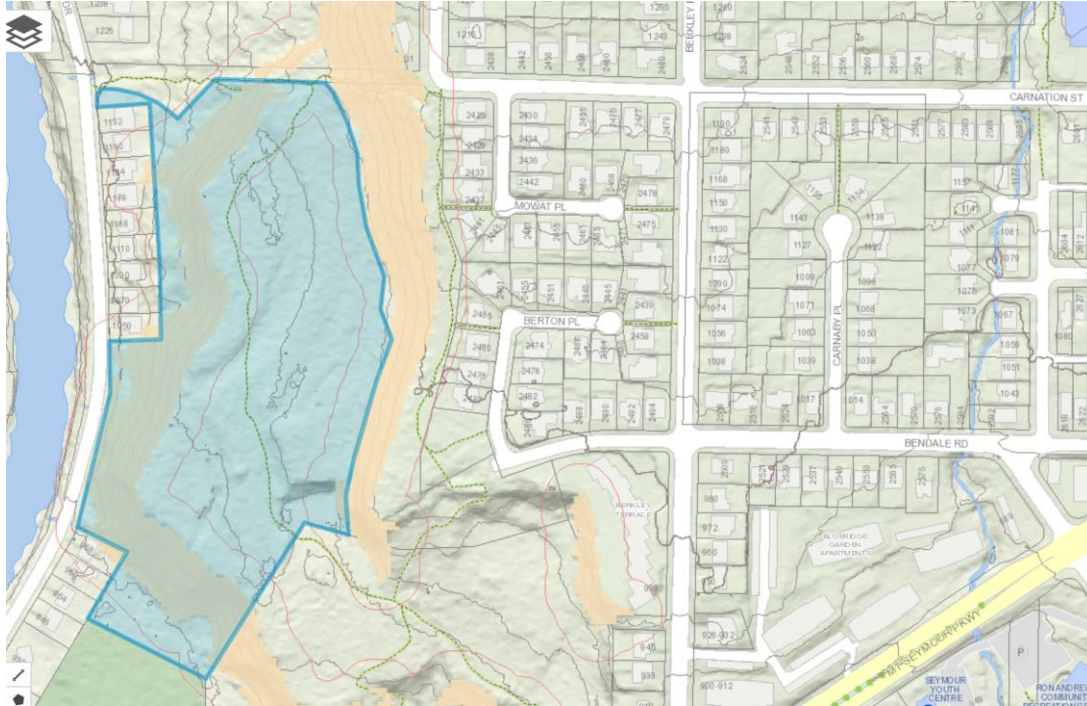


Figure 6: Slope Hazard DPA

As a minimum there will be setbacks from the slide risk above or additional treatments on any works in the area. Arya has been providing feedback on the layouts to date. No buildings are expected to be placed in the run-out zones. Any driveway work in the DPA areas will need to address the global stability for the areas affected by the proposed works.

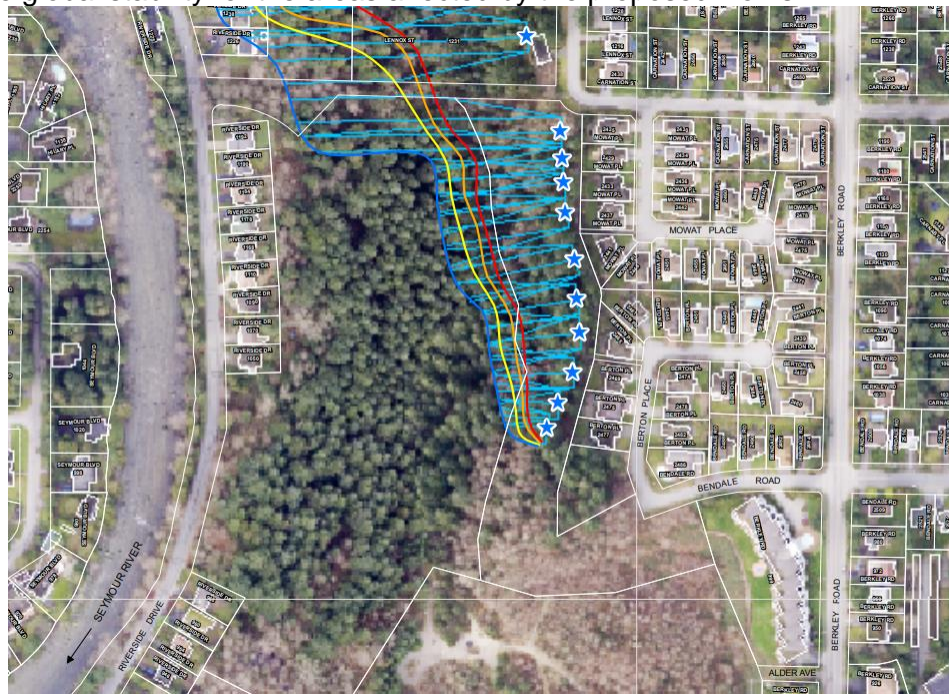


Figure 7: Slide Run out limits.

There will also be setbacks from the toe of all slopes to a safe angle, this should be mapped to determine the safe building envelope that is left.

7. ACCESS

This has been a major issue that has been worked on over the last year. There were a number of options that have been reviewed. We have summarized the key opportunity and construction for each option.

- a. From West Directly off Riverside
 - i. Access is an issue as the building area is roughly 30 m higher than Riverside Drive. There are cliff faces where the property abuts Riverside Drive. There are geotechnical issues with the existing.
 - ii. This is under in a Form and Character, Energy Water, Streamside and Slope Hazard DP area. We have not been able to get a clear answer on whether DNV will entertain work in that area.
 - iii. That portion of the property is zoned PRO Public Recreation. While Parking is listed as an acceptable use, a driveway is not specifically looked at. This option has not been pursued.
- b. From East off Bendale at the southern portion of the property, deemed the Southern Option.
 - i. This route appears to have been an intended as the access routing from the original zoning and subdivision of the lands to the east.
 - ii. The Province owns Lot 24 immediately to the east of lot 17. The District of North Vancouver owns Remainder of DL676 that sits between Lot 24 and Bendale Road. It appears Bendale Road was to be extended towards Lot 17 around the Remainder.
 - iii. In February 2010, the province followed up on correspondence and meetings with DNV in a letter from the Province's Director from Ministry of Agriculture and lands, Crown Land Opportunities Branch to the DNV's Manager, Real Estate and Properties. The correspondence may have been triggered by an application by Heritage Vale Properties, but which references commitments for access that predate that application.
 - iv. The province and the district appear to agree that DNV does not need to take over Lot 24 in its entirety.
 - v. The letter commits to granting an easement over a portion of Lot 24 for the benefit of Lot 17. Specifically, it states "In order to maintain Bendale Road as the future access to remainder of Lot 17, the Province will grant and register an access easement agreement. That is, the owner of Lot 17 will obtain from the owner of Lot 24 an easement on, over and under Lot 24 comprising the Easement Area for the purposes of access to, and egress from the Lot 24 and for constructing a roadway thereon and for installation and operation of utility works. A copy of this easement is enclosed for your information."
 - vi. The easement would be released if DNV replaces it with a dedicated road. The client would be satisfied with a dedicated road or easement. The works would not affect the Remainder Lands owned by the DNV.

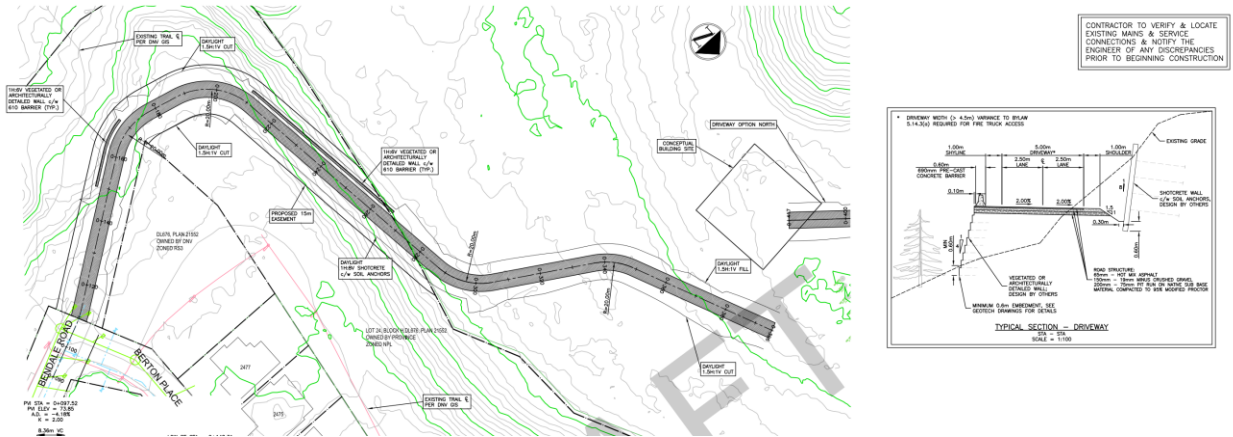


Figure 8: South Access Preliminary Plan

- c. From North off of the lot 17 panhandle and a portion of the unopened Carnation Street Right of way
 - i. There is a small portion of Lot 17 land that fronts riverside drive adjacent to the Carnation Road Dedication.
 - ii. There is approximately x m² of footprint within the Unopened Carnation Street ROW that would be permanently impacted by the driveway. There is an opportunity to offset that with areas of land being transferred to DNV where existing trails trespass on Lot 17.
 - iii. This area has two drainages that may impact access. While one crossing could be done with limited to no ground impact, the second crossing will likely trigger an application under the WSA.
 - iv. Creus has looked at a number of route options. There is an opportunity to achieve net benefit with the works, however approval would likely be required.

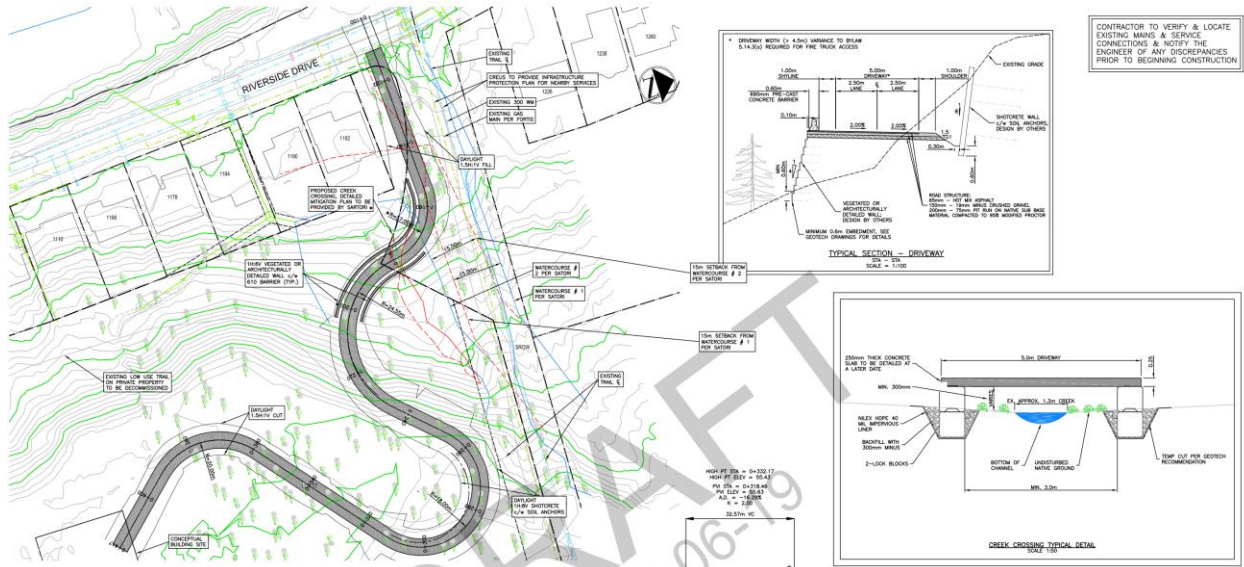


Figure 9: North Access Preliminary Plan

Driveway Access Permits will be required for the proposed driveways. The driveways have been designed to accommodate emergency service vehicles along with turnaround per DNV requirements.

The owner of the land is looking for direction from the District on the option that DNV would support that will provide viable access in a time frame and approval basis that is reasonable and secure.

8. INFRASTRUCTURE

8.1. WATER

Riverside drive has 2- Metro Vancouver Trunk mains but also a 600 mm DNV Steel Watermain Creus has confirmed there is static pressure of 120-124psi has been recorded recently (Fall 2021) during fire flow tests at the hydrants adjacent the property to the west, depending on exact where the tests were taken, this puts Lot 17 at 80 psi, which should meet the needs of the single-family use.

There is a 200 mm water line in Bendale road that stubs onto lot 24 as part of the originally intended road extension. In the southern option, this would be extended as a private main to a hydrant to serve lot 17.

The main would be sized to accommodate Fire and Domestic flows per DNV requirements which can be done with standard engineering and construction techniques. The main would be metered and anchored to DNV standards.

8.2. SANITARY

There is 250 mm Sanitary in Riverside Drive that should be accessible from Lot 17 within the Northern Approach Driveway. This would be a relatively standard design and construction solution.

There is a 200 mm Sanitary Main in Bendale Road which could be a pumped solution in the southern option. That option could also have a direction drill connection to Riverside Drive.

8.3. STORM

There are two braided drainages/creeks to the north. There are cut off ditches cut in the plateau to which we do not know the reason for There is drainage along the back of the lots that front Riverside for which there is a DNV SROW. The site is serviced by the existing 300, 250, 375 and a 150 mm service. The Storm system discharges regularly to Seymour River to the west of the road.

The site will have limited hardscape as a percentage of area. There are a number of stormwater features, tanks, ponds, infiltration routings, bioswales that could be located on specific elements of the site as reviewed and approved by the Geotechnical Engineer.

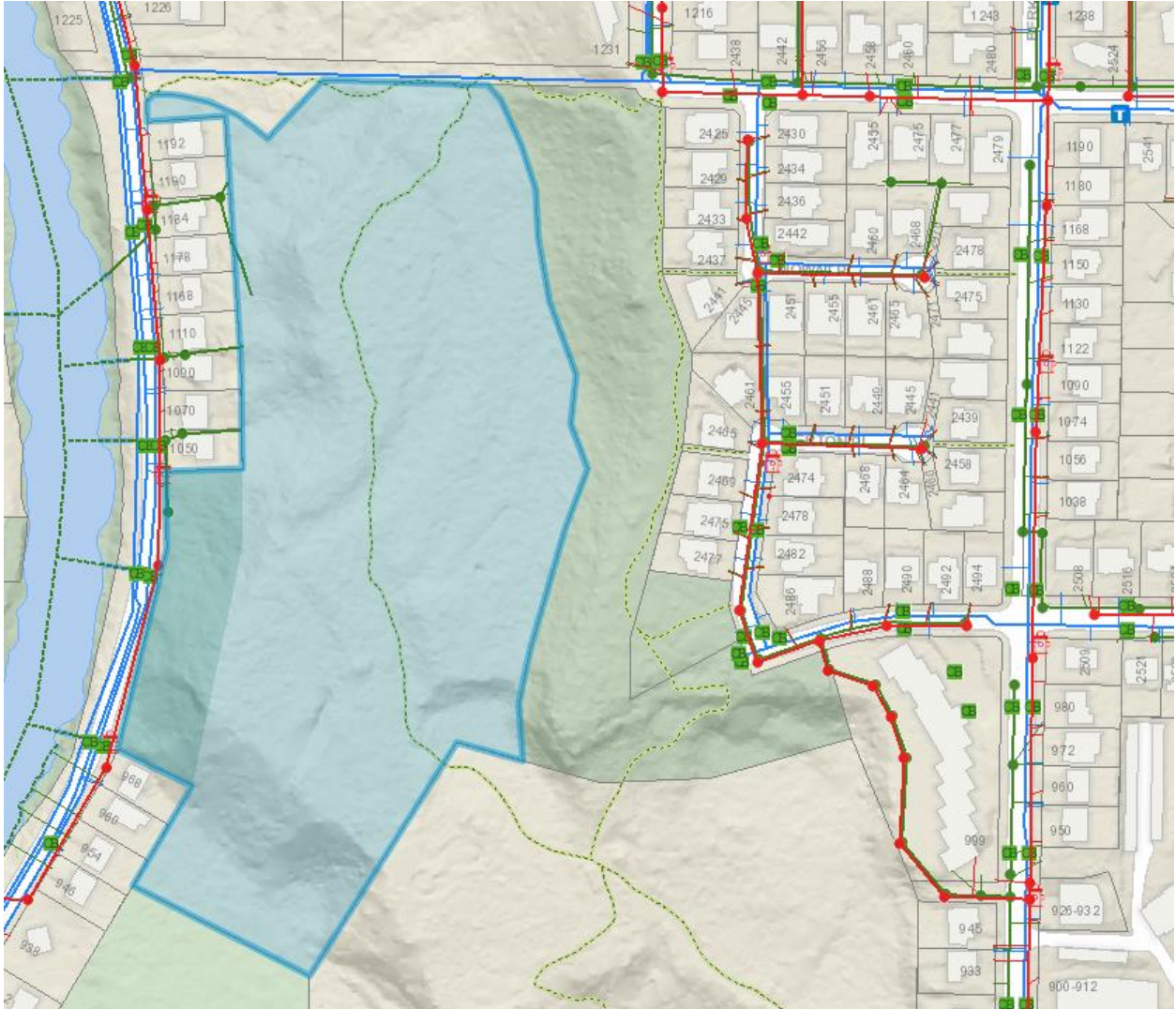


Figure 10: Local Infrastructure

8.4. OTHER UTILITIES

BC Hydro and Telus are run on aerial lines on poles on west side of Riverside Drive. In the northern access approach, the property would likely be served by an underground feed which would run up the driveway.

In the southern approach, Bendale and Berton have underground hydro and Telus systems that would be extended to the site within the driveway off the existing stubs on Bendale Road.

9. CONCLUSION

The property does not require a rezoning, OCP amendment or subdivision. The access can be achieved off of existing DNV ROW from Riverside and Carnation or from the south via the extension of access off of Bendale via an Easement as documented by the province. Servicing Infrastructure can be extended to the site using standard design and construction techniques either through the north or south access.

There are geotechnical issues to be addressed on site, however they appear to be reasonably addressed using standard design and construction techniques. While this solution will be costly, they will actually extend protection to those properties immediately above or below them.



Figure 11: Natural Environment DPA



Figure 12: DPA Energy/Water/GHG



Figure 13 Wildfire DPA

There is streamside protection DPA where its front Riverside. This is not expected to materially affect the use of the lands. Sartori has reviewed the drainage to the northern portion of the lot. The site is within a Natural Environment DPA which will be incorporated into the detailed layout. The area is also within the Wildfire Interface zone and the property would be developed under the DNV and Fire Smart guidance documents. There are opportunities for compensation works to have a net positive impact on the lands.

Respectfully yours,

CREUS Engineering Ltd

Kevin Healy, P.Eng.

APPENDICES

Appendix 1	PROPERTY REPORT
Appendix 2	TITLE SEARCH
Appendix 3	Existing Geotechnical Information
Appendix 4	RS1 Zoning
Appendix 5	PRO
Appendix 6	Creus Drawing Submission
Appendix 7	Photo Summary