STAFF REPORT TO COMMITTEE

MEETING TYPE & DATE	Electoral Area Services Committee of October 15, 2025
FROM:	LAND USE SERVICES - Development Services
SUBJECT:	Application No. RZ25E01 (5611 Culverton Road/PID: 003-851-168)
FILE:	RZ25E01

REPORT SUMMARY

The purpose of this report is to present an application to redesignate and rezone the subject property at 5611 Culverton Road (PID: 003-851-168), to permit a seventeen (17) lot bare land strata subdivision serviced by a private water system, and to realign the park-zoned area.

In accordance with the CVRD Development Application Referrals Policy, this is a "preliminary report" intended to introduce the application to the EASC.

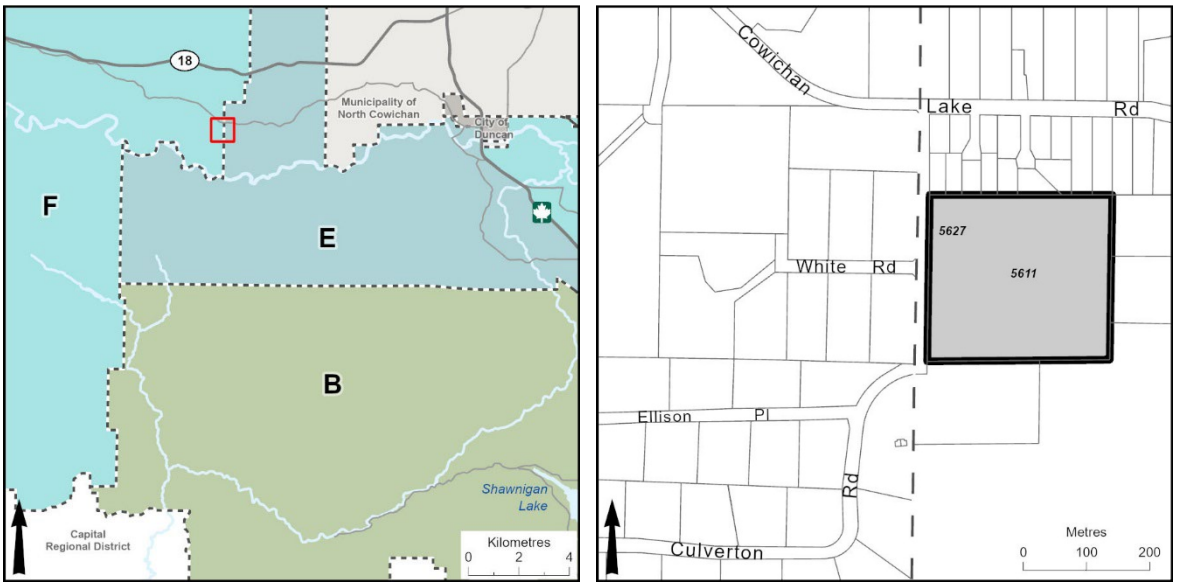
RECOMMENDED RESOLUTION

That it be recommended to the Board:

That Application No. RZ25E01 (5611 Culverton Road, PID: 003-851-168), be referred to the following external agencies and First Nations:

1. Electoral Area E – Cowichan Station/Sahtlam/Glenora Advisory Planning Commission;
2. Electoral Area E – Cowichan Station/Sahtlam/Glenora Parks Advisory Commission;
3. Agricultural Land Commission;
4. BC Transit;
5. Cowichan Valley School District (SD 79);
6. Nanaimo Ladysmith School District (SD 68);
7. Island Health;
8. Ministry of Environment and Parks;
9. Ministry of Housing and Municipal Affairs;
10. Ministry of Transportation and Transit;
11. Ministry of Water, Land and Resource Stewardship;
    a. Aquatic Ecosystems Branch; and
    b. Water Authorizations Branch;
12. Royal Canadian Mounted Police;
13. Cowichan Tribes;
14. Halalt First Nation;
15. Lyackson First Nation;
16. Penelakut Tribe;
17. Stz'uminus First Nation; and
18. Ts'uubaa-asatx First Nation.

LOCATION MAP



BACKGROUND

The subject property is a 7.5-hectare (ha) parcel located on Culverton Road in Electoral Area E. Culverton Road follows the boundary between Electoral Area E (east side) and F (west side). Surrounding properties are residential properties to the north, east and west, and agricultural properties to the south. The property boundary to the south is shared with two parcels in the Agricultural Land Reserve (ALR).

The property was historically used for a sawmill operation but is currently vacant and undeveloped. The majority of the parcel has been cleared, with a perimeter of remaining trees. The site is subject to a remediation order issued by the Ministry of Environment. Staff have received a copy of the Certificate of Compliance issued under section 53 of the *Environmental Management Act*, confirming that remediation meets applicable Contaminated Sites Regulation standards and criteria.

As part of a previous rezoning application approved by the CVRD Board, the subject property was rezoned from industrial to the current split-zoning R-6 Bare Land Strata Residential and P-1 Parks and Institutional. This removed the industrial use of the site, which was considered incompatible with the surrounding neighbourhood. The rezoning was supported on the basis that a manufactured home park would offer an affordable and alternative housing option compared to larger single dwelling acreages typical of the area. At that time, community concerns were raised regarding groundwater impacts and the protection of adjacent wells. In response, the R-6 zone regulations were specifically crafted to address these concerns by emphasizing water conservation measures and requiring landscaping.

At present, it appears unlikely that the property can be developed in accordance with the requirements of the R-6 zone, particularly with respect to servicing requirements. As a result, the applicant is proposing a private water system and individual onsite sewerage systems. The private water system would require a provincial water licence.

Watercourses, including streams and wetlands, are located along the north and northwest boundaries and south and southeast boundaries. The property is currently the subject of a Development Permit application related to unpermitted development activities (land alteration)

and proposed restoration of riparian areas. A separate Development Permit will be required for any future subdivision of the parcel.

POLICY AND REGULATORY CONSIDERATIONS

Official Community Plan for the Electoral Areas Bylaw No. 4270 (OCP):

The subject property is designated Residential regionally and Manufactured Home Park locally and is not within a Growth Containment Boundary (GCB). The Manufactured Home Park designation applies to manufactured home parks (MHP), recognizing that this form of housing is an important component of the CVRD's affordable housing stock.

An amendment to the OCP is required to redesignate the subject property. The Rural Residential designation is considered the most appropriate land use designation for the proposed development. This designation is intended to support a rural lifestyle and serve as a buffer between rural resource uses (i.e. forestry and agriculture) and more urbanized residential areas. Properties within this designation are generally characterized by single detached dwellings, forested areas and small-scale agricultural uses. Community water and sewer services are not planned for areas designated Rural Residential.

Relevant OCP policies are listed in the Background Table (Attachment A).

The subject property is within the following Development Permit Areas (DPA): DPA 1 – Riparian Areas Protection; DPA 4 – Aquifer Protection; DPA 8 – Protection of Farming; and DPA 9 – Intensive Residential.

The OCP amendment would include removal of the property from DPA 9, as this DPA is applicable to lands in the R-6 zone on Culverton Road and the proposed rezoning would remove this parcel from the R-6 zone, thus making DPA 9 no longer applicable.

Proposed Official Community Plan Bylaw No. 4373:

The subject property is currently designated Medium Lot Suburban in Schedule L of Proposed Bylaw No. 4373. Properties to the north, east and west are designated Small Lot Rural and properties to the south are designated Agriculture. The property is not included in the GCB in Schedule G of Proposed Bylaw No. 4373.

The Medium Lot Suburban designation enables detached dwellings with suburban character and provides opportunities for clustering units into pocket neighbourhoods. The bylaw states, "*Mobile home parks are generally designated Medium Lot Suburban for density purposes but are not intended for typical suburban detached housing.*" Properties in this designation typically have access to community water or sewer systems. The maximum density in the Medium Lot Suburban designation is 15 units per hectare (UPH), plus permitted suites. The proposed UPH for this application is approximately 2.25 UPH.

Alternatively, the Country Suburban designation supports detached dwellings that reflect a "country character", where dwellings are oriented to front onto a street. It also accommodates properties that may not be connected to community or water systems, with a maximum density of 2.5 UPH.

Electoral Area E (Cowichan Station/Sahtlam/Glenora) Zoning Bylaw No. 1840:

The subject property is currently split-zoned R-6 Bare Land Strata Residential and P-1 Parks and Institutional.

The R-6 zone permits modular homes or single detached dwellings, with a gross floor area of 120 m^2 and height limit of 6 m. The R-6 zone includes density bonus provisions that allow for subdivision of up to 50 parcels, subject to specific amenity and servicing requirements. These include connection of all residential parcels to a community sewer and water system owned and operated by the CVRD, designed to CVRD specifications. Additional requirements include a recycled water treatment and distribution system for irrigation and toilets; individual water metering; and registration of a covenant requiring low-flow fixtures and appliances and drought-tolerant landscaping.

The P-1 zone permits institutional uses, which include assembly, civic use, public park, religious facility, schools, and one single detached dwelling accessory to the permitted institutional uses.

COMMISSION / AGENCY / DEPARTMENTAL CONSIDERATIONS

CVRD division referral comments are summarized as follows:

- **Fire Rescue Division** – Recommends installation of a minimum 10,000 gallon fire service water supply tank with 24-hour access for fire department; roads, cul-de-sacs and driveways to be constructed to withstand fire apparatus up to 36,287 kg; road width minimum of 8 m and cul-de-sacs should have a minimum turning radius of 14 m.
- **Parks & Trails Division** – The site is constrained due to the presence of riparian areas and does not appear to provide sufficient width or buffer to accommodate a trail consistent with CVRD Parks standards; additional space may be required. The subject area is heavily impacted by invasive plant species, and considerable remediation and restoration work will be required to bring the proposed park area to a usable and ecologically functional state; this should be completed prior to CVRD Parks & Trails acceptance. Recommend referral to the Electoral Area E Community Parks Advisory Commission (PAC). Separate from the rezoning application, the proposed density triggers park dedication (or cash-in-lieu) under section 510(3) of the *Local Government Act* (LGA) at the time of subdivision.

Complete CVRD division referral comments are provided in Attachment E.

Recommended external referrals are listed in the staff recommendation on Page 1 of this report.

PLANNING ANALYSIS

While current OCP policies do not support subdivision in rural areas located outside of growth containment boundaries and where community servicing is unavailable, the subject property is currently designated and zoned for a manufactured home park of up to 50 dwellings, subject to the R-6 zone's density bonusing provisions. These include servicing requirements – such as connection to a CVRD-owned and operated community water and sewer system – that cannot be met on this site. Additionally, the presence of watercourses and associated riparian areas further limit the developable area. In response, the applicant proposes to reduce the permitted density by creating larger parcels (minimum 0.2 ha) and servicing them with a private water system and individual onsite sewerage systems.

Under the Proposed OCP Bylaw No. 4373, the subject property will be in the Medium Lot Suburban designation, which supports the current zoning permitting a higher density in the form of a mobile home park. The proposed development density of 2.25 UPH is well below the maximum density of 15 UPH for this designation. Staff consider the Country Suburban designation to be a more appropriate designation for the current proposal – as this designation

enables detached dwellings with “country character”, where dwellings do not always have access to community or water systems, with a maximum density of 2.5 UPH.

Servicing:

There are no community water, sewer or drainage systems within the vicinity of the subject property. Proposed servicing includes a private water system and individual onsite sewerage systems.

A well was drilled in 2022, located in the northwest corner of the site; the well is within the area currently zoned P-1. An application for a water licence has been submitted to the Province and is pending review.

Under the *Water Sustainability Act* (WSA), water supply systems providing domestic water to five (5) or more dwellings are considered a utility under the *Water Utilities Act* (WUA). The applicant is required to ensure eligibility to hold a water licence under the *WUA* and *WSA*. Requirements for operating a water supply system are also regulated under the *Drinking Water Protection Act*. Groundwater supplied and/or stored for fire service should be included in the water licence.

The proposed larger parcel sizes will better accommodate onsite sewerage, which are subject to Island Health Subdivision Standards. The Technical Memo (Onsite Septic Suitability Letter), by McElhanney, dated April 3, 2025 (Attachment H) considers the site to be suitable for onsite septic system installation, with final details to be determined on a site-specific basis.

The Technical Memo (Stormwater Management Strategy), by McElhanney Ltd., dated April 3, 2025 (Attachment I), recommends individual rock pits directed to centralized flow control structures with overflow directed to adjacent watercourses. The objective of the stormwater management strategy is to ensure proper drainage, prevent increased downstream flooding and erosion, maintain or reduce post-development flows to pre-development levels, and improve water quality and minimize runoff. It is noted, unless already connected, drainage directed to a watercourse may require provincial approval under the *Riparian Areas Protection Regulation* (*RAPR*) and *WSA*.

The Aquifer Impact Assessment (AIA), McElhanney Ltd., dated May 20, 2025 (Attachment F), considers potential impacts to the groundwater resource to be low. The AIA indicates that the stormwater management strategy promotes groundwater recharge through low-impact development practices – including on-site retention, infiltration and controlled discharge. The AIA consider risk to primarily be with future property owners and use or handling of chemicals.

Park Reconfiguration:

As part of the rezoning application, the applicant is proposing to reconfigure the park area to the southern and southeastern portion of the property, with a trail system around the wetland and benches. The designated park area would increase from 0.94 ha to 1.9 ha, encompassing the wetland and stream features located on the southern portion of the parcel, all of which are subject to the *RAPR*.

OCP policies base park acquisition on Community Parks and Trails Master Plans, considering recreation needs, environmental sensitivity, land suitability, trail connectivity and physical characteristics, and priorities for park acquisition include nature/interpretive parks, green space and habitat conservation.

CVRD Parks & Trails staff have provided comments in relation to the proposed park reconfiguration (Attachment E). Specifically, Parks staff note that remediation and restoration of

the riparian area, including removal of invasive species and restoration plantings, will need to be completed prior to acceptance. The Electoral Area E PAC has been included as a referral agency in the staff recommendation.

Remediation and restoration of the disturbed areas are to be included as part of the active Development Permit application DP22E10, which is a separate process from the rezoning application.

Recommendation:

While the subject property lies outside of the GCB identified in the current OCP and proposed OCP (Bylaw No. 4373), it is zoned and designated to allow up to 50 residential dwellings through density bonusing provisions. However, due to limitations in meeting servicing requirements under the current zoning and the presence of multiple watercourses that constrain the developable area, the applicant is proposing a reduced density of approximately 17 parcels. The proposal for a private water system would require approval by the Province for a groundwater licence under the *WSA* and *WUA*.

The proposed reduction in density aligns better with the surrounding rural context and reflects the OCP's direction for lower-density development outside the GCB. In addition, the applicant is proposing to realign and expand the total park area, which may enhance habitat protection and support the retention of natural areas, while providing a green space for the public.

Staff are recommending the application proceed to external referrals prior to further consideration.

OPTIONS

Option 1: (Recommended, refer to external agencies and First Nations)

That it be recommended to the Board:

That Application No. RZ25E01 (5611 Culverton Road, PID: 003-851-168), be referred to the following external agencies and First Nations:

1. Electoral Area E – Cowichan Station/Sahtlam/Glenora Advisory Planning Commission;
2. Electoral Area E – Cowichan Station/Sahtlam/Glenora Parks Advisory Commission;
3. Agricultural Land Commission;
4. BC Transit;
5. Cowichan Valley School District (SD 79);
6. Nanaimo Ladysmith School District (SD 68);
7. Island Health;
8. Ministry of Environment and Parks;
9. Ministry of Housing and Municipal Affairs;
10. Ministry of Transportation and Transit;
11. Ministry of Water, Land and Resource Stewardship;
    a. Aquatic Ecosystems Branch; and
    b. Water Authorizations Branch;
12. Royal Canadian Mounted Police;
13. Cowichan Tribes;
14. Halalt First Nation;
15. Lyackson First Nation;

16. Penelakut Tribe;
17. Stz'uminus First Nation; and
18. Ts'uubaa-asatx First Nation.

Option 2: (refer application back to staff for more information, prior to further consideration)

That it be recommended to the Board that Application No. RZ25E01 (5611 Culverton Road, PID: 003-851-168), be referred back to staff for further information, including: *[requested information to be identified by the Board]*, prior to further consideration.

Option 3: (deny the application)

That it be recommended to the Board that Application No. RZ25E01 (5611 Culverton Road, PID: 003-851-168), be denied (for reasons to be provided…).

Submitted by: J. Dubyna, Planner III
Concurrence: M. Pressman, RPP, MCIP, MPlan, Manager, Development Services Division
Concurrence: A. Kjerulf, MCP, RPP, MCIP, General Manager, Land Use Services

Reviewed for form and content and approved for submission to the Committee:

Resolution:	Financial Considerations:
☒ Corporate Officer	☒ Chief Financial Officer

ATTACHMENTS:
Attachment A – Background Table & OCP Policies
Attachment B – Context Maps & Site Photos
Attachment C – Applicant Rationale
Attachment D – Proposed Plans
Attachment E – CVRD Division Referral Responses
Attachment F – Aquifer Impact Assessment, McElhanney Ltd., May 20, 2025
Attachment G – Geotechnical Assessment, Ryzuk Geotechnical, May 5, 2025
Attachment H – Technical Memo (Septic), McElhanney Ltd., April 3, 2025
Attachment I – Technical Memo (Stormwater), McElhanney Ltd., April 3, 2025

BACKGROUND TABLE

File: RZ25E01

Applicant:	Deane Strongitharm, Strongitharm Consulting Ltd. (agent)
Registered Property Owner:	Whynott Holdings Ltd., Inc.No. A0075973
Civic Address:	5611 Culverton Road
PID & Legal Description:	003-851-168 LOT 1, SECTION 8, RANGE 6, SAHTLAM DISTRICT, PLAN 12309, EXCEPT THOSE PARTS IN PLANS 22890, 23708, 25003 AND 29157
CVRD Covenants on Title:	None
Size of Existing Parcel(s):	7.5 ha
Existing Use of Parcel(s):	Undeveloped
Natural Hazards:	None mapped
Archaeological Site:	Unknown
Environmentally Sensitive Areas:	None mapped
Watershed:	Cowichan River, Currie Creek, Inwood Creek
Species at Risk:	None mapped
Agricultural Land Reserve (ALR):	Not within, adjacent to ALR properties to south
Land Use Designation:	Residential – Manufactured Home Park
Containment Boundary:	Not within
Development Permit Areas (DPA's):	DPA 1 Riparian Areas Protection DPA 4 Aquifer Protection DPA 8 Protection of Farming DPA 9 Intensive Residential Development
Zoning:	R-6 Bare Land Strata Residential P-1 Parks and Institutional
Fire Service:	Sahtlam Fire Protection Service Area
Existing Water Service:	None
Existing Sewerage Service:	None
Existing Drainage Service:	None
Proposed Designation	**Rural Residential**
Proposed Zoning	**Site-specific**
Proposed Water Service	**Shared (private) water system (well)**
Proposed Sewer Service	**Individual Onsite Septic Systems**
Proposed Drainage Service	**Onsite**
Relevant OCP Bylaw No. 4270 policies:	

- **3.2.1.2.5** Supports compact development near transit and within serviced areas that have capacity for growth.
- **3.2.1.4.2** Supports housing that is consistent with the surrounding context, including character of existing neighbourhoods and rural areas.
- **3.2.1.4.5** Does not support subdivision within rural areas or on parcels within the ALR.
- **3.2.2.2.2** Supports identification, protection and restoration of priority ecological areas and wildlife corridors to increase resilience of the natural environment.
- **3.2.2.2.4** Discourages development immediately adjacent to a mudflat, marsh or delta area, wetlands, floodplains, important bird breeding areas and at-risk Garry Oak complexes.
- **3.2.2.4.1** Recognizes aquatic habitats and resources as environmentally sensitive sites to be protected and restored.
- **3.2.2.4.3** Supports rainwater quality control for development sites near freshwater and marine environments.
- **3.2.2.4.4** Supports consideration of impacts to ground and surface water resources during development application reviews. Applications that pose negative impacts will not be supported unless those impacts are mitigated on the subject parcel or an adjacent parcel containing similar habitat such that the end result represents an overall improvement to the function of the ecosystem being impacted.
- **4.1.2.1** Any development should minimize the impact on the natural environment and existing neighbourhoods. Any development should be designed to prevent pollutants from entering into any water system, including surface-water runoff channels, aquifers, groundwater areas, recharge areas and the ocean.
- **4.1.2.2** Water purveyors should ensure water quantity and quality are adequate for future growth of the area including community water connections and consistency with zoning build-out.
- **4.1.2.4** Development should limit the removal of, or damage to, any of the existing natural vegetation cover.
- **4.1.2.6** No development or site alteration should be permitted on a wetland, in a riparian area or within the buffer zone specified in this bylaw for wetlands and riparian areas.
- **4.7.2.1** Prioritizes the acquisition of park land for
    a. waterfront parks to provide public access to rivers, lakes and the ocean;
    b. playgrounds;
    c. community parks;
    d. sports fields;
    e. nature/interpretive parks;
    f. green space and protection of ecologically sensitive areas; and
    g. any combination of the above.
- **4.7.2.3** Will acquire parkland as guided by Community Parks and Trails Master Plans to support both active outdoor recreation and habitat conservation through consideration of the following factors:
    a. the present and future park needs of the neighbourhood;
    b. the environmental sensitivity of the land;
    c. the capability of the land for park and open space use;
    d. the need for trails (pedestrian, equestrian and cycling connections);
    e. the size, topography and configuration of the land; and
    f. any other matter deemed important by the Regional District.

- **4.10.2.1** Encourages innovative housing and subdivision designs such as clustered residential developments, particularly for sloped upland areas; the Regional District will provide flexibility in regulatory bylaws.
- **4.12.1.2** Does not envision significant change to existing land use or further subdivision that increases density, impact or intensity of use of land until sufficient comprehensive planning has been approved, except in those areas where public infrastructure is required to address environmental issues.

Relevant LAP policies:

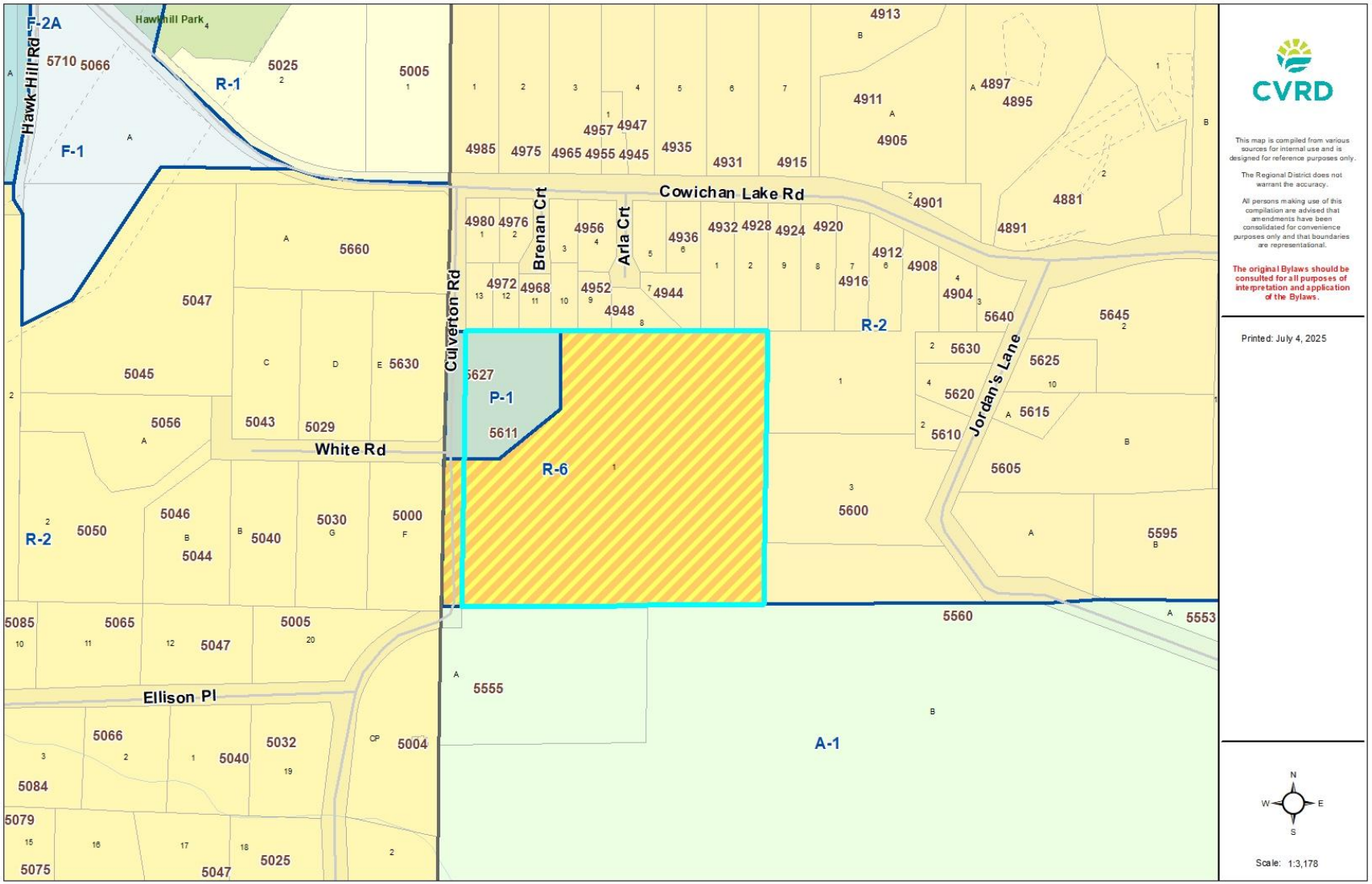
- **1.5.2.3** Supports environmental design for safety and access in development.
- **2.6.2.2** Acquires parkland through subdivision in the following circumstances:

  a. When parcels designated as Village Residential, Rural Residential, River Corridor or Manufactured Home Park are considered for subdivision into three or more additional lots, will determine whether the owner of land being subdivided shall

  i. provide, without compensation, community parkland equivalent to 5% of the parcel size and in a location acceptable to the CVRD to be designated as Park on the plan of subdivision; or

  ii. pay to the CVRD an amount that equals the market value of the land that may be required for park purposes, not to exceed 5% of the land being proposed for subdivision
- **2.9.2.1** Does not support extending community water and sewer services into Rural Residential areas.
- **2.9.2.3** Encourages small footprints and clustering of buildings.

Zoning


F-2A
Hawk Hill Rd
Hawkhill Park
5710
5066
5025
5005
R-1
F-1
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4955
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Cowichan Lake Rd
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Brenan Crt
4956
Arla Crt
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Culverton Rd
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Jordan's Lane
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White Rd
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Ellison Pl
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A-1
CVRD
This map is compiled from various sources for internal use and is designed for reference purposes only.
The Regional District does not warrant the accuracy.
All persons making use of this compilation are advised that amendments have been consolidated for convenience purposes only and that boundaries are representational.
The original Bylaws should be consulted for all purposes of interpretation and application of the Bylaws.
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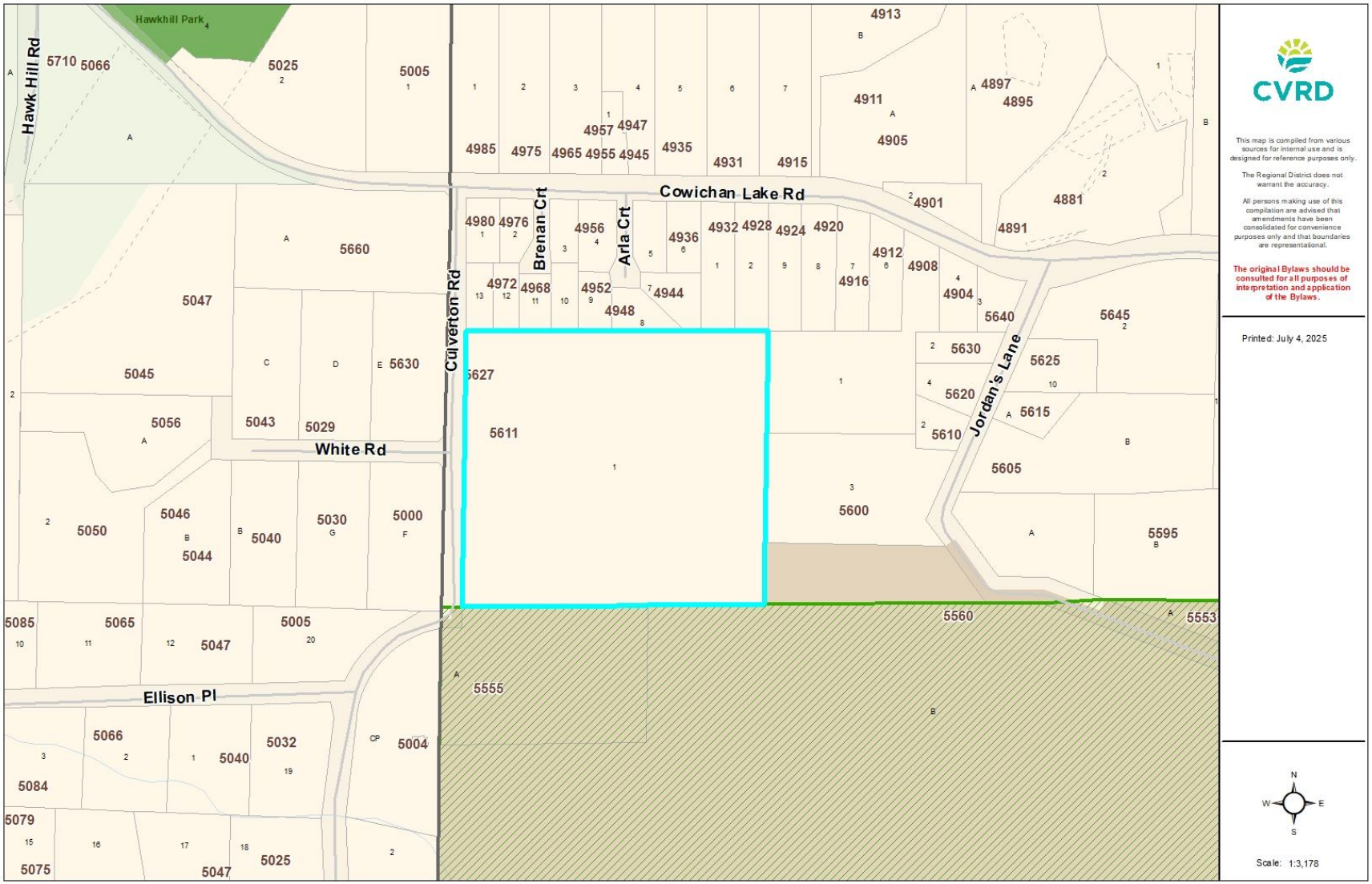
OCP Designation (Bylaw No. 4270)



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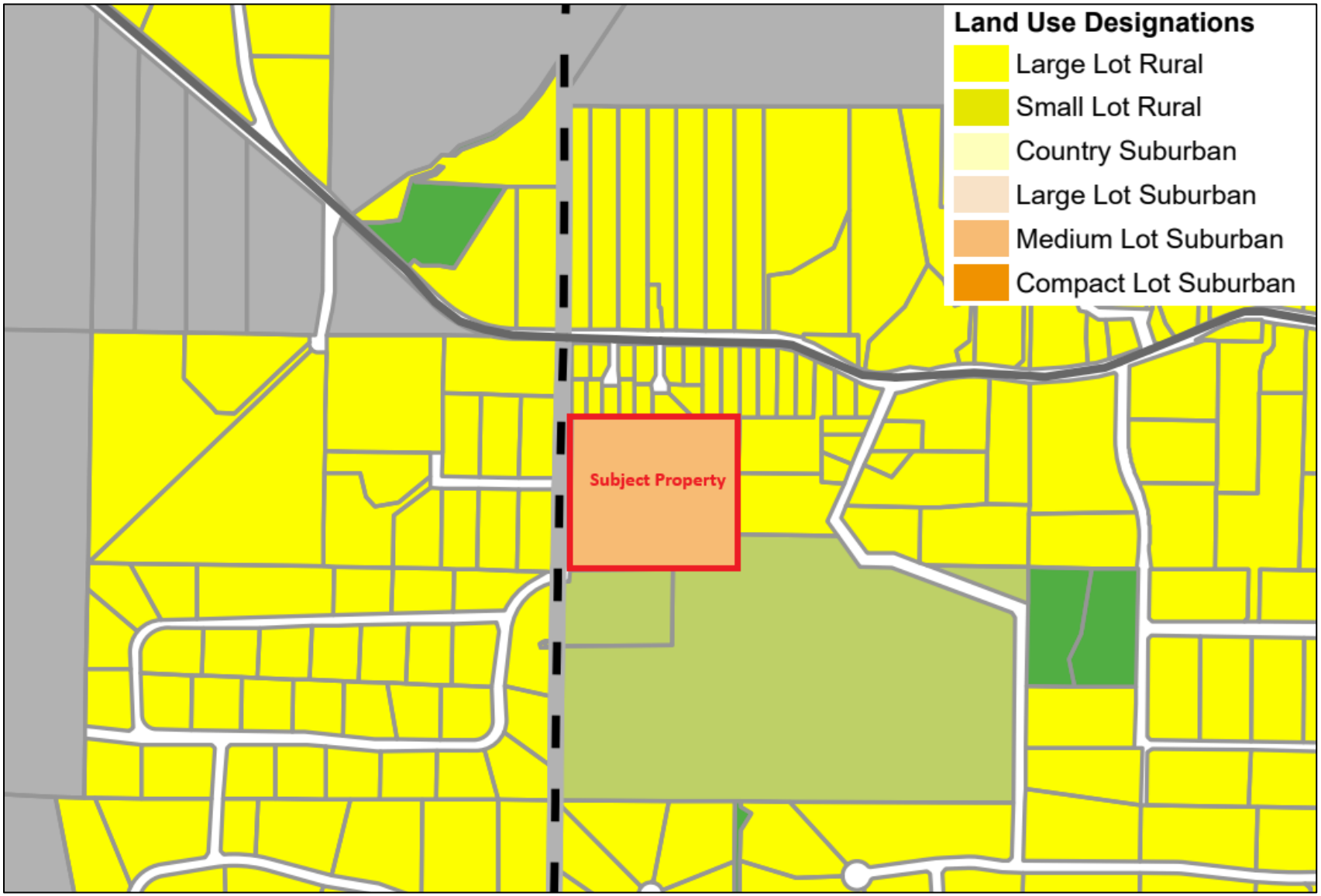
Proposed OCP Designation (Proposed Bylaw No. 4373)



Orthophoto


Cowichan Lake Rd
Brenan Crt
Arla Crt
Culverton Rd
White Rd
Jordan's Lane
Ellison Pl
4980
4976
4960
4956
4936
4932
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4920
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CVRD
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Printed: July 4, 2025
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Scale: 1:2,119

From Culverton Road, looking southeast

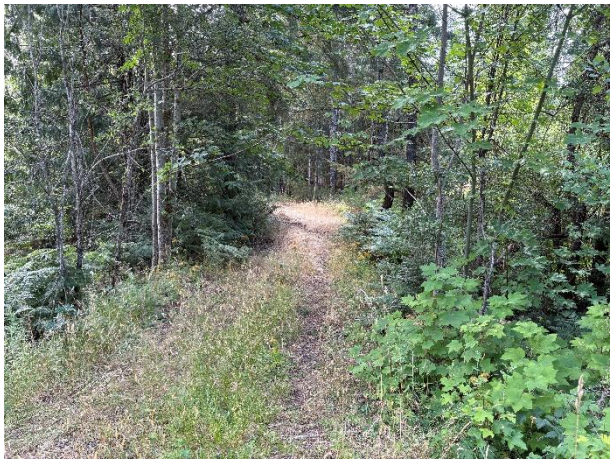
Northeast corner of parcel

Wetland (north)

Wetland (southeast)

Path around wetland (southeast)

Below wetland (south)



Old driveway (south)

Wetland (southwest corner)

STRONGITHARM CONSULTING LTD.

January 22, 2025

Yuli Siao
Senior Planner
Cowichan Valley Regional District
175 Ingram Street
Duncan, BC V9L 1N8

Sent via email

RE: Rezoning Application for 5611 Culverton Road

Dear Yuli:

We are pleased to submit this application to rezone 5611 Culverton Road from R-6 (Bare Land Strata Residential Zone) and P-1 (Parks and Institutional) to a new site-specific zone to permit the development of 17 residential lots and the creation of new park space. The goal is to build 3-bedroom homes to support family housing. The application is in response to the Regional District's concern over density, of which is permitted under the current zoning for the site. We have also considered the utility of the current P-1 (Park) zoned area and envisioned the opportunity to create better park space on the property. We have concluded that there are much preferred layouts to both the residential design and park space.

The property is located within Electoral Area E of the Cowichan Valley Regional District (CVRD). The application is consistent with the "Residential" OCP land use designation. The subject property is outside of the growth containment boundary.

Property Summary and Zoning Rationale
Located in proximity to Cowichan Lake Road, 5611 Culverton is a +/- 75,000m^2 (7.54 ha) parcel of land characterized by its mainly open landscape, manmade watercourses at the north and south edges of the property, and a manmade wetland located in the south-easterly quadrant of the site. Mature trees surround much of the perimeter of the property. The predominant historic use of the property was a sawmill operation along with other ancillary storage activities. The site was extensively logged before the current owner purchased the property.

The current owner has expended considerable energy, time, and money cleaning up the site in preparation for future development. When the current owner purchased the property, the site was already zoned for a 50-lot manufactured home community, in recognition of remedial work that needed to be undertaken, reflecting the importance the Regional District has placed on

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778-401-6053 | 250-889-1862 | strongitharmconsult@icloud.com

removing the old industrial activities and returning it to a residential use consistent with OCP policies.

The motivation for this current application is complicated. and is at least in part caused by contradictory policies. This rezoning application has been precipitated because the "manufactured home park" designation is not compatible with the servicing and sewer policies in the CVRD. Historically, the CVRD "Utility Acquisition Policy" requires a minimum of 50 service connections for a system to be taken over by the Regional District. However, in conversations with CVRD planning, that density of development was considered inappropriate. Even a more recent application (February 2024) proposing 37 residential lots was also considered to be too dense.

This situation is exacerbated by a policy pertaining to the distance of community sewer treatment plants from active water wells. Provincial Municipal Wastewater Regulation requires, where the discharge is greater than 37 m^3/d., that a treatment plant discharge field must be at least 200m from any neighbouring well. There are multiple neighbouring wells within a 200m radius of the property, and it is not feasible for the owner to install a treatment plant on the property in accordance with Regional District zoning, Utility Acquisition Policy, and Municipal Wastewater Regulations.

Finally, the current zoning pattern for the site does not best acknowledge the existing environmental features or take advantage of key features that can create more meaningful park space on the site. The existing P-1 zoned portion of the property represents approximately 13% (9,802m^2) of total site area (75,400 m^2). The application proposes to designate approximately 19,020m^2 of the site to the P-1 zone, or about 25% of the site as park and open space.

The impact of these constraints identified above has produced a proposed development of only 17 lots with a minimum lot size of 2,000m^2, much less than what the original R-6 zone envisioned. Restricting the development to 17 lots has had financial implications for the project, but we feel this is the clearest way of moving the application forward in the most timely way (see attached proposed development plan in Appendix A).

A summary of the key elements of the application are shown below.

ITEM	EXISTING	PROPOSED
SITE AREA	75,400 m^2	75,400 m^2
ZONING	R-6 & P-1	Site Specific
LOTS	Up to 50 lots	17 lots
AVERAGE DENSITY	6.7 units/ha	2.25 units/ha

PARKS AND OPEN SPACE	9,802 m^2 (0.9 ha)	19,020 m^2 (1.9 ha)
PARK AREA AS % OF TOTAL	13%	25%

OCP Land Use Policies

The following land use policies have been taken into consideration for this application.

a. Land-use Policy:

    i. The OCP identifies the land as "Residential".

The proposed plan is consistent with the OCP land-use designation.

b. Parks Policy:

    i. Encourages providing parkland that provides greenspace that protects sensitive areas (sensitive ecosystems).

    ii. Encourages neighbourhood parks.

    iii. Supports installation of trails.

The proposed Park and Open Space plan (Appendix B) is consistent the neighbourhood park objectives.

Proposed Park and Buffer Areas

The proposed park area represents a significant amenity contribution (see attached Park and Open Space Plan in Appendix B). A public trail is proposed to circle the wetland and provide both residents of the development and existing neighbourhood a place to enjoy a pleasant walk or sit on a bench looking out onto a pleasing, bucolic setting. Trail areas border the SPEA (located outside the SPEA) will be protected by split rail fencing to protect the identified watercourses.

The lands to the east of the site are inside the Agricultural Land Reserve and to be consistent with Agricultural Land Commission guidelines, a buffer area has been provided between the individual strata lots and the westerly property boundaries, except where the lands are proposed for park dedication. The remaining "buffer lands" will become common property of the strata. The schematic layout of the development contains a buffer area on all three side of the property, with the exception of the Culverton Road frontage.

Approximately 0.96ha (9,649 m^2) of open space and park area on the property has been provided as an amenity for new and existing neighbourhood residents. The riparian area on the property, estimated at 0.94ha (9,372m^2), will also be conserved, with a proposed total open space and parkland area of 1.9 ha.

Summary of Key reports

Supporting reports prepared and on file include:

1. A Geotechnical Assessment, completed by Ryzuk Geotechnical, that confirms the stability of the ground for the purposes proposed.
2. An aquatic assessment carried out by Aqua-Tex Scientific Consulting, QEP, that has identified riparian areas and SPEA setbacks on the site (see section below).
3. An Aquifer Impact Assessment prepared by McElhanney.
4. Provincial Certificate of Compliance site remediation.

Environmental Assessment

The property owner has undergone a full environmental assessment and site remediation process, and a Certificate of Compliance has been received for the property.

Aqua-Tex Scientific Consulting Ltd. (Aqua-Tex) completed a Riparian Area Protection Regulation (RAPR) Assessment (February 2024), describing the property as historically disturbed through industrial activity. Aqua-Tex identifies headwater streams and wetlands on the north and south property lines and a small manmade wetland created toward the south easterly portion of the property. Aqua-Tex notes that through correspondence with the former property owner and adjacent neighbours the aquatic features on the property are primarily manmade and are not natural watercourses. However, the watercourses are qualified under Provincial Streamside Protection Regulation measures to protect and maintain the SPEA, as noted in the RAPR assessment. Protection measures include:

- Protection of trees within the SPEA will be required, in addition to vegetation within the SPEA area;
- Encroachment mitigation – installation of signs and orange snow fencing to protect the SPEA area;
- Sediment control plan – prepared by McElhanney; and,
- Stormwater management – prepared by McElhanney.

Prior to construction, all conservation measures proposed by the QEP will be followed including field monitoring by qualified professionals. An erosion and sediment control plan will be completed by McElhanney.

Ministry of Environment Order - Additional Site Environmental Enhancements

A Ministry of Environment (MOE) order remains to be implemented, directing the property owner to plant ground cover and vegetation around the manmade wetland located toward southeasterly part of the site, and the installation of a split rail fencing and signage along other watercourses on the property.

The MOE order has not yet been completed due to a combination of issues regarding the zoning, servicing, and development rights described above. The planting regime proposed is very extensive and requires a water irrigation system to be in place to ensure that the plantings survive the dry season. The owner has been in contact with a landscaping company to prepare for the remediation planting. The company stated that due to the extensivity of the planting list they need approximately 1 year to order and receive all plantings before beginning the work.

The required water irrigation system means an operating well and reservoir system, and the installation on-site electrical to fulfill the MOE order. It is thus essential to have an approved development plan in place in order that future servicing is appropriately placed. The project consultants and property owner believe that installing the required plantings on the property should be completed as part of the servicing contract to construct the subdivision works. It is standard practice to leave the landscaping elements to the end of a project to mitigate potential disturbance.

An extension to MOE order will be made to complete the planting regime to the end of lot servicing and construction. After completing the planting strategy requirements, Aqua-Tex will submit a completion report.

Subdivision and Servicing

A bare-land strata subdivision application for the 17-lot plan will be submitted later in the process, once this rezoning application has received and a preliminary review and consideration by the Regional District and MOTI has been undertaken.

At time of subdivision detailed drawings on servicing will be reviewed and approved and any associated covenants or easements will be identified as part of the Preliminary Layout Approval (PLA) process.

The proposed application is to construct 17 residential lots, complete with strata roads, underground servicing, park dedication and open space areas. Primary services will include:

- Underground hydro and street lighting;
- Onsite sewage disposal on each lot;
- Community water system based; and,
- Onsite stormwater management engineered to filter into the adjacent watercourses.

Community Water
A new well has been identified and tested for both water quality and volume. An Aquifer Impact Assessment has been completed by McElhanney, the consulting engineers. McElhanney concludes that the new well has more than adequate supply to support the development. Subsequently, a water license application, prepared by McElhanney, has been submitted to the Province in January 2023, which is currently in the queue process.

Ground Sanitary Sewer Disposal
The individual lots on the proposed plan have been sized to comply with Health requirements for induvial ground disposal. Preliminary analysis indicates suitable soil conditions to accept ground disposal and meet regulations. At time of the subdivision application formal test results will be prepare and submitted to Island health for review and approval.

Closing
We thank you for your consideration for this application. We look forward to working with the Regional District to achieve a timely approval of the application.

Yours truly,

Deane Strongitharm, MCIP, RPP

cc. Larry Davidson, Owner, Whynott Holdings

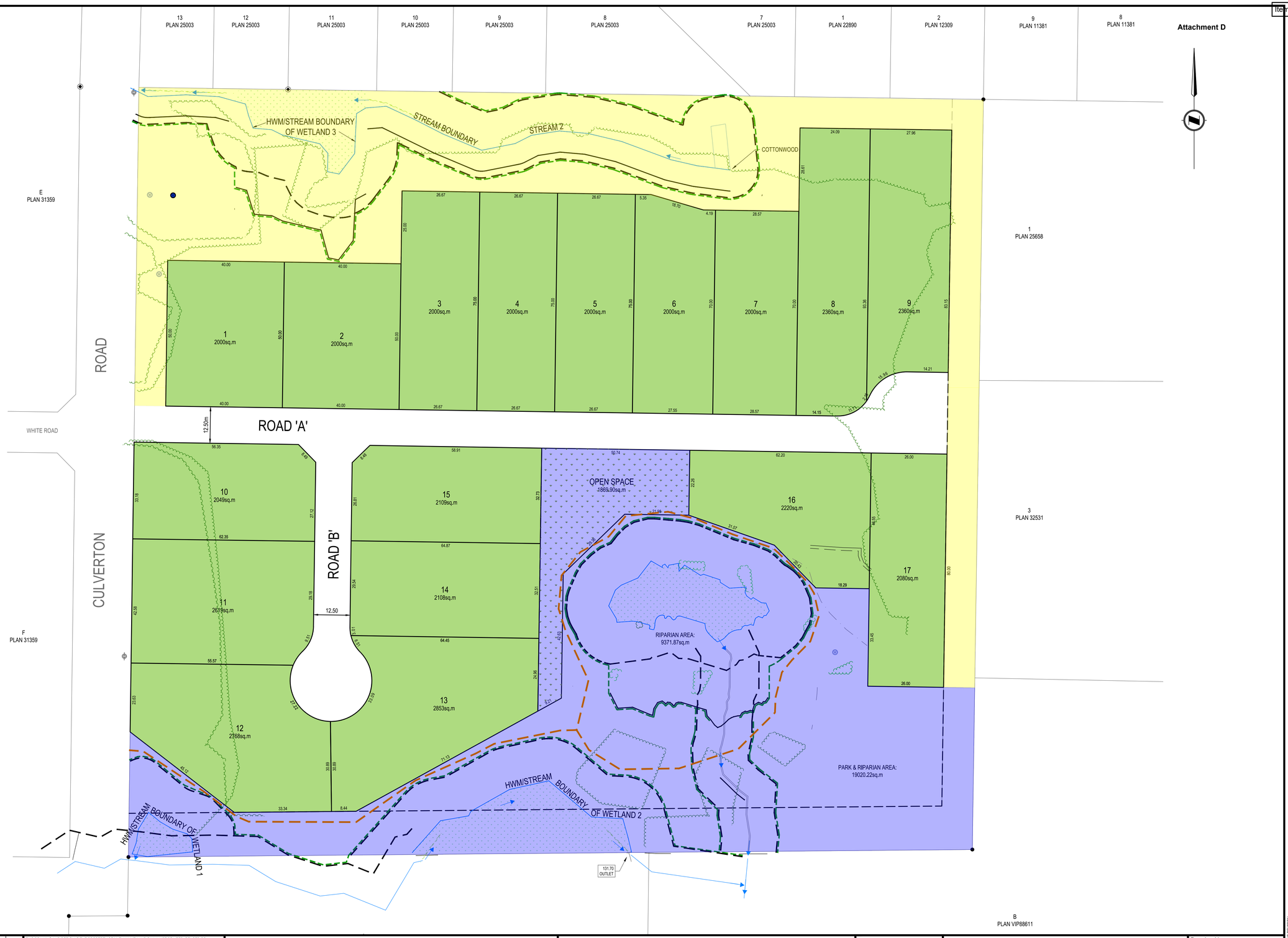
Jon Irving, Engineering Division Manager, McElhanney

Attach.

1. 5611 Culverton Road Strata Lot Plan
2. 5611 Culverton Road Zoning Map
3. 5611 Culverton Road Park and Open Space Plan

Appendix A

Attachment D



LEGEND:

- EXISTING PROPERTY LINE & IRON PIN
- PROPOSED SETBACK
- PARCEL AREA
- WETLAND
- COMMON PROPERTY
- PARK & RIPARIAN AREA
- SPEA BOUNDARY
- ENVIRONMENTAL SENSITIVITY ZONE
- PROPOSED TRAIL
- EXISTING WELL
- PROPOSED WELL

Rev	Date	Description	Drawn	Design	App'd
PB	2025-01-13	ISSUED FOR INFORMATION ONLY	RPH	RPH	JI
PA	2024-10-15	ISSUED FOR INFORMATION ONLY	RPH	RPH	JI

0 1:600 30

ORIGINAL DWG SIZE: ARCH D (24" x 36")

McElhanney
Suite 107
225 Canada Avenue
Duncan BC
Canada V9L 1T6
T 250 748 3335

PRELIMINARY NOT FOR CONSTRUCTION

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

WHYNOTT HOLDINGS
2467 MILL BAY ROAD, MILL BAY, BC, V0R 2P4

5611 CULVERTON ROAD STRATA DEVELOPMENT
LOT LAYOUT PLAN
OPTION 2

Drawing No. SK-2

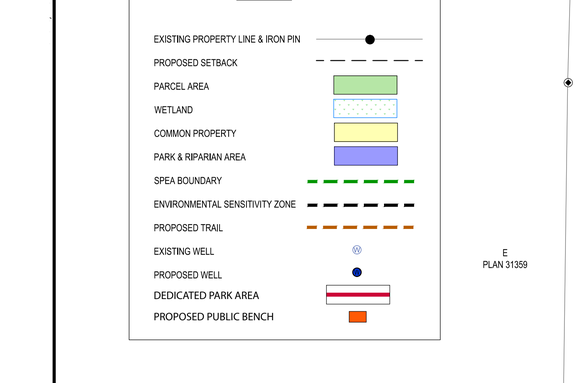
Project Number 2233-02041-00

Rev. PB

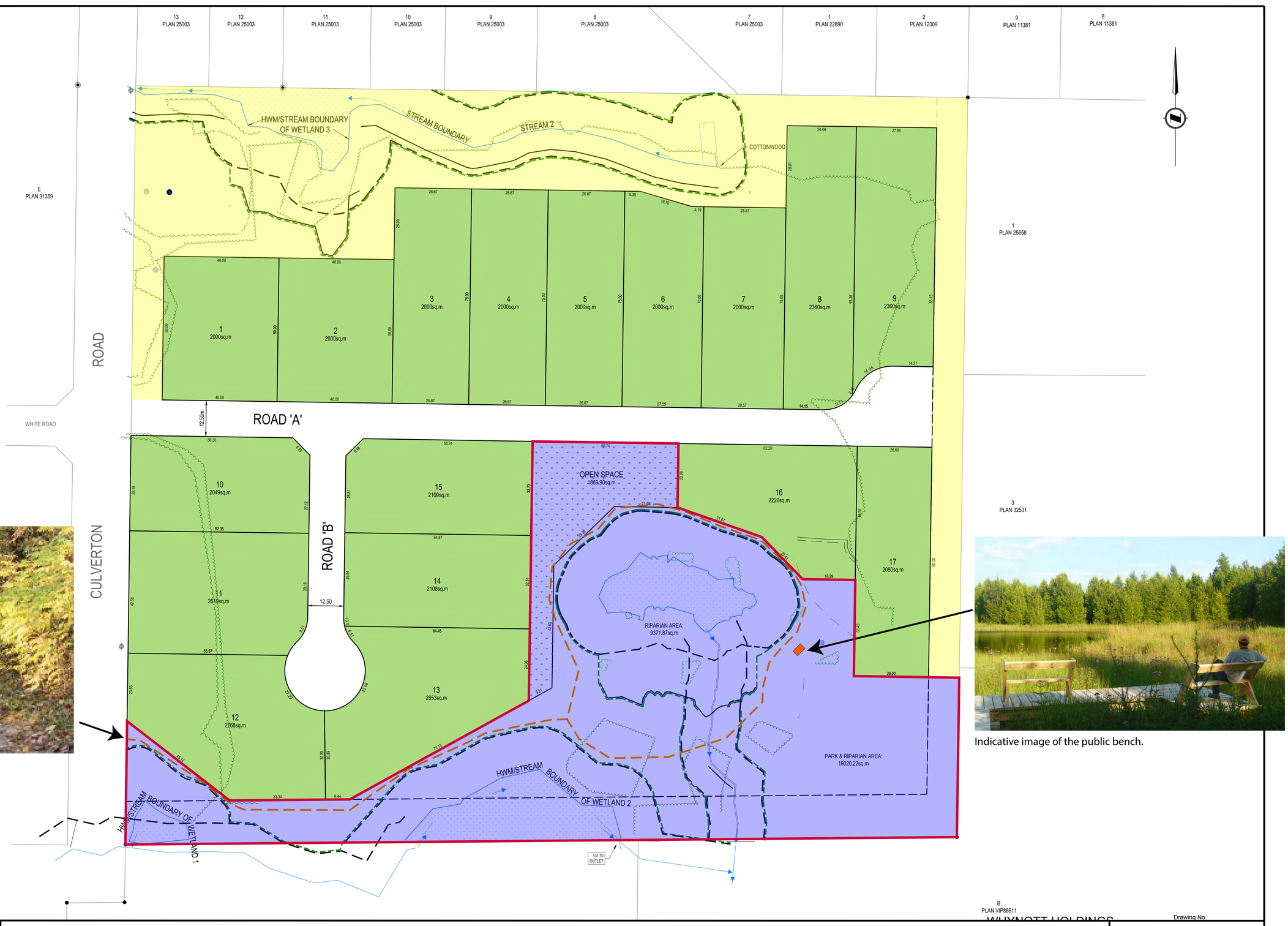
Appendix B - 5611 Culverton Road Parks and Open Space Plan

LEGEND:

- EXISTING PROPERTY LINE & IRON PIN
- PROPOSED SETBACK
- PARCEL AREA
- WETLAND
- COMMON PROPERTY
- PARK & RIPARIAN AREA
- SPEA BOUNDARY
- ENVIRONMENTAL SENSITIVITY ZONE
- PROPOSED TRAIL
- EXISTING WELL
- PROPOSED WELL
- DEDICATED PARK AREA
- PROPOSED PUBLIC BENCH



Indicative trail image.



Indicative image of the public bench.

Scale: 1:600

Original DWG size: 24' x 36"

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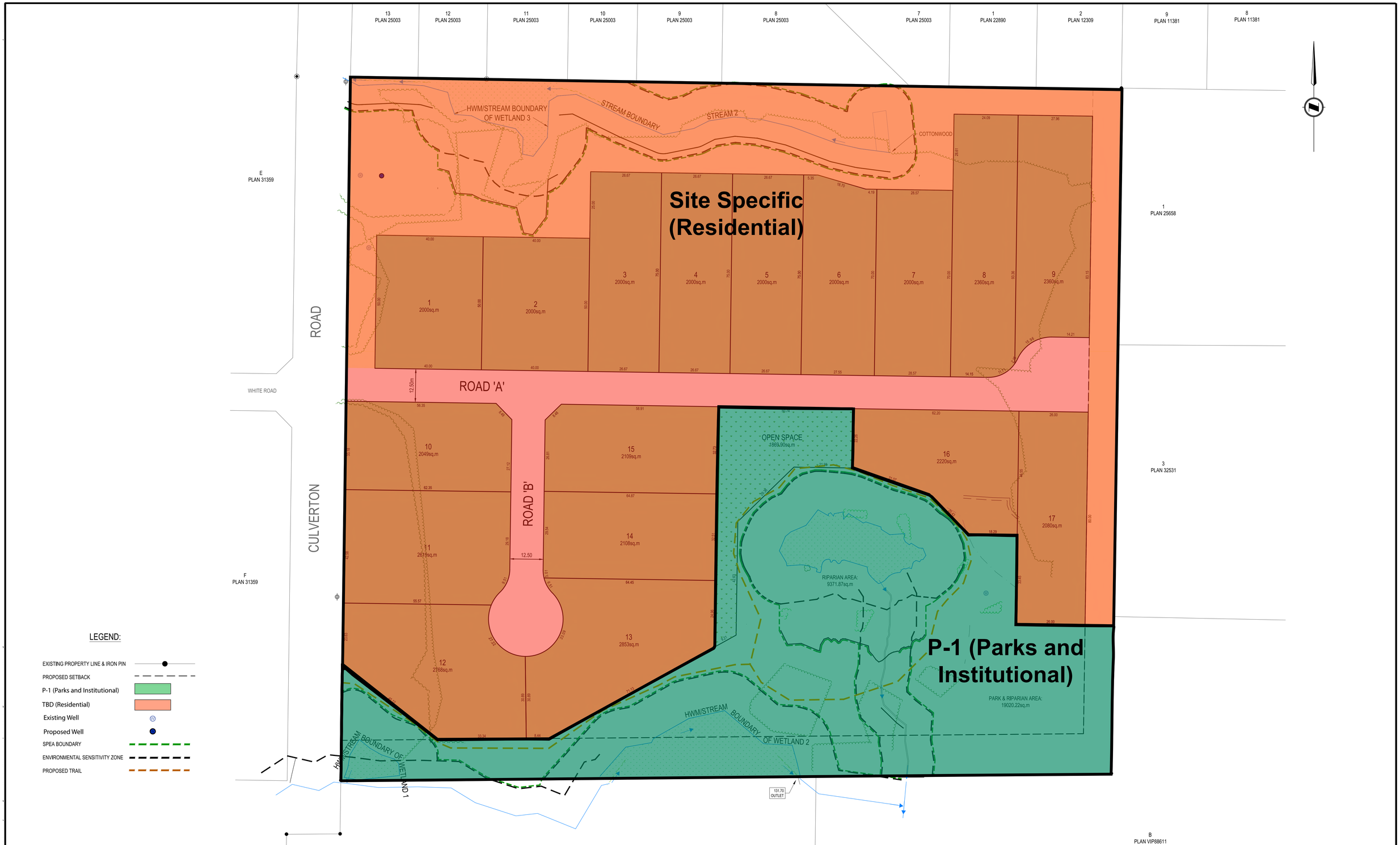
Drawing No.

Date: January 17, 2025

Appendix C - 5611 Culverton Road Zoning Map



Scale: 1:600

Original DWG size: 24' x 36"

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Date: January 17, 2025

Internal Referral Response Summary

Application No. RZ25E01

Organization: CVRD Utilities **Name/Title**: Vanessa Thomson, Manager	**Date of Response**: May 9, 2025 **Level of Support**: No comment
Comments: CVRD Utilities division has no comments as there is no request for water, sewer or drainage services.	
Organization: CVRD Building Inspections & Bylaw Enforcement **Name/Title**: Sonny Bryski, Chief Building Official	**Date of Response**: May 22, 2025 **Level of Support**: No comment
Comments: Nothing from Building; we'll need to address the soil class and storm water infrastructure at BP stage however.	
Organization: CVRD Parks & Trails **Name/Title**: Mark VandenDungen, Parks Planner	**Date of Response**: August 29, 2025 **Level of Support**: Support subject to recommendations

Comments:

Under Division 11, Section 510(3) of the *Local Government Act*, the proposed density of development would trigger park dedication (or cash in lieu) at time of subdivision. The CVRD Parkland Dedication Cash-In Lieu Policy is applicable to the development.

- Should the development be approved as proposed, the future subdivision application will require a decision of the Board to authorize the proposed parkland dedication (5% of the land or cash-in-Lieu) and will be referred by staff to the applicable Community Parks Advisory Commission (CPAC) prior to proceeding to the EASC.
- This is separate from the rezoning process before us today.

With respect to the rezoning application, the Parks & Trails Division offers the following comments/recommendations:

- The application has modified the previously approved plan, which included a P-1 (Park) designated area located in the northwest corner of the site. This P-1 designation has been moved in the current proposal and replaced with a revised parks and open space plan, which now shows a central dedicated park area along the south with an indicative trail and proposed public bench.
- The Parks & Trails Division notes that the revised proposed park dedication appears to meet or exceed the area of the previously dedicated P-1 parcel located in the northwest corner of the site. However, the site is also quite constrained due to the presence of riparian areas that will not accommodate the addition of park infrastructure to be built.
- The proposed trail alignment does not appear to provide sufficient width or buffer to accommodate the trail in a manner consistent with CVRD Parks standards. Additional space may be required to ensure adequate trail setbacks, user safety, and long-term durability.
- The subject area, including the proposed park dedication, is known to be heavily impacted by invasive plant species. The ecological condition of the site is poor, and considerable remediation and restoration work will be required to bring the park area to a usable and ecologically functional state. Invasive species removal, replanting with native

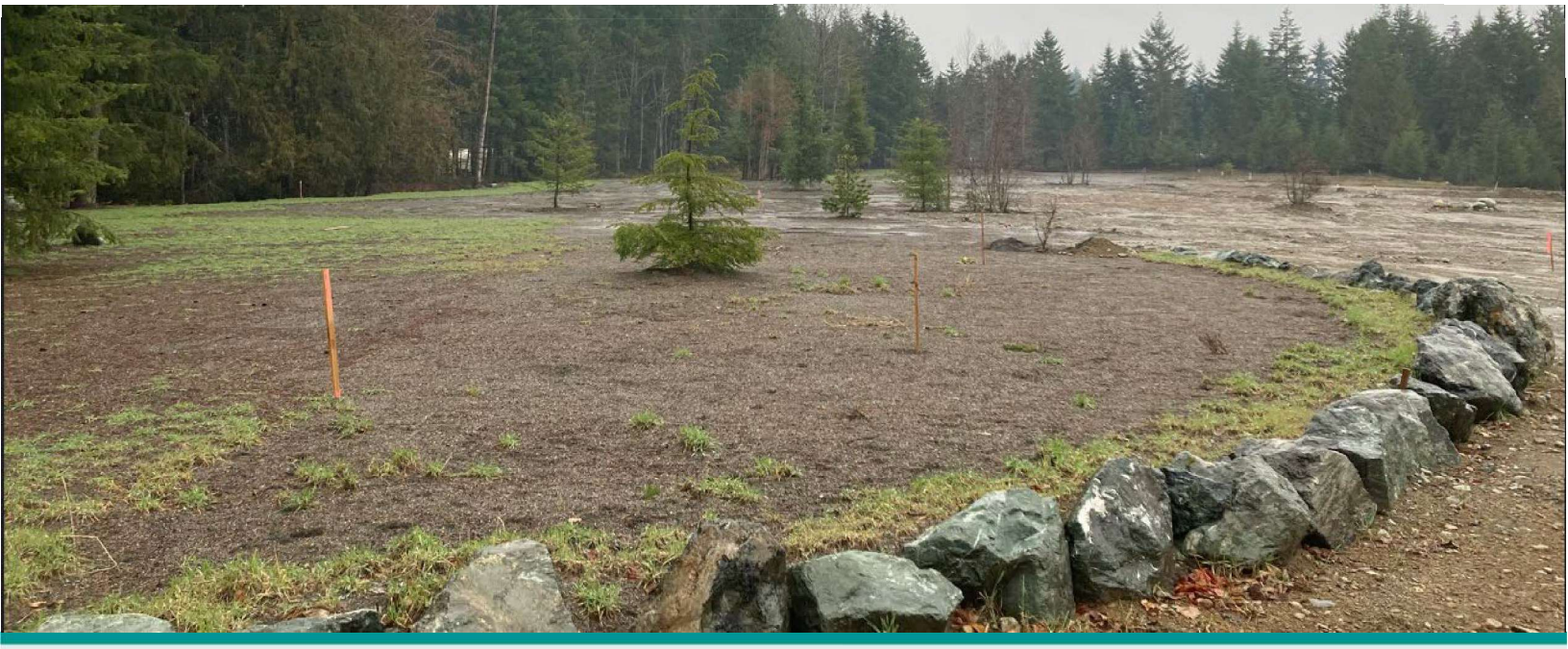
vegetation, and soil stabilization may be needed prior to acceptance by CVRD Parks & Trails.
- The park land as proposed is constrained by environmental features that may not allow the land to be used effectively as a community park. The inclusion of an indicative trail and public bench is positive, but further detail is required to determine the feasibility of a trail through the indicated riparian area.
- The application will be referred to the Electoral Area E Community Parks Advisory Commission (CPAC) for comment and recommendation on the proposed park plan.

Organization: CVRD Operations/Fire Rescue Services
Date of Response: September 23, 2025
Name/Title: Glenn Cooper, Manager Fire Rescue Services
Level of Support: Support subject to recommendations
Comments:

- Instillation of minimum 10,000 gallon fire service water supply tank that would;
    - Be easily accessible for fire apparatus from Culverton Rd 24 hours a day for all fire department operations,
    - Strata responsible for all repairs and insurance,
    - If possible, under the water license be connected to site well for auto fill capability,
    - Liaised with Sahtlam Fire Chief for connections size and type.
- All residences and structures should have clearly visible driveway or property signage for address numbers. This is critical for prompt emergency response to properties. Address signage should be reflective and clearly visible from both ways of travel so it can be easily seen by emergency responders including ambulance, fire and police. Lettering and numbers on signs or posts should be a minimum of 2.5” in height if reflective, or 6” in height if non-reflective.
- Road and driveway access to properties is essential for emergency response and fire protection.
    - All driveways should be built to support apparatus height, weight, and length, this includes private bridges and related structures.
    - Driveways should have a 3.75-meter-wide driveable surface, 6 meters of unobstructed sight clearance, 4-meter clearance height, parking and space to turn around near structures. If a driveway is longer than 500 metres, there should be 6-meter-wide pullouts along the roadway to allow for two-way vehicular traffic.
    - It is the property owner’s responsibility to ensure the driveway is kept clear of snow, brush and tree branches. Access roads should enable fire apparatus to drive within 45 meters of an exterior door for one-or two-family dwellings.
    - Roadways and paved driveways should be built to withstand the NFPA standard of not greater than 689kPa for aerial fire apparatus stabilizers.
    - Roadways, bridges and driveways should be designed to withstand fire apparatus up to 36,287kg.
    - Roadways should be a minimum of 8 metres wide.
    - Cul-de-sacs should have a minimum turning radius of 14 metres, with no rocks or landscaping features out to 16 meters to accommodate modern fire apparatus.
    - Cul-de-sacs should have no internal circle, unless the circle can be driven over by fire apparatus with weights up to 36,287kg, for example a 100mm high raised button with hardscaped features would be acceptable.
- Owner(s) should be aware the property is in the Sahtlam Fire Protection Area serviced by Sahtlam Volunteer Fire Department and appears to be within 8km of the firehall.

McElhanney

BEST MANAGED COMPANIES CANADA



Aquifer Impact Assessment (DPA 4) - REVISED

Proposed Strata Development at 5611 Culverton Road

May 20th, 2025

Submitted to: Whynott Holdings Ltd
Prepared by McElhanney Ltd.

Contact
Jon Irving
Project Manager
778-762-0660
jirving@mcelhanney.com

Address
107 – 225 Canada Avenue,
Duncan BC Canada V9L 1T6

Our file: 2233-02041-00

Your Challenge.
Our Passion.

Our file: 2233-01041-00

May 20, 2025

Whynott Holdings
2467 Mill Bay Road
Mill Bay, BC V0R 2P1

Attention: Larry Davidson

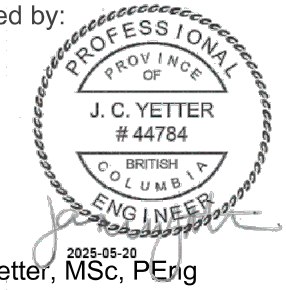
Re: Revised Aquifer Impact Assessment (5611 Culverton Road)

This document is an updated version of an aquifer impact assessment (AIA) issued in March 2023 that considered an earlier version of the development plan at 5611 Culverton Road. The revisions made to this AIA reflect changes to the proposed subdivision from a 50-lot bare-lot strata to a 17-lot residential subdivision. The assumed occupancy of dwellings on each lot was maintained as 2.5 individuals. The water demand associated with the proposed development decreased with the reduction in supported population. On-site sewerage management was changed from centralized sewerage management with two separate effluent fields, to individual septic systems at each lot.

If there are any questions regarding the information presented in this document please contact the Project Manager, Jon Irving, at 778-762-0660 or jirving@mcelhanney.com, or the author if this report, Jane Yetter, whose contact information is provided below.

Sincerely,
McElhanney Ltd.

Prepared by:



Jane Yetter, MSc, PEng
Groundwater Resources Engineer
jyetter@mcelhanney.com
778-746-7406

Reviewed by:

Remi Allard, MEng, PEng
Senior Hydrogeologist
rallard@mcelhanney.com

PERMIT TO PRACTICE
McElhanney Ltd.
PERMIT NUMBER: 1003299
Engineers and Geoscientists of BC

Contents

Figures

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Appendices

1. Introduction

1.1. TERMS OF REFERENCE

Whynott Holdings Ltd. (WHL) contracted McElhanney Ltd. (McElhanney) to complete an aquifer impact assessment in the context of a proposed subdivision at an existing property located at 5611 Culverton Road, Duncan, BC (the "Subject Property") (*Figure 1*). The property identification number (PID) is 003-851-168 and the legal description is: Lot 1, Section 8, Range 6, Sahtlam District, Plan 12309, except those parts in plans 22890, 23708, 25003, and 29157 Lot 3, Block 2, Section 18, Range 4, Quamichan District, Plan 1493. An aquifer impact assessment is a required submission to the Cowichan Valley Regional District (CVRD) as a part of any development permit applications associated with the Subject Property.

Figure 1. Site location in regional context

1.2. REGULATORY CONTEXT

The Subject Property lies within Area E of the Cowichan Valley Regional District (CVRD) Official Community Plan (OCP) Bylaw No. 3900, 2022. Zoning for the Subject Property is designated Residential Manufactured Home Park, in the OCP.

Development Permit Area 4: Aquifer Protection ('DP4-AP') applies to parts of Area E that are included in the provincial groundwater aquifers dataset. The basis for the designation is to *protect the natural environment, its ecosystems and biological diversity*[1]*, and to conserve water*[2].

The objectives of the guidelines for AP are to*: "protect subsurface aquifers from contamination by land use and development activities and to avoid depletion of aquifer water supplies, maximize their recharge, and promote the efficient use of water to ensure a stable and sustainable hydrologic system"*[3].

To follow the permit guidelines as outlined in DP4-AP (*Appendix A*), the applicant for a development permit (DP) must submit a report prepared by a qualified environmental professional that analyzes the impacts of the proposed development on aquifers in the development permit area.

1.3. OVERVIEW OF PROPOSED DEVELOPMENT

The Subject Property is southeast of the intersection of Culverton Road and Cowichan Lake Road. The property covers an area of approximately 7.5 hectares (75,000 m²) and is currently undeveloped. WHL has proposed a development that includes 17 residential lots each 2,000 to 2,853 m^2 in area (0.5 to 0.7 acres), with communal trails and dedicated park space.

The Site is currently unserviced. Water will be sourced from an onsite well and distributed to each lot. Wastewater will be managed by individual, private septic systems at each lot. Stormwater management will incorporate low-impact development (LID) practices, including on-site retention, infiltration, and controlled discharge. There is no landscaping planned for communal areas, and therefore no centralized irrigation system. Further detail on water supply, wastewater management, and stormwater management is provided below.

A conceptual site layout that illustrates the proposed development is attached as *Appendix B.*

Water Use & Community Water Supply

A new water well was drilled in October 2022 at the northwest corner of the Site and is the intended water source for the proposed development. WHL submitted a water license application to the BC Ministry of Forests, Water Authorizations, which is pending review.

[1] Pursuant to section 488(1)(a) of the *Local Government Act.*
[2] Pursuant to section 488(1)(i) of the *Local Government Act.*
[3] "Development Permit Area 4: Aquifer Protection" within Schedule C of the CVRD's Official Community Plan for Electoral Areas Bylaw No. 4270

The anticipated average daily water demand (ADD) for the proposed development is approximately 19m^3/day, which is equivalent to approximately 7,000 m^3 per year. This was based on:

- 17 lots with an average of 2.5 persons per lot;
- Master Municipal Construction Document (MMCD) design guidelines (2014);
- Unmetered water use;
- A storage reservoir to accommodate water needs for fire fighting and peak demand; and,
- A resulting ADD of 450 litres per capita per day.

To add a measure of safety, a 20% contingency was added to the annual average water demand calculation to ensure the project is not under-serviced, resulting in an estimated total annual groundwater use of 8,400 m^3/year.

WHL intends for the water system to be developed in consultation with the CVRD, and ultimately transferred to and operated by the CVRD, creating a public, community water supply. McElhanney understands from communications with CVRD that it discourages private water utilities and prefers the municipality operates small water systems within its jurisdiction to ensure safe drinking water and fire protection for residents.

Sewerage Management

Wastewater will be managed by individual effluent disposal to ground (septic) systems at each lot. It will be the responsibility of the purchaser of the lot to hire a registered onsite wastewater practitioner (ROWP) or engineer to design their septic system.

Storm Water Management Strategy

The stormwater management strategy[4] developed for the project incorporates low-impact development (LID) practices, including on-site retention, infiltration, and controlled discharge. The ultimate design will comply with the CVRD and Ministry of Transportation and Transit (MoTT) requirements for drainage, projected runoff calculations, prevention of downstream flooding and erosion, mitigate peak flows, and use LID to minimize runoff, enhance infiltration, and improve runoff water quality.

The stormwater management strategy was developed with the assumption that the maximum impervious area per lot is 50%. Each lot will have a dedicated soak away (rock) pit to manage runoff from onsite impervious areas through detention and controlled discharge. Overflow pipes from the rock pits will drain to a centralized storm sewer, that flows to a centralized rock pit. All stormwater will run through an oil/grit separator prior to being discharged into a downstream wetland at a controlled rate. A schematic is presented in *Appendix B*.

[4] McElhanney, 2025. Technical Memo: 5611 Culverton Road – Stormwater Management Strategy. Prepared for Larry Davidson, Whynott Holdings, April 3, 2025. File no. 2233-02041-00.

Landscaping Plans

There is no landscaping plan for the proposed development. Landscaping will be conducted privately by individuals purchasing and developing the lots and will need to adhere to any applicable bylaws regarding irrigation and seasonal water restrictions. Water use for irrigation was incorporated into the household water demand calculations.

1.4. OBJECTIVES

Potential aquifer impacts from rural residential developments include:

- Groundwater extraction for water supply,
- Groundwater quality impacts from poorly designed or inadequately maintained sewerage systems,
- Reduction of infiltration from creation of hardscapes and management of stormwater runoff in closed-system pipes with no on-site retention and infiltration, and
- Ornamental landscaping that requires irrigation in the summer rather than use of drought-tolerant native species.

Thus, the objectives of this aquifer impact assessment were to:

- Assess the potential impact of groundwater extraction on the regional aquifer, as the primary potential impact of the proposed development on groundwater resources; and,
- Assess and provide comment on the potential for impacts to aquifer water quality or quantity from onsite wastewater management, stormwater management, and land cover/landscaping.

1.5. SCOPE OF WORK AND APPROACH

The approach of the work was designed to assess the potential for the proposed development to have a negative impact on groundwater quality and quantity in local aquifers.

The approach to address potential impacts to groundwater quality consisted of consideration of the overall land use for the proposed development and available information for on-site sewerage management.

The approach to address potential groundwater resource depletion consisted of:

- A water balance assessment to assess the quantity of groundwater extraction for the project in the context of available groundwater resources;
- A capture zone assessment to predict potential impact to neighbouring groundwater users;
- Consideration of the stormwater management and landscaping plans for promoting infiltration, maintenance of the natural site hydrologic regime, and minimizing hardscapes and irrigation requirements.

The scope of work consisted of:

- Review of the revised development plan current to May 12, 2025.

- Review of local and regional hydrogeology information from publicly available sources to identify mapped aquifers, records of water wells, topography and drainage, and local watercourses.
- Consideration of information from on-site water well assessments including groundwater level measurements, video camera inspections, a step-drawdown pumping test on one of the wells, and a recent well completion report.
- An aquifer water balance assessment to understand the proposed groundwater use in the context of total aquifer inflows and other uses/outflows.
- Calculation of the water well capture zone to assess potential impacts on neighbouring groundwater users from the expected water demand from this development and to assess potential risks to groundwater quality for the Project's community water supply.
- Review of the revised wastewater management strategy.
- Review of the revised stormwater management strategy.
- Preparation of this report to document the findings, present a professional opinion regarding potential impacts from the proposed development on groundwater resources and, if applicable, recommendations for mitigation or monitoring of impacts.

2. Physical Setting

2.1. CLIMATE

The Subject Property is in the 'Coast Mountains and Islands' climate region of BC where winters are mild and moist, and summers are mild and dry. The area is in the rain shadow of the Vancouver Island Ranges to the west and the Olympic Mountains to the south, receiving less precipitation than the west coast of Vancouver Island. Most of the annual precipitation occurs from mid-fall through early spring, primarily as rain. Snow is typically limited to higher elevations. Summers are comparatively dry, and moisture deficits are common in that season.

Climate change research predicts that the intensity and frequency of fall and winter precipitation events will increase, and in contrast, hot and dry conditions in summer will create a prolonged and increased moisture deficit in that season[5]. Longer summers, a longer growing season, and higher demand for irrigation in the region will put increased demand on both aquifers and surface water sources where agriculture is prevalent. Despite the increase in summer moisture deficit, an annual precipitation surplus is expected with the potential for increased annual groundwater recharge.

2.2. VEGETATION

Much of the site has been cleared. Vegetation across the site is intermittent and mostly comprised of trees. The photograph on the cover of this report shows the typical vegetation for the Site. There are three small wetland areas at the east central and south-central locations on the property.

2.3. TOPOGRAPHY AND DRAINAGE

The Site is generally flat. Elevation difference across the site is approximately 6 m. The lowest elevation areas of the Site are at the south and southeast corner, which generally promotes drainage and shallow groundwater flow from west to east and to the southeast (Figure 2).

There is a small creek roughly 400 m north of the Site, and another located roughly 220 m southwest of the Site. Both creeks flow from west to east and are tributaries to the Cowichan River. The Cowichan River, 1700 m south of the Site, flows east toward the Cowichan Estuary, and is a regional drainage feature.

[5] Investment Agriculture Foundation of BC. Climate Change Adaptation Program, Vancouver Island. https://bcclimatechangeadaptation.ca/regional-adaptation/vancouver-island/

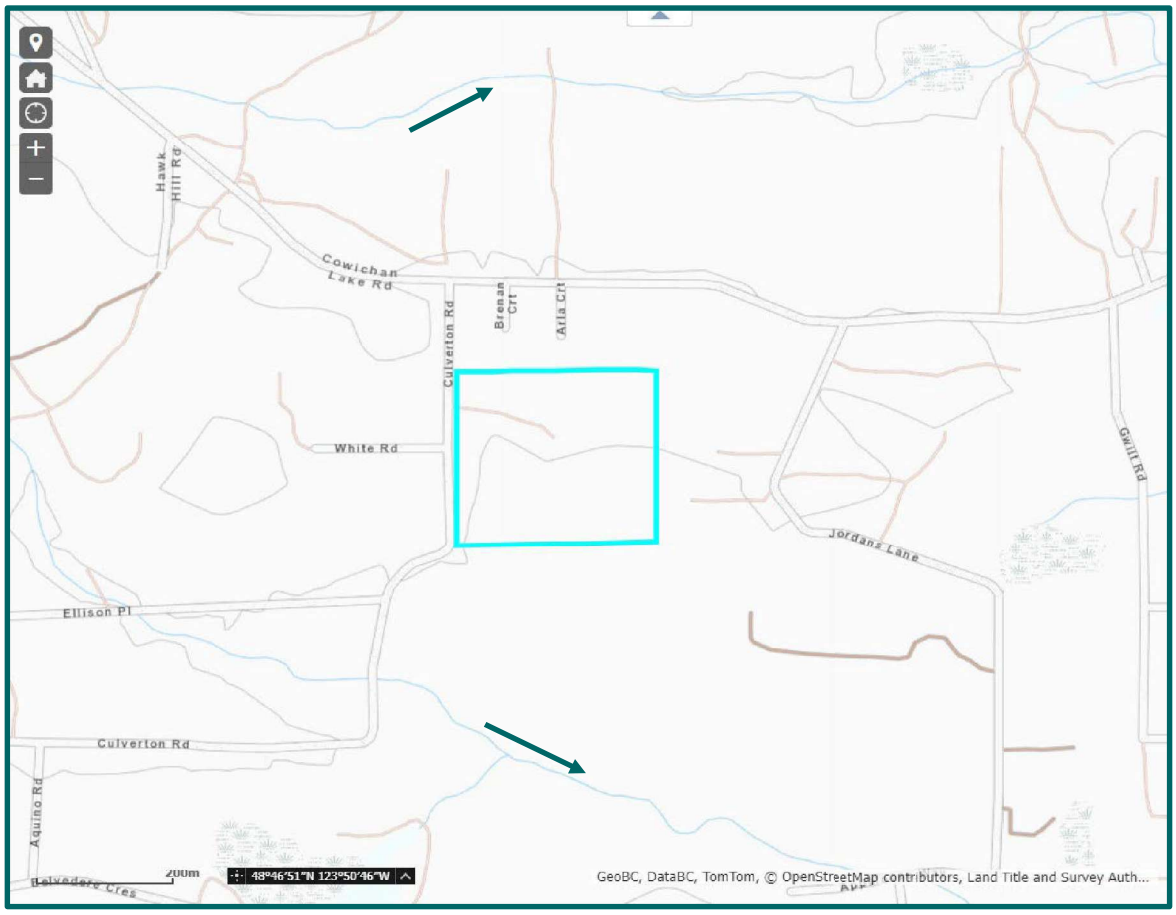

Figure 2. Site location, topography, and local watercourses

2.4. GEOLOGY

Based on information available on the BC Water Resources Atlas (WRA)[6], the uppermost bedrock in the area consists of sedimentary rocks of the Nanaimo Group, represented by a sequence of sedimentary units that grade upwards from carbonate-rich deltaic sandstone and conglomerate through beds of siltstone, sandstone, and coal-bearing shale, into pure shale and mudstone. Nanaimo Group rocks are rarely exposed at surface in the South Cowichan region as they are covered by thick deposits of unconsolidated sediments.

Harris and Usher[7] categorized the regional surficial sediments in the local area as till and silty glaciolacustrine (typically silt and clay) deposits. Both units overlie glaciofluvial outwash aprons of sand and gravel. The till is part of the Vashon Drift, which can contain minor interbedded sands and gravels

[6] https://maps.gov.bc.ca/ess/hm/wrbc/
[7] Harris, M and S. Usher, 2017. Preliminary groundwater budgets, Cobble-Hill / Mill Bay Area, Vancouver Island, BC. Water Science Series, WSS2017-01, Prov. of BC, Victoria, BC.
https://a100.gov.bc.ca/pub/acat/documents/r52917/Cobble_Budget2017_1509144934984_9144072763.pdf

within predominantly sand-silt textured sediments. If water-saturated and interconnected, the sands and gravels may create aquifers of limited extent. The glaciolacustrine sediments are part of the Capilano Sediments, which consist of silt and clay with minor sand and thus form aquitards. Hammond, Hinnell and Clague[8] identify the glaciofluvial sediments as the Quadra Sands, and are expected to contain elongated lenses or beds of sand and gravel with thicknesses in the range of 15-20 m. Where water-saturated, the Quadra Sands form regionally important aquifers.

2.5. REGIONAL HYDROGEOLOGY & GROUNDWATER USE

Most water wells in the area are completed in BC Aquifer 180, which is a confined to semi-confined sand and gravel aquifer, generally present on the north flank of the Cowichan River to the west of Duncan (*Figure 3*). Aquifer 180 covers an area of 8.7 km^2 and is comprised of glacial fluvial deposits and late glacial gravel outwash from the Vachon Drift. The Site is close to the west and northwest extents of Aquifer 180. The east extent of Aquifer 180 is near Winchester Road.

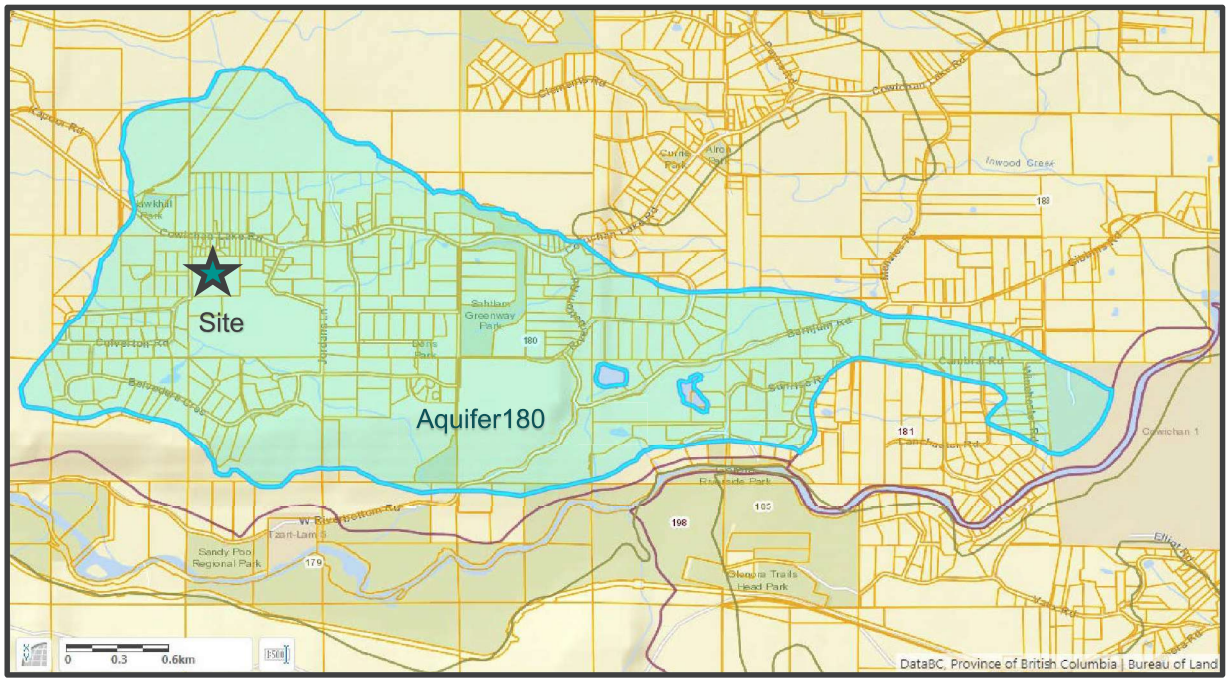

Figure 3. Mapped extent of sand and gravel Aquifer no. 180

Aquifer 180 has been characterized by BCMoE as mostly confined in nature and therefore classified as IIC using the BC Aquifer Classification System[9]. The IIC classification indicates a confined aquifer with a moderate level of development, moderate demand (usage), moderately high yield and low vulnerability to contamination. The confining layer consists of clay and hardpan layers, and the degree of confinement is indicated to be moderately high. The direction of flow in Aquifer 180 has not been determined in any reports available in the public domain. However, the probable direction of flow is inferred to be generally

[8] Hammond, Z., A. Hinnell, and J. Clague, 2019. Detailed Aquifer Mapping Study: Shawnigan Lake Area, Vancouver Island, BC. Water Science Series, WSS2019-02, Prov. B.C., Victoria, BC. https://a100.gov.bc.ca/pub/acat/documents/r56659/WSS2019-02,Shawniganareamapping_secured_1581368838565_1368739019.pdf

[9] J. Berardinucci and K. Ronneseth, "Guide to Using the BC Aquifer Classification Maps," Ministry of Water, Land and Air Protection, 2002, p. 54

southwards, towards the Cowichan River. Recharge is expected to be predominantly from infiltration of precipitation. Local creeks are also potential sources of recharge in wet-season flood conditions.

Underlying Aquifer 180 is bedrock Aquifer 182, which consists of fractured shale associated with the Duncan Formation as part of the upper Cretaceous Nanaimo Series. There are few wells completed in bedrock Aquifer 182, owing to the convenience of access to the shallow and more productive Aquifer 180.

2.6. ON-SITE WATER WELLS

The proposed water supply for the property is from a water well with well identification plate (WIDP) number 65828 and well tag number (WTN) 127289. This well was drilled in October 2022 by Drillwell Enterprises Ltd, with well design and technical support provided by McElhanney. The well is 38.7 m deep, and it is completed near the base of sand and gravel Aquifer 180. The static water level recorded on the well completion record was 14.3 m below ground surface (bgs).

There are three other water wells on the Site completed in Aquifer 180:

- WIDP 28256 located at the NW corner of the Site, approximately 6m from WIDP 65828;
- WTN 55528, which is 27.5 m north of WIDP 28256; and,
- WTN 96740, which is at the southeast corner of the Site.

Both WIDP 28256 and WTN 96470 have been vandalized and are not suitable for water supply or rehabilitation. They are inactive but may be useful as aquifer observation wells for monitoring changes in water levels over time. WIDP 28256 is used intermittently by the neighbouring fire hall to fill water trucks for fire fighting.

The locations of Site water wells are shown in *Appendix B*. Copies of well records and well completion details, where available, are provided in *Appendix C*. A summary of the known details for the four wells on Site is presented in *Table 1*.

Table 1. Summary of on-site water wells

Formal Well Identification	Well Tag No. 55528 (no plate ID #)	(no WTN) Plate ID #. 28256	Well Tag No. 96740 (no plate ID #)	Well Tag No. 127289 Plate ID # 65828
Description of Location *(see Figure 1 for locations)*	NW of property	NW of property	SE of property	NW of property
Provincial Water Well Record Available?	Yes	No *(no other well completion records)*	Yes	Yes
Total Depth of Well	28.7 m (94 ft)	Unknown > 35 m (>114.8 ft)	37.8 m (124 ft)	38.7 m (127 ft)
Estimate of Yield and Method/Source	0.76 L/s (12 US gpm) Driller's estimate (well record)	Potentially greater than 12.6 L/s (200 US gpm) based on step-drawdown pumping test (McElhanney)	5.1 L/s (80 US gpm) Driller's estimate (well record)	9.5 L/s (150 US gpm) Driller's estimate * *Pumping test pending in 2023*
Well Condition	Not assessed	Blocked at 35 m (114.8 ft). No screen observed to 35m (with submersible camera). Attempts by water well contractor to remove blockage were unsuccessful.	Blocked at 10.5 m (34.6 ft) Cause of blockage unknown	New
Use	Occasional use by fire department for filling fire truck (fire fighting)	Inactive. Well condition precludes use for project water supply. Potential for use as aquifer observation well. Otherwise, must be decommissioned.	Inactive. Well condition precludes use for project water supply. Potential for use as aquifer observation well. Otherwise, must be decommissioned.	Intended: water supply for proposed strata development (transfer to CVRD as community water well)

3. Assessment Methods

3.1. AQUIFER CHARACTERIZATION

Aquifer characterization information from public sources was limited. Further aquifer characterization was conducted using groundwater levels and lithology from public water well records and information from the step-rate pumping test conducted on Site water well (WIDP) 28256.

Aquifer characterization results were used in the aquifer water balance assessment and the overall assessment of potential Project impacts to the aquifer.

3.2. AQUIFER WATER BALANCE

An empirical assessment of the aquifer water balance was conducted to evaluate the potential impact of proposed groundwater use on Aquifer 180. Proposed project groundwater use was compared to natural water inputs to the aquifer and to other regional groundwater uses (outputs) from Aquifer 180.

Under natural conditions and over the long term, the inputs to and outputs from an aquifer will balance, leading to stability in groundwater levels within aquifer. Natural water input to the aquifer (recharge) comes from surface infiltration of precipitation and inflow from hydraulically connected aquifers and surface waters (*Figure 4*). Natural water outputs from an aquifer (discharge) include outflows to watercourses and waterbodies (fresh and marine) and outflow to adjacent and hydraulically connected aquifers. Groundwater extraction from wells offsets the natural balance and can reduce storage, lowering the water level in the aquifer, or divert some of the outputs from natural receptors of groundwater like creeks, adjacent aquifers, or (for coastal areas) the ocean. If a small percentage of an aquifer's input or storage is diverted for human uses, the impact on the aquifer will be minimal.

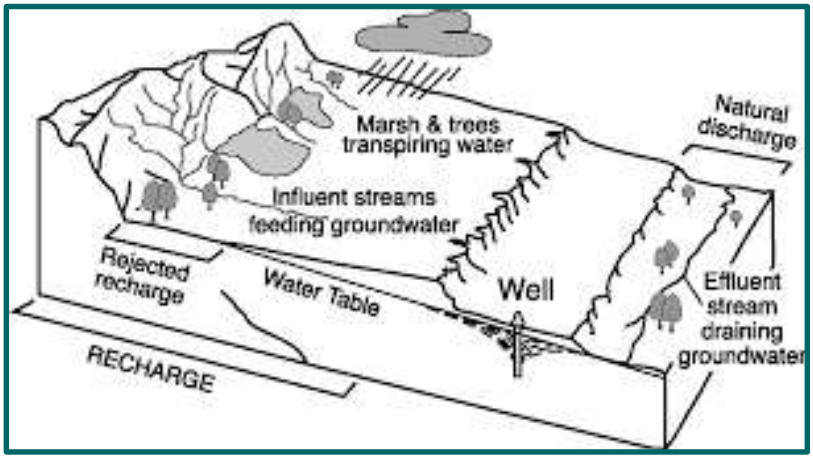

Figure 4. Generalized illustration of inputs to (recharge) and outputs (discharge) from an aquifer

Estimates of recharge (inflow) to Aquifer 180 were calculated using two methods:

1. Calculation of infiltration (groundwater input) as a percentage of regional precipitation within watersheds upslope of the aquifer and over the aquifer footprint:

   *Recharge (m^3/year) = annual precipitation (mm) x % infiltration x aquifer area (km^2) * 1000*

2. Calculation of Darcy Flux across the aquifer, assuming the flux of water flowing through the aquifer stabilizes under natural conditions and over the long term, where inflows equal outflows.

Flux (m^3/year) = width of aquifer (m) x aquifer thickness (m) x hydraulic conductivity (m/yr) x hydraulic gradient

Where aquifer width is perpendicular to groundwater flow, and hydraulic gradient is in the direction of groundwater flow.

The results from the two methods were compared and the most conservative was used to approximate annual water input to the aquifer.

An estimate of existing groundwater diversion from the aquifer for human uses was based on 1,000 m^3/year use from each water well on provincial record[10] within Aquifer 180, plus the added volume from licensed water users. Since groundwater use is rural, treated wastewater is assumed to be discharged to ground through domestic effluent dispersal fields, and thus some of the diverted groundwater will be returned to the aquifer. Considering that Aquifer 180 is confined to semi-confined, only 10% of water diverted from the aquifer was assumed to be returned through infiltration of discharged wastewater.

The anticipated project water demand was then compared to total water inputs to the aquifer and existing groundwater diversions to assess the potential impact of project water use on the aquifer.

3.3. WATER WELL CAPTURE ZONE

The water well capture zone was calculated to assess the area of the aquifer that may be influenced by groundwater diversion from the Project water well to predict potential impacts on neighbouring groundwater users.

The method used follows the Analytical Equations method presented in BC's Well Protection Toolkit – Step Two, for delineating water well capture zones. The water well capture zone was devised based on an averaged, continuous pumping rate of 0.27L/s (4.2 US gpm), per the average daily water demand, and considered 100-day and 1-year times of travel. The resulting capture zones are approximations to illustrate the change in area from which groundwater is drawn from the aquifer over the longer term.

3.4. ASSESSING OTHER ASPECTS OF THE PROPOSED DEVELOPMENT

Onsite sewerage management will consist of a new private septic system on each of the 17 lots. These systems have not yet been designed. It will be up to the developer or purchaser of each lot to ensure qualified professionals are retained to design and install their septic system according to applicable

[10] Based on provincial allocation of 2000 L/day for household domestic uses per private dwelling unit, plus a safety factor to account for unrecorded wells and unlicensed groundwater uses.

regulations, ensuring for example soil and site suitability and adequate setbacks from existing water wells.

As there is no design yet for the stormwater management system, the stormwater management strategy memo was reviewed for how it serves the DP objectives for maximizing aquifer recharge. The stormwater management strategy was reviewed for its consideration of local bylaws promoting infiltration and maintenance of water within the local hydrologic system.

There is no landscape plan for communal spaces within the development project. Any water use for irrigation was assumed to be accounted for in the per capita water use used in the calculated water demand. Landscape development and design will be the responsibility of each individual landowner, and water use for irrigation will be subject to any local bylaws or seasonal water restrictions.

The overall approach and rationale applied to assessing potential aquifer effects from onsite sewerage management, stormwater management and landscaping were described in Section 1.5.

4. Results and Discussion

4.1. AQUIFER CHARACTERIZATION

Regional Water Wells

Based on a review of the online BC WELLS database[11] there are 30 water well records within a 350 m radius of the Site. These wells range in depth from 6.1 to 41.4 m below ground surface (m bgs) and all are completed in sand and gravel Aquifer 180. There are no records for wells in the area that have penetrated the underlying fractured bedrock, Aquifer 182. Reported static water levels in wells completed within Aquifer 180 ranged from 0.9 to 66.8 (m bgs), and the average depth to groundwater was 16.1 m bgs.

Based on review of lithology from water well records, Aquifer 180 is best described as heterogeneous (non-uniform) in nature. It trends to semi-confined or unconfined in nature in the extreme northwest corner of the aquifer footprint, including beneath the Site. It becomes more confined to the south and east of the Site. Well depths tend to be greater to the southwest and shallower to the north and east.

Currently, there are two wells that have been licensed within the footprint of Aquifer 180. There are also several licenses for springs and surface points of diversion on small tributaries to Currie Creek and adjacent to Wake Lake. Most of the extracted volume associated with these other licenses is for localized wetlands management, in which case the pumped water is released down-gradient of the extraction location with potential for infiltration to groundwater and recharge to Aquifer 180.

Aquifer Thickness (*b*)

Regional aquifer thickness was determined by analyzing lithologic data from water well records and identifying water-bearing layers composed of coarse-grained materials. Aquifer thickness appears greater at the northwest, west and southwest areas of the Aquifer (*Figure 3*). The proposed development is in the portion of the aquifer where the thickness is greater. The maximum aquifer thickness is roughly 11 m in the immediate area of the Site.

From a statistical analysis of well records in Aquifer 180, the resulting mean aquifer thickness was approximately 3 m. Recognizing that aquifer thickness is likely under-estimated in domestic wells as they typically do not fully penetrate an aquifer, the mean aquifer thickness is expected to be greater. Domestic wells are usually completed at the top of an aquifer with open-ended casing, to minimize costs to the homeowner.

[11] https://apps.nrs.gov.bc.ca/gwells/

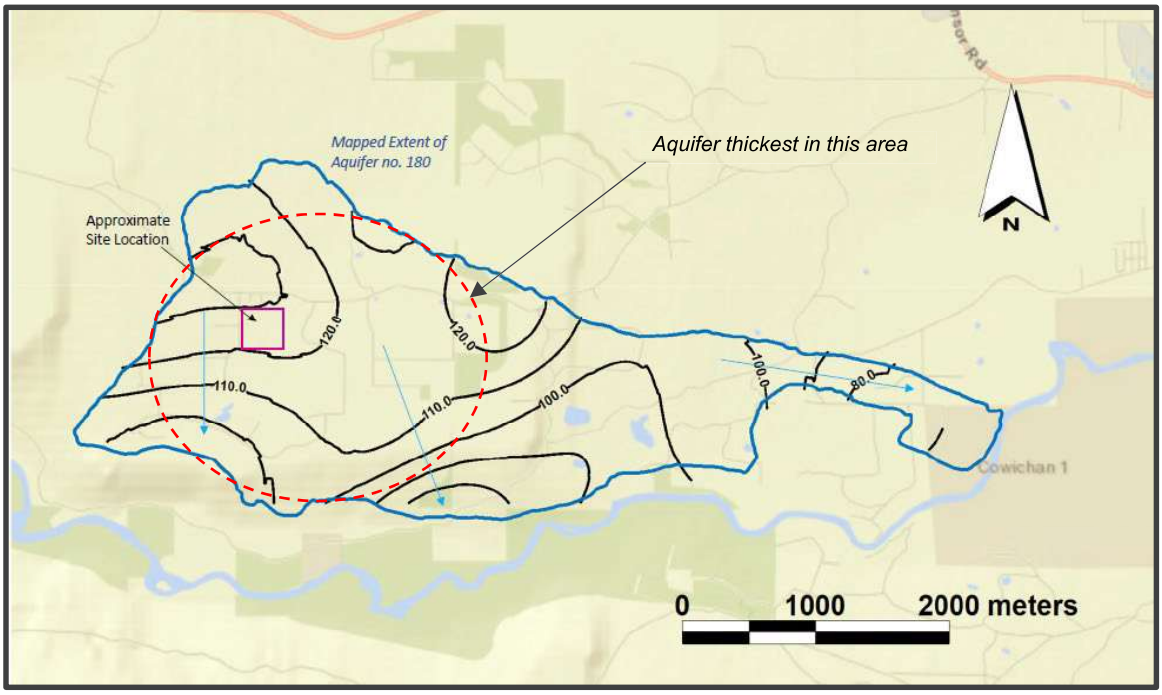

Figure 3. Groundwater elevation contour map for Aquifer 180 (contours in metres above sea level)

Generalized Groundwater Elevations & Flow Direction

Using static groundwater levels and well location coordinates from water well records, along with approximated ground surface elevations obtained from Google Earth, a groundwater elevation contour map was prepared to determine the direction and gradient of flow in Aquifer 180. As shown in *Figure 3*, groundwater flow in Aquifer 180 is to the south, southeast and east towards the Cowichan River[12], which generally follows regional topography. Some groundwater outflow from Aquifer 180 likely occurs to the underlying bedrock aquifer (Aquifer 182).

Hydraulic Gradients

The hydraulic gradient is 0.05 towards the south at the west end of the Aquifer, where aquifer thickness is greatest, and groundwater flow (volume per unit time) is greater. The hydraulic gradient to the east is 0.015, where lower aquifer thickness results in relatively less groundwater flow. Thus, the greatest groundwater resource potential within Aquifer 180 is in the west portion of the aquifer, where it is thickest and where the flow is greatest (*Figure 3*).

[12] While the mapped extent of Aquifer 180 does not reach the Cowichan River to the south, well records show there are wells between the mapped aquifer footprint and the river that are completed in sand and gravel. Thus, there is likely some discharge of groundwater from Aquifer 180 to the Cowichan River. Mapping of Aquifer 180 was conducted in the 1990s and likely could be updated with added lithology information from water wells records added since that time.

Aquifer Transmissivity, Hydraulic Conductivity, and Storage

Local aquifer parameters were derived from a step-drawdown pumping test conducted on a water well on the site (WIDP 28256) that McElhanney supervised in March 2021[13]. Since WIDP 28256 and the new water source well WTN 127189 are only 6 m apart, the calculated aquifer parameters from the step-drawdown test on WIDP 28256 were assumed to be similar and used for further analysis of potential impacts from groundwater diversion from WTN 127189.

From analysis of the test data, it was inferred that Aquifer 180 was semi-confined and leaky in the Project area. Calculated aquifer parameters were transmissivity (T) = 40 m^2/day, hydraulic conductivity (K) = 2 m/day and storage (S) = 0.0012 (dimensionless).

4.2. AQUIFER WATER BALANCE

Average annual precipitation in the area is 1660 mm, based on the mean of data from the web-hosted BC Climate Map (UBC, 2022) and Canadian Climate Normals (1981-2010) for the Duncan Kelvin Creek reporting station (Env. Can., 2022). Much of the annual precipitation occurs from October through April when temperatures are cooler and plants are in a more dormant stage, so precipitation exceeds evapotranspiration in this period and creates groundwater recharge potential (*Table 2*), shown by the negative monthly water deficit.

Table 2. Summary of regional climate data

	Jan (1)	Feb (2)	Mar (3)	Apr (4)	May (5)	Jun (6)	Jul (7)	Aug (8)	Sep (9)	Oct (10)	Nov (11)	Dec (12)	Totals
Precipitation Env. Can. (Kelvin Ck.)	248.2	139.1	135.5	115.1	49.1	36.7	22.3	33.2	31.6	119.5	228.0	290.0	1448.3
Precipitation UBC Atlas (mm)	270.0	233.0	211.0	99.0	64.0	42.0	30.0	42.0	64.0	172.0	280.0	367.0	1874.0
Mean PPT (UBC + Env. Canada)	259.1	186.1	173.3	107.1	56.6	39.4	26.2	37.6	47.8	145.8	254.0	328.5	1661.2
ET,Eref (mm) UBC Atlas (mm)	9	16	33	57	87	105	120	102	64	31	12	7	643
Monthly Water Deficit (mm)	-261	-217	-178	-42	23	63	90	60	0	-141	-268	-360	-1231

In addition to recharge occurring within the aquifer footprint itself, recharge to the aquifer is from upland watersheds to the north of the Site. The area of Aquifer 180 is 8.7 km^2. A portion of infiltrated precipitation falling on adjacent, up-gradient watersheds will also contribute to inflow to Aquifer 180. *Figure 4* illustrates the watershed catchment areas located up-gradient of Aquifer 180. Recently completed water balance estimates for semi-confined and confined aquifer systems in the nearby Cobble Hill area[14], support an assumption that approximately 5% of the precipitation within the upslope watershed and within the aquifer footprint will be available for recharge to Aquifer 180. This calculation using percentage of infiltration of precipitation over the aquifer and adjacent catchments resulted in an estimated annual aquifer recharge of 1,900,000 m^3/yr.

[13] McElhanney technical memo: Preliminary Well Assessments – 5611 Culverton Road, Duncan, BC. Prepared for Whynott Holdings Ltd, November 30th, 2021. File no. 2233-02041-00

[14] Harris, M and S. Usher, 2017. Preliminary groundwater budgets, Cobble-Hill / Mill Bay Area, Vancouver Island, BC. Water Science Series, WSS2017-01, Prov. of BC, Victoria, BC. https://a100.gov.bc.ca/pub/acat/documents/r52917/Cobble_Budget2017_1509144934984_9144072763.pdf

It is acknowledged that Aquifer impacts from regional groundwater extraction will be most notable from May through September when there is little to no natural aquifer recharge. Groundwater will be recharged primarily in the wetter months from October through April.

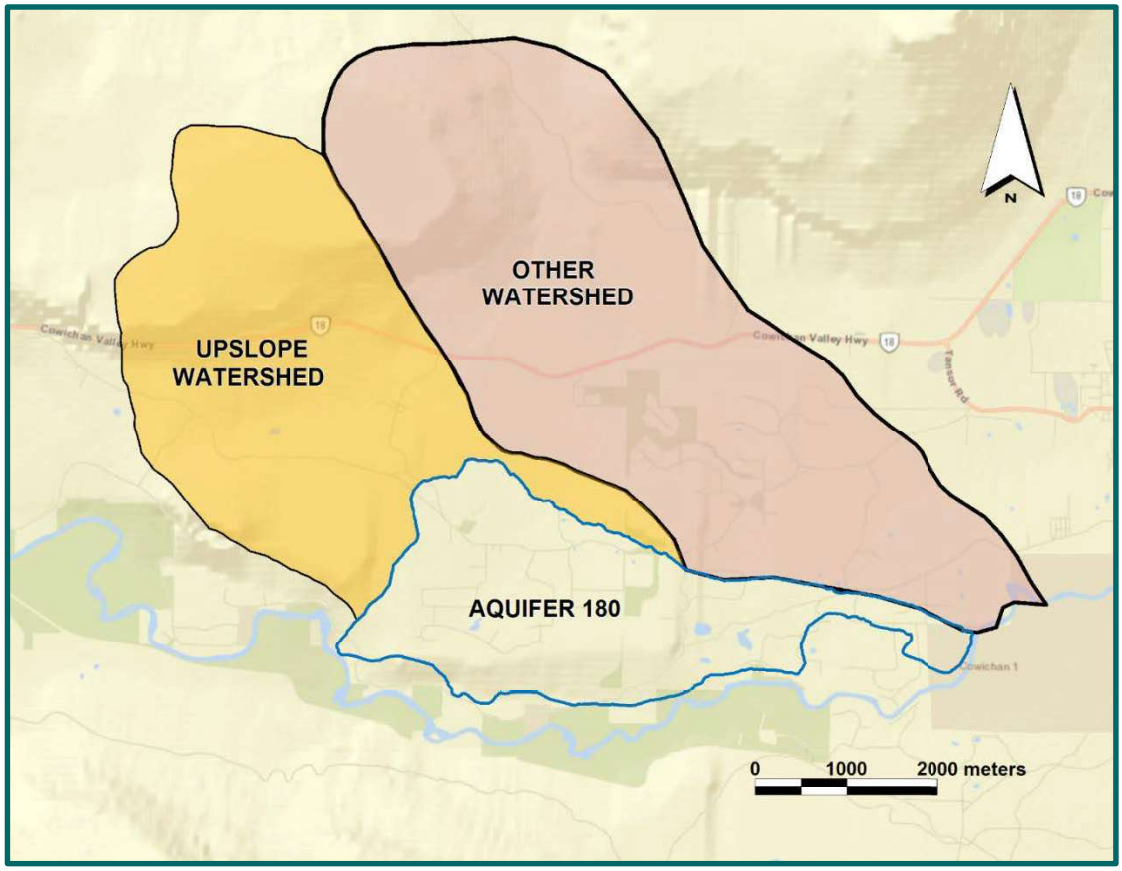

Figure 5. Aquifer 180 and adjacent upslope watersheds

The Darcy Flux method of calculating water input to an aquifer approximates the recharge required to sustain groundwater flow through and the water levels in an aquifer. Darcy Flux is dependent on several aquifer characteristics including transmissivity, aquifer width and thickness, and the hydraulic gradient. These characteristics for Aquifer 180 were discussed in Section 4.1. To calculate Darcy Flux for Aquifer 180 the aquifer was divided into two parts, recognizing two prominent flow directions and hydraulic gradients. Combining the flow from the two parts, the total Darcy Flux in Aquifer 180 was estimated to be 1,400,000 m^3/yr.

Of the two estimates of aquifer recharge, from infiltration of precipitation and from Darcy Flux, the smaller was used for a more conservative estimate of water input to Aquifer 180: 1,400,000 m^3/yr.

The estimated total annual volume of water currently extracted from Aquifer 180 *by others* for human uses was estimated to be 200,000 m^3/yr, or 13% of the total annual recharge. The estimated extraction of groundwater for the Project (8,400 m^3/yr) is equivalent to roughly 0.6% of the annual recharge to Aquifer

180. Adding the proposed Project groundwater use to existing groundwater use by others, would create a total diversion of roughly 14% of the annual aquifer recharge, and roughly a 5% increase in groundwater diversion from the aquifer. The yearly water balance indicates the proposed Project's water demand on this aquifer is low.

4.3. CAPTURE ZONE

The predicted capture zones for planned groundwater diversion from the Project water well are shown in *Figure 6*. Locations of neighbouring wells, based on provincial records, are noted in the figure, and labelled with their WTN. The well labelled as 'NW Well' has no WTN and refers to WIDP 28256. Over longer periods of continuous pumping (e.g., from 100 days to 1 year), the groundwater capture zone only changed significantly in the upgradient direction, lengthening the ellipse of the capture zone. There was no change in the width or downgradient length of the predicted capture zone.

The predicted capture zones extend to the northwest, upgradient from proposed water supply well WTN 127189. The predicted capture zone does not overlap with neighbouring water wells, based on the locations and information available from the Provincial database[15]. Locations and use of water wells on neighbouring properties were not verified as part of this or previous assessments.

The orientation of the illustrated capture zones is based on an interpreted groundwater flow direction. There can be some seasonal variation in groundwater flow directions; however, that variability in groundwater flow direction is not expected to be significantly different than the inferred direction used in this assessment. Groundwater flows also can be altered locally by extraction from local water wells; however, neighbouring wells are for single-family domestic use and thus their influence on flow in the aquifer will be minimal due to their low extraction rates.

A pumping test was conducted in November 2023 to assess the maximum well yield and aquifer characteristics, and McElhanney submitted a report on the test to WHL and to the Ministry in support of a water license application[16]. The test was conducted at a constant pumping rate of 5 L/s (80 US gpm) for 48 hours, which is much greater than the calculated average annual water demand for the proposed development of 0.27 L/s (4.2 US gpm, or 8,400 m^3/year). Analysis of the pumping test data indicated that the potential impact to groundwater levels would be less than 2 m at any neighbouring wells within 650 m of the production well. Considering the actual groundwater diversion rate from the production well will be roughly 5% of the test pumping rate, any impacts to groundwater levels from operation of the water supply well for the proposed development are expected to be negligible.

[15] Accessible through BC Water Atlas and iMap BC: https://maps.gov.bc.ca/ess/hm/wrbc/ and https://maps.gov.bc.ca/ess/hm/imap4m/

[16] McElhanney, 2023. Aquifer Pumping Test (WID 65828) for Water Supply Assessment in Support of a Proposed Strata Development – 5611 Culverton Road, Duncan, BC. Report prepared for Whynott Holdings Ltd. December 18th, 2023. Project number 2233-02041-00.

Figure 6. Illustration of predicted water well capture zones: 100 days (green) and 1-year (blue) times-of-travel. Local water wells are indicated by their well tag numbers.

4.4. POTENTIAL IMPACTS FROM OTHER ASPECTS OF THE PROPOSED DEVELOPMENT

Onsite Sewerage Management

Since wastewater is managed on-site, groundwater diverted for water supply will be returned locally to the environment as treated wastewater via the effluent dispersal fields. Some groundwater recharge to Aquifer 180 will occur from this discharge of treated wastewater. However, it is expected that most of the groundwater diverted for this project will not be returned to Aquifer 180, as it will be transported at shallow depths in the subsurface toward local drainage features and waterbodies or lost through evapo-transpiration in the growing season and warmer months. The proportion of diverted water returned to Aquifer 180 depends on seasonal evapotranspiration rates and vegetation activity/dormancy, as well as the spatial extent of the confining layer overlying the aquifer.

All of the proposed lots are downgradient from the onsite water supply well, and outside of the predicted capture zone. Thus, the proposed wastewater management strategy of private septic systems is not expected to cause a health hazard to the new community water system.

Each of the 17 lots will be sold without wastewater service and it will be the responsibility of the purchaser to create a private wastewater treatment system (*i.e.,* septic system). To reduce the potential for negative impacts to local and downgradient groundwater quality, the design of each septic system must meet the requirements in the provincial Sewerage System Regulation. Only authorized persons can design or construct sewerage systems in BC. Regular maintenance of each the septic system should be conducted per recommendations by the authorized person(s) who designed and/or constructed the system, as mandated in the Sewerage System Regulation (SSR).

The designer of the septic system should:

- confirm that effluent discharge is feasible on the subject lot, and in what areas; and,
- ensure that locations for components of the system are outside of the setbacks from water wells, water bodies, and riparian areas to prevent negative impacts to groundwater quality.

The wastewater effluent fields should be located a suitable distance away from the rock pits to ensure that stormwater infiltration does not interfere with operation of the sewerage management system. Specifically, ensuring that the seasonal maximum water table level and mounding of groundwater from infiltration do not impact the function of the effluent field.

Stormwater Management

Positive impacts from the stormwater management strategy include maintaining infiltration of precipitation from the undeveloped to developed condition, through use of rock-pits and conveyance of water to a natural pond/wetland system. By retaining at least 50% permeable surface per lot and utilizing LID practices, the strategy reduces the volume and velocity of surface runoff, decreasing the risk of erosion and downstream sedimentation.

The risk of groundwater contamination was deemed low, considering the proposed land use is low-density residential. Risk is considered to lie primarily with future landowner behaviour and use or handling of chemicals, rather than the stormwater management strategy.

Infiltration patterns at the Site will change, with decreased infiltration in impermeable areas and increased infiltration at rock pits, but the overall quantity of water infiltrated should remain similar to the pre-development condition.

The potential for negative impacts to groundwater due to infiltration via rock pits was considered low, if adequate groundwater assessment is conducted to ensure the proposed infiltration strategy is feasible. Since groundwater levels fluctuate seasonally, assessment should include determining the seasonal maximum groundwater level and confirmation there is adequate unsaturated thickness of soil during the wet season to allow for groundwater mounding from infiltration. Assessment should also consider whether shallow geologic material can disperse and convey the infiltrated stormwater away from the rock pit.

Landscaping

There is no formal landscaping planned for the few common or ‘natural’ areas outside of the private lots. Areas will be revegetated with functional plants but will not be irrigated in the long term. Given the relatively small size of common areas, the limited duration of irrigation required to establish new vegetation is not expected to have a significant impact on the overall rate of groundwater use or have a long-term impact on the aquifer.

Purchasers of the individual lots will be responsible for their own landscaping. Water use for private irrigation was included in the per capita water demand and is not expected to increase water use for the proposed development.

5. Conclusions & Recommendations

5.1. PRESERVATION OF AQUIFER WATER QUALITY

The proposed development is residential, rather than commercial or industrial; thus, the potential for negative impacts to aquifer water quality is low as compared to other potential land-uses.

The proposed on-site sewerage systems are not expected to adversely impact local aquifers, provided they are designed and installed by authorized persons in accordance with the BC Sewerage System Regulation. These systems will be newly constructed and located outside the predicted capture zone of the Project's water supply well, further reducing the potential for interaction with the proposed community's drinking water source. While malfunctioning or poorly designed systems can affect groundwater quality, adherence to regulatory standards mitigates this risk. Any impacts, if they occur, are anticipated to be minor and localized, with no expected effect on regional aquifers, nearby watercourses, or adjacent groundwater users. In general, regular maintenance of septic systems, as recommended by the system designer, is essential to ensure continued performance and protection of groundwater resources and downstream receptors.

The on-site pond/wetland and infiltration areas identified in the stormwater management strategy are outside of the water well capture zone and thus do not pose a health or water quality risk to the proposed community's water supply. Based on the proposed strategy, the stormwater system is not expected to cause a negative impact to local groundwater quality in the aquifer.

To prevent the old, unused water wells on Site from being conduits for surface contaminants to the aquifer, they must be decommissioned. Per the BC Groundwater Protection Regulation[17], if a well has not been in service for 5 years, it shall be decommissioned (Part 9, Section 71).

5.2. PRESERVATION OF GROUNDWATER LEVELS AND NATURAL FLOWS

Groundwater diversion for water supply will have a localized impact on groundwater levels; however, from capture zone analysis, predicted changes to groundwater levels are not expected to impact neighbouring groundwater users. Based on results from a pumping test conducted in November 2023, any changes to groundwater levels at neighbouring water wells are expected to be negligible.

There is no landscaping planned for the proposed development. Water for irrigation was included in the per capita water use and considered in the overall groundwater demand calculations.

Impacts to the aquifer from groundwater diversion will be greatest from May through September, when precipitation and regional aquifer recharge are lowest and per capita water use tends to be highest (e.g. for irrigation). Groundwater diversion for the project is estimated to equate to roughly 0.6% of the overall

[17] B.C. Reg. 39/2016. O.C. 113/2016. Last amendment Dec. 1, 2022 by BC Reg 253/2022. https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/39_2016

annual recharge to Aquifer 180, and a 5% increase to the estimated current groundwater diversion; thus, the anticipated impact of the proposed development on local groundwater resources is considered low. To mitigate aquifer impacts in drier months, water use restrictions are recommended, similar to those implemented by the regional district.

Diverted groundwater will return to the environment through treated wastewater via the individual septic systems, and some recharge to the aquifer will occur from this discharge of treated wastewater. The proportion of diverted water returned to the aquifer depends on seasonal evapotranspiration rates and vegetation activity/dormancy, as well as the extent and continuity of fine-grained material overlying the aquifer and whether it permits local aquifer recharge.

The stormwater management strategy promotes local groundwater recharge through retention of stormwater and LID practices. Infiltration patterns at the Site will change, with decreased infiltration in impermeable areas and increased infiltration at rock pits, but the overall quantity of water infiltrated should remain similar to the pre-development condition.

The potential for negative impacts to groundwater due to infiltration via rock pits was considered low, if adequate groundwater assessment is conducted to ensure the proposed infiltration strategy is feasible. Since groundwater levels fluctuate seasonally, assessment should include determining the seasonal maximum groundwater level and confirmation there is adequate unsaturated thickness of soil during the wet season to allow for groundwater mounding from infiltration. Assessment should also consider whether shallow geologic material can disperse and convey the infiltrated stormwater away from the rock pit.

6. Limitations

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APPENDIX A

Development Permit Area 4: Aquifer Protection

(Excerpt from CVRD's Official Community Plan for Electoral Areas Bylaw No. 4270, Schedule C)

Development Permit Area 4: Aquifer Protection

Development Permit Area

DPA 4 – Aquifer Protection designated the following areas a development permit area:

- those parts of electoral areas A, B, C, D, E, F, G and I of the Cowichan Valley Regional District included in the provincial Ground Water Aquifers dataset, and those parts of electoral area H, shaded purple on Schedule U, UDPA4 Aquifer Protection - Regional.

The quality of surface and groundwater is affected by both natural factors, such as geology or climate, and human-caused factors related to land-use. Agricultural activities, sewage discharges, landfills or industrial composting can provide sources of nutrients, such as phosphorus or nitrogen, that influence the water quality within nearby aquifers and streams.

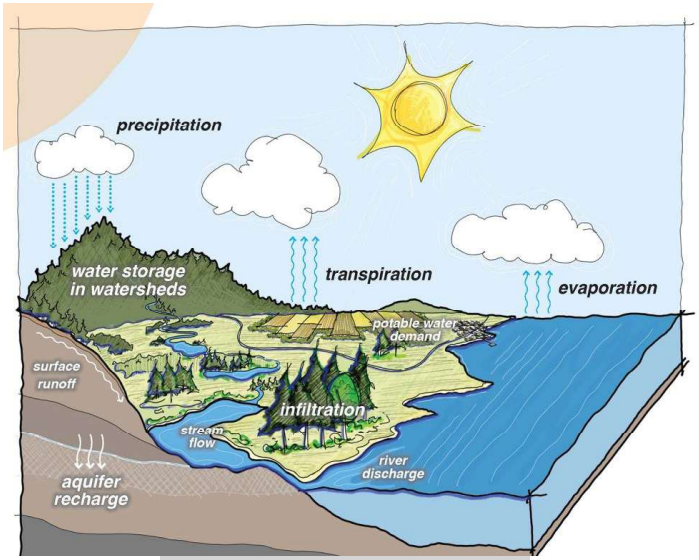

Figure 1-4: The Hydrological Cycle

It is important to protect the quality of aquifer water and to ensure its quantity is not unduly diminished by human overuse and by reductions in the surficial flows on which it depends for replenishment. In short, the ongoing health of aquifers depends on a combination of protection from contamination and promotion of efficient and frugal use of water supplies.

Basis for Designation

These areas are designated development permit areas in order to establish guidelines

- to protect the natural environment, its ecosystems and biological diversity pursuant to section 488(1)(a) of the *Local Government Act*; and
- to conserve water pursuant to section 488(1)(i) of the *Local Government Act*.

Justification for Designation

Access to clean, uncontaminated water supplies for domestic use is a critical priority for Cowichan Valley communities. A significant portion of Cowichan Valley Regional District households and commercial enterprises depend on aquifers for their daily water use. Aquifers in the region are vulnerable both to the impacts of drought and overuse on recharge capabilities and to the impacts of contamination on water quality.

The objectives of the guidelines for aquifer protection are to

- protect subsurface aquifers from contamination by land use and development activities; and
- avoid depletion of aquifer water supplies, maximize their recharge and promote the efficient use of water to ensure a stable and sustainable hydrologic system.

Permit Exemptions

Under section 489 of the *Local Government Act*, the following activities in an area designated as a development permit area for the purpose of water conservation are prohibited without a development permit or an exemption:

a. subdivision of land;
b. construction of, addition to or alteration of a building or other structure; and
c. alteration of land or a building or other structure on that land.

In DPA 4, the following activities are exempt from the above requirements and do not need a development permit:

a. construction of, addition to or alteration of a single detached dwelling including accessory structures.

The following activities are also exempt from the requirement for a development permit:

a. removal of trees certified by an arborist to be hazardous;
b. maintenance of existing lawns and gardens;
c. removal of invasive plants and planting of native plants;
d. repair and maintenance of existing structures; and
e. forest management activities as described in Schedule A to the Private Managed Forest Land Regulations that are occurring on private managed forest land.

These criteria are applied differently depending on whether a development permit application relates to an existing development or a new development.

Application Requirements

AP-AR1 Prior to construction or excavation, along with a development permit application submit a report, prepared by a qualified environmental professional, that analyzes the impacts of proposed development on aquifers in the development permit area.

Permit Guidelines

General

AP1. Plan and undertake development activities in a manner that complies with B.C. and federal government guidelines for best management practices, including

a. Develop with Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia Government of British Columbia, 2014; and
b. Natural Resource Best Management Practices Government of British Columbia.

AP2. Follow B.C. and federal government best management practices for the protection of water quality and quantity in surface and groundwater hydrologic systems, including

a. Integrated Rainwater and Groundwater Management Water Sustainability Action Plan for British Columbia, 2012;
b. Land Development Guidelines for the Protection of Aquatic Habitat. Fisheries and Oceans Canada, 1993; and
c. Stormwater Planning. Government of British Columbia, 2002.

Protection of Aquifers from Contamination and Depletion

AP3. Do not construct any septic tank, storage tank, drainage, irrigation or water system in any area identified as having unstable soils or water laden lands subject to degradation. The development permit may allow individual and low-density septic disposal systems only if there is adequate investigation and monitoring to assess the effects of the proposal on the groundwater regime and the steps taken to mitigate degradation.

AP4. Ensure sewage treatment and disposal methods meet the requirements of the most recent Liquid Waste Management Plans.

Classifications of Aquifers

Groundwater levels are not declining everywhere across the province, but rather in localized areas where there is intensive groundwater withdrawal and urban development. The provincial map-based aquifer classification system categorizes aquifers based on their current level of development (use) and vulnerability to contamination, and ranks them to indicate their relative importance.

The classification system shows that some communities in B.C. are highly dependent on groundwater and particularly vulnerable to problems with water supply and groundwater contamination. These areas include the Lower Mainland, Okanagan, east coast of Vancouver Island and the Gulf Islands.

In addition to declining quantity, groundwater quality is also at risk in many urbanizing areas where contaminants from land uses may eventually enter aquifers in unacceptable quantities, causing public health threats and compromising long-term sustainability.

Groundwater Bylaws Toolkit. Okanagan Basin Water Board, 2009

AP5. Locate, design, construct and maintain buildings, structures and uses involving the transportation, storage or use of materials, chemicals, compounds or substances that could contaminate an aquifer or groundwater, including materials or substances used during land alteration and construction activities, to minimize the possibility of contamination.

AP6. Implement landscape approaches such as xeriscaping that minimize watering requirements, preserve native vegetation and use non-invasive plant species suited to the local climate.

Image 13: Landscape designs with native plant species reduce water demand for irrigation.

Table 1: Aquifers in the Cowichan Valley Regional District (Source: Ground Water Aquifers, Ministry of Environment and Climate Change Strategy, 2019)

Aquifer Name / Number	Location Description	Electoral Area
Lower Cassidy	Cassidy	H*
Cassidy	Cassidy	H*
162	Cedar, Yellow Point, N. Oyster (Ladysmith)	H*
168	Ladysmith	H*
169	Saltair, South Ladysmith	G
170	Panorama Ridge, Chemainus	G
178	Skutz Falls, Lake Cowichan, Paldi	F
179	Sahtlam	E, F
180	Sahtlam	E, F
181	West Duncan	E
182	Paldi – Sahtlam	E, F
183	West Duncan	E
185	Deerholm, South Duncan	E
Lower Cowichan River A	Duncan	D, E
Lower Cowichan River B	Duncan	D
Lower Cowichan River C	Duncan	D
189	Honeymoon Bay & Mesachie Lake	F
190	Youbou	I
191	North Lake Cowichan	I
192	North Lake Cowichan	F, I
196	Deerholm / Duncan	B, E
197	Cowichan Bay / Cobble Hill	A, B, C, D, E
198	Cowichan Station / Duncan	B, D, E
199	Cowichan Station	B, C, E
200	Cobble Hill / Duncan	B, E
201	Cobble Hill	B
202	Shawnigan Lake / Cobble Hill	B, C
203	Shawnigan Lake / Cobble Hill	B
204	Cobble Hill / Mill Bay	A, B, C
205	Cobble Hill / Shawnigan Lake	A, B
206	Mill Bay	A
207	Mill Bay / Shawnigan Lake	A, B
208	Spectacle Lake / Malahat	A, B
945	Northeastern shore of Cowichan Lake	F, I
946	Northeastern shore of Cowichan Lake	I
947	East shore of Mesachie Lake	F
948	West shore of Marble Bay, Cowichan Lake	I
949	East shore of Mesachie Lake	F
962	Ladysmith, BC	H*
964	Cassidy – Nanaimo Airport	H*

* Discrepancy with areas mapped in Area H. Area H mapped as per Electoral Area H – North Oyster/Diamond Official Community Plan, Bylaw 1497.

APPENDIX B

Conceptual Development Plan

LEGEND:

- EXISTING PROPERTY LINE & IRON PIN
- PROPOSED SETBACK
- WETLAND
- SPEA BOUNDARY
- ENVIRONMENTAL SENSITIVITY ZONE
- PROPOSED TRAIL
- EXISTING WELL
- PROPOSED WELL

Rev.	Date	Description	Drawn	Design	Appd
PB	2025-01-13	ISSUED FOR INFORMATION ONLY	RPH	RPH	JI
PA	2024-10-15	ISSUED FOR INFORMATION ONLY	RPH	RPH	JI

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ORIGINAL DWG SIZE: ARCH D (24" x 36")

0 1:600 30

McElhanney
Suite 107
225 Canada Avenue
Duncan BC
Canada V9L 1T6
T 250 748 3335

PRELIMINARY
NOT FOR
CONSTRUCTION

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

WHYNOTT HOLDINGS
2467 MILL BAY ROAD, MILL BAY, BC, V0R 2P4

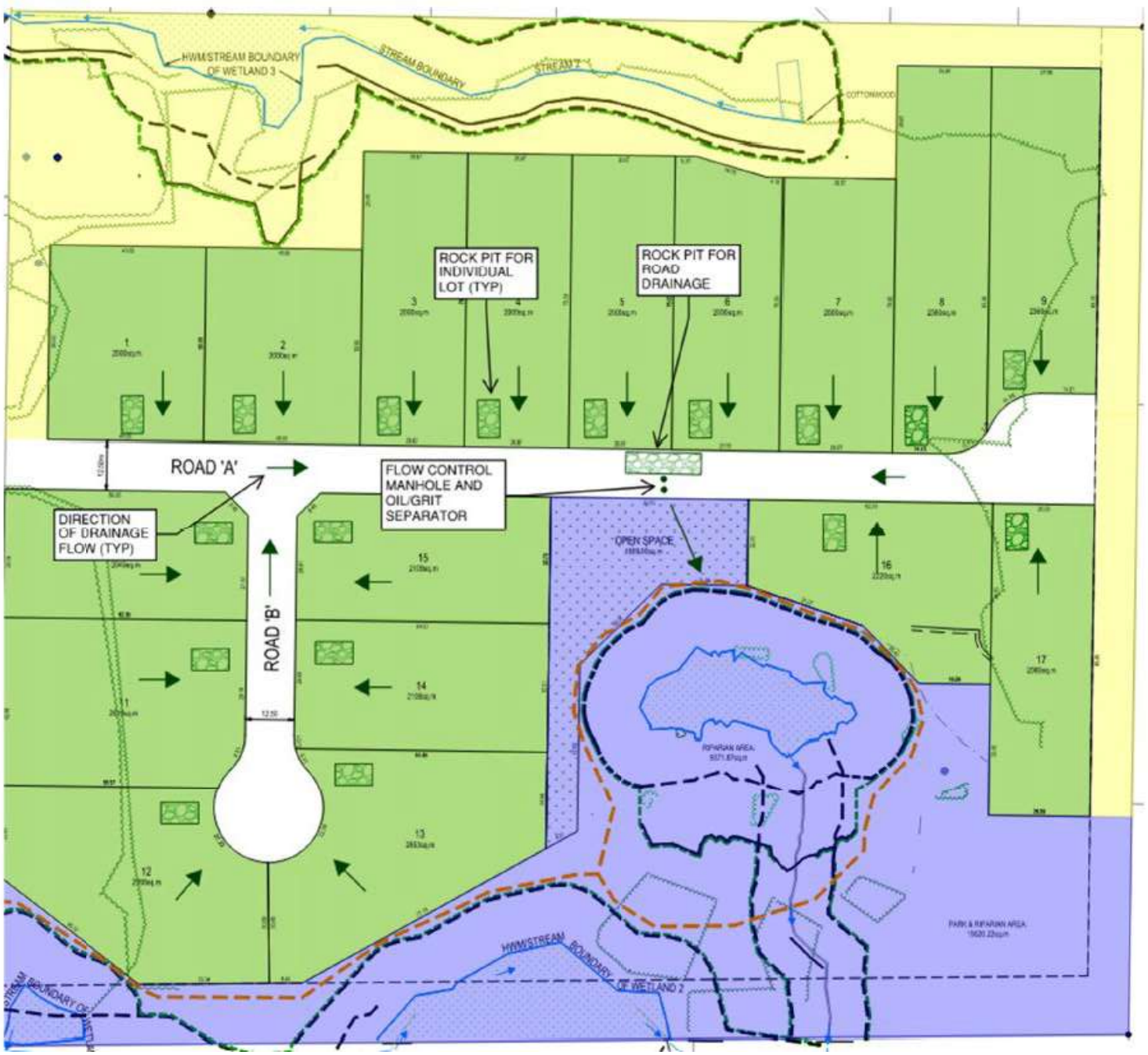
5611 CULVERTON ROAD STRATA DEVELOPMENT
LOT LAYOUT PLAN
OPTION 2

Drawing No.
SK-2

Project Number
2231-02000-00

Rev.
PB

STORMWATER MANAGEMENT STRATEGY CONCEPT



SOURCE: McElhanney, 2025. Technical Memo: 5611 Culverton Road – Stormwater Management Strategy. Prepared for Larry Davidson, Whynott Holdings, April 3, 2025. File no. 2233-02041-00.

APPENDIX C

Water Well Records and Well Completion Records
(On-Site Water Wells)

Item 6.4

Groundwater Wells and Aquifers

Well Summary

Well Tag Number: 127289
Well Identification Plate Number: 65828
Owner Name: Whynott Holdings Ltd.
Intended Water Use: Water Supply System
Artesian Condition: No

Well Status: New
Well Class: Water Supply
Well Subclass: Not Applicable
Aquifer Number:
Technical Report: N/A

Observation Well Number:
Observation Well Status:
Environmental Monitoring System (EMS) ID:
Alternative specs submitted: No

Licensing Information

Licensed Status: Unlicensed
Licence Number:

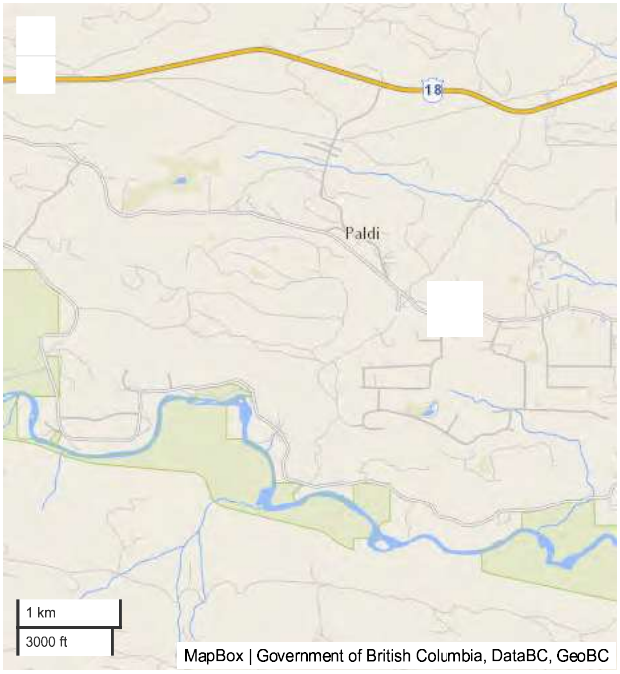
Location Information

Street Address: 5611 Culverton Road
Town/City: Duncan

Legal Description:

Lot	1
Plan	VIP12309
District Lot	
Block	
Section	8
Township	
Range	6
Land District	50
Property Identification Description (PID)	003851168

Description of Well Location:



Geographic Coordinates - North American Datum of 1983 (NAD 83)
Latitude: 48.77557
Longitude: -123.83735
UTM Easting: 438480
UTM Northing: 5402846
Zone: 10
Coordinate Acquisition Code: (10 m accuracy) Handheld GPS with accuracy of +/- 10 metres

Well Activity

Activity	Work Start Date	Work End Date	Drilling Company	Date Entered
Construction report	2022-10-25	2022-10-28	Drillwell Enterprises Ltd.	January 12th 2023 at 1:24 PM

Well Work Dates

Start Date of Construction	End Date of Construction	Start Date of Alteration	End Date of Alteration	Start Date of Decommission	End Date of Decommission
2022-10-25	2022-10-28				

Item 6.4

Well Completion Data

Total Depth Drilled: 147 ft bgl
Finished Well Depth: 127 ft bgl
Final Casing Stick Up: 24 inches
Depth to Bedrock: 147 feet bgl
Ground elevation: 496 feet

Estimated Well Yield: 150 USgpm
Well Cap: Hinge and lock
Well Disinfected Status: Disinfected
Drilling Method: Dual Rotary
Method of determining elevation: GPS

Static Water Level (BTOC): 47 feet btoc
Artesian Flow:
Artesian Pressure (head):
Artesian Pressure (PSI):
Orientation of Well: VERTICAL

Lithology

From (ft bgl)	To (ft bgl)	Raw Data	Description	Moisture	Colour	Hardness	Observations	Water Bearing Flow Estimate (USGPM)
0	44	Gravel, coarse		Moist	brown	Loose	Loose/medium	
44	85	Till, silty gravel, silt layers		Damp	grey	Hard	Hard/stiff	
85	124	Sand, gravel coarse zones		Wet	grey	Loose	Sandy zones	
124	147	Till, very silty gravel		Damp	grey	Hard		

Casing Details

From (ft bgl)	To (ft bgl)	Casing Type	Casing Material	Diameter (in)	Wall Thickness (in)	Drive Shoe
0	17		Steel Pulled Out	10		
0	147		Steel	8	0.322	Installed

Surface Seal and Backfill Details

Surface Seal Material: Bentonite clay
Surface Seal Installation Method: Poured
Surface Seal Thickness: 1 inches
Surface Seal Depth: 17 feet

Backfill Material Above Surface Seal:
Backfill Depth:

Liner Details

Liner Material:
Liner Diameter:
Liner from:

Liner Thickness:
Liner to:

Liner perforations

From (ft bgl)	To (ft bgl)
There are no records to show	

Screen Details

Intake Method: Screen
Type: Telescope
Material: Stainless Steel
Opening: Continuous Slot
Bottom: Plate

Installed Screens

From (ft bgl)	To (ft bgl)	Diameter (in)	Assembly Type	Slot Size
99.00	101.00	7.00	K_RISER	
101.00	106.00	7.00	SCREEN	100.00
106.00	116.50	7.00	SCREEN	50.00
116.50	122.00	7.00	SCREEN	100.00
122.00	127.00	7.00	TAIL_PIPE	

Well Development

Developed by: Air lifting, Bailing

Development Total Duration: 15 hours

Well Yield

Estimation Method: Air Lifting
Static Water Level Before Test:
Hydrofracturing Performed: No

Estimation Rate: 150 USgpm
Drawdown:
Increase in Yield Due to Hydrofracturing:

Estimation Duration: 4 hours

Well Decommission Information

Reason for Decommission:
Sealant Material:
Decommission Details:

Method of Decommission:
Backfill Material:

Item 6.4

Comments

No comments submitted

Documents

- WTN 127289_#65828 Whynott Holdings, 5611 Culverton Rd, Duncan.pdf

Disclaimer

The information provided should not be used as a basis for making financial or any other commitments. The Government of British Columbia accepts no liability for the accuracy, availability, suitability, reliability, usability, completeness or timeliness of the data or graphical depictions rendered from the data.

BRITISH COLUMBIA

☒ Well Construction Report
☐ Well Alteration Report

DRILLWELL ENTERPRISES LTD.
4994 Polkey Road
Duncan, B.C. V9L 5W3
Phone: 250-746-5268
Stamp company name/address/ phone/fax/email here, if desired.

Ministry Well ID Plate Number: 65828
Where ID Plate is attached: on well casing
Ministry Well Tag Number: _____

See reverse for notes & definitions of abbreviations.

Well Class: Class of well (see note 2): Water Supply **Sub-class of well:** Domestic
Water supply wells: indicate intended water use: ☐ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify): _____
Start date of work (YYYY/MM/DD): 2022/10/25 **End date of work** (YYYY/MM/DD): 2022/10/28

Person Responsible for Work (print clearly): **Name (first, last)** (see note 3): Scott Burrows
Person who completed the work: Scott Burrows **Registration no.** (see note 4): WD04121407
Consultant (if applicable; name and company): Mike Harris @ McElhanney
DECLARATION: Well construction, well alteration or well decommission, as the case may be, has been done in accordance with the requirements in the Water Sustainability Act and the Ground Water Protection Regulation.
Signature of Person Responsible S Burrows

Owner name: Whynott Holdings Ltd.
Mailing address: 2467 Mill Bay Rd Town Mill Bay Prov. BC Postal Code V0R 2P4
Well Location (see note 6): Address: Street no. 5611 Street name Culverton Road Town Duncan
(or) **Legal description:** Lot 1 Plan VIP12309 D.L. _____ Block _____ Sec. 8 Twp. ___ Rg. 6 Land District 50
(or) **PID:** 003-851-168 (and) **Description of well location (attach sketch, if nec.):** _____

Well Location:
NAD 83: Zone: 10 (see note 7) (and) **UTM Easting:** 0438480 m **UTM Northing:** 5402846 m (or) **Latitude** (see note 8): _____ **Longitude:** _____
Method of drilling: ☒ air rotary ☒ dual rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ other (specify): _____
Orientation of well: ☒ vertical ☐ horizontal Ground elevation: 496' ft (asl) Method (see note 9): GPS

Lithologic description (see notes 10-15)

From ft (bgl)	To ft (bgl)	Material Description	Moisture: Dry	Damp	Moist	Wet	Colour: Black	Blue	Brown	Green	Grey	Vari-coloured	Red	Tan	White	Hardness: Dense	Hard	Loose	Medium	Soft	Stiff	Very Hard	Very Soft	Observations (e.g. other geological materials (e.g. boulders), est. water bearing flow (USgpm))
0	44	Gravel, coarse		X	X				X									X	X					
44	85	Till + silty gravel, Silt layer	X								X						X				X			
85	124	Sand + Gravel coarse Zones			X						X							X						Sandy Zones
124	147	Till, Very silty Gravel	X								X						X							

Casing Details:
Type: ☐ Surface ☐ Production ☐ Open Hole ☐ Steel Removed

From ft(bgl)	To ft (bgl)	Dia in	Casing Material/Open Hole (see note 16)	Wall Thickness in	Drive Shoe
0	17'	10"	Steel/Removed	—	—
0	147'	8"	Steel	.322	DR

Surface seal: Type: Bentonite Depth: 17' ft
Method of installation: ☒ Poured ☐ Pumped Thickness: 1" in
Backfill: Type: _____ Depth: _____ ft
Liner: ☐ PVC ☐ Other (specify): _____
Diameter: _____ in Thickness: _____ in
From: _____ ft (bgl) To: _____ ft (bgl)
Perforated: From: _____ ft (bgl) To: _____ ft (bgl)

Screen details:

From ft(bgl)	To ft (bgl)	Dia in	Type (see note 17)	Slot Size
99'	101'	7"	Riser + K Packer	—
101	106	7.00"	S.S Screen	.100"
106'	116.5	7"	SS Screen	.050"
116.5	122	7"	SS Screen	.100"

Intake: ☒ Screen ☐ Open bottom ☐ Uncased hole 122'-127' Sump
Screen type: ☒ Telescope ☐ Pipe size
Screen material: ☒ Stainless steel ☐ Plastic ☐ Other (specify): _____
Screen opening: ☒ Continuous slot ☐ Slotted ☐ Perforated pipe
Screen bottom: ☐ Bail ☒ Plug ☒ Plate ☐ Other (specify): _____
Filter pack: From: _____ ft To: _____ ft Thickness: ____ in
Type and size of material: _____

Developed by: ☒ Air lifting ☒ Bailing ☐ Jetting ☐ Pumping ☐ Surging ☐ Other (specify): _____ Total duration: 15 hrs
Notes: _____
Well yield estimated by: ☐ Pumping ☒ Air lifting ☐ Bailing ☐ Other (specify): _____
Rate: 150 USgpm Duration: 4 hrs SWL before test: _____ ft (btoc) Drawdown: _____ ft (btoc)
Hydro-fracturing: ☐ Yes ☒ No Increase in Well Yield due to Hydro-fracturing: _____ USgpm

Water Quality: Water sample collected: ☒ Yes ☐ No
Date (YYYY/MM/DD) _____ Water quality odour: _____
Characteristics: ☒ Clear ☐ Cloudy ☒ Fresh ☐ Gas ☐ Salty ☐ Sediment ☐ Other (specify): _____
Colour: ☐ Black ☐ Black flecks ☐ Brown ☐ Clear/none ☐ grey ☐ Slight colour/milky ☐ Orange ☐ Other (specify): _____
Comments: _____

Final well completion data:
Total depth drilled: 147' ft Finished well depth: 127 ft (bgl)
Final casing stick up: 24" in Depth to bedrock: 147 ft (bgl)
SWL: 47 ft (btoc) Estimated well yield: 150 USgpm
Artesian flow: _____ USgpm, or Artesian pressure: _____ ft
Type of well cap: Hinged Lock Well disinfected: ☒ Yes ☐ No

☐ **Confirmation/alternative specs. attached**
☐ **Original well construction report attached**

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction or alteration, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time.

white: Customer copy
canary: Driller copy
pink: Ministry copy

Sheet 1 of 1

Item 6.4

Groundwater Wells and Aquifers

Well Summary

Well Tag Number: 55528
Well Identification Plate Number:
Owner Name: SAHTLAM VOL FIRE DEP
Intended Water Use: Water Supply System
Well Status: New
Well Class: Water Supply
Well Subclass: Not Applicable
Aquifer Number: 180
Observation Well Number:
Observation Well Status:
Environmental Monitoring System (EMS) ID:
Alternative specs submitted: No

Licensing Information

Licensed Status: Unlicensed
Licence Number:

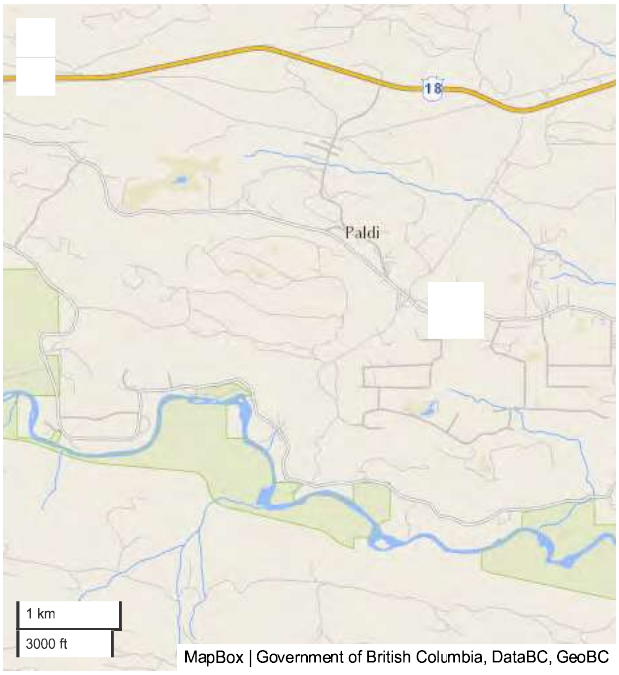
Location Information

Street Address: CULVERTON ROAD
Town/City: DUNCAN

Legal Description:

Lot	1
Plan	12309
District Lot	
Block	
Section	8
Township	
Range	6
Land District	50
Property Identification Description (PID)	

Description of Well Location:



Geographic Coordinates - North American Datum of 1983 (NAD 83)
Latitude: 48.775367
Longitude: -123.837342
UTM Easting: 438480
UTM Northing: 5402823
Zone: 10
Coordinate Acquisition Code: (10 m accuracy) ICF cadastre and good location sketch

Well Activity

Activity	Work Start Date	Work End Date	Drilling Company	Date Entered
Legacy record	1985-11-13		Drillwell Enterprises	August 13th 2003 at 4:21 AM

Well Work Dates

Start Date of Construction	End Date of Construction	Start Date of Alteration	End Date of Alteration	Start Date of Decommission	End Date of Decommission
1985-11-13					

Item 6.4

Well Completion Data

Total Depth Drilled:
Finished Well Depth: 94 ft bgl
Final Casing Stick Up:
Depth to Bedrock:
Ground elevation:
Static Water Level: 49 feet btoc
Estimated Well Yield: 12 USgpm
Artesian Flow:
Artesian Pressure:
Method of determining elevation: Unknown
Well Cap:
Well Disinfected Status: Not Disinfected
Drilling Method: Other
Orientation of Well: VERTICAL

Lithology

From (ft bgl)	To (ft bgl)	Raw Data	Description	Moisture	Colour	Hardness	Observations	Water Bearing Flow Estimate (USGPM)
0	45	Brown silty sand and gravel						
45	57	Silty brown sand, water-bearing						
57	64	Silty brown sand and gravel, water-bear-						
0	0	ing						
64	76	Very silty grey gravel						
76	94	Cleaner grey sand and gravel						

Casing Details

From (ft bgl)	To (ft bgl)	Casing Type	Casing Material	Diameter (in)	Wall Thickness (in)	Drive Shoe
There are no records to show						

Surface Seal and Backfill Details

Surface Seal Material:
Surface Seal Installation Method:
Surface Seal Thickness:
Surface Seal Depth:
Backfill Material Above Surface Seal:
Backfill Depth:

Liner Details

Liner Material:
Liner Diameter:
Liner from:
Liner Thickness:
Liner to:

Liner perforations

From (ft bgl)	To (ft bgl)
There are no records to show	

Screen Details

Intake Method:
Type:
Material:
Opening:
Bottom:

Installed Screens

From (ft bgl)	To (ft bgl)	Diameter (in)	Assembly Type	Slot Size
There are no records to show				

Well Development

Developed by:
Development Total Duration:

Well Yield

Estimation Method:
Static Water Level Before Test:
Hydrofracturing Performed: No
Estimation Rate:
Drawdown:
Increase in Yield Due to Hydrofracturing:
Estimation Duration:

Well Decommission Information

Reason for Decommission:
Sealant Material:
Decommission Details:
Method of Decommission:
Backfill Material:

Item 6.4

Comments

EST. WELL YIELD: 12 GPM. METHOD OF DRILLING = DRILLED

Alternative Specs Submitted: No

Documents

- WTN 55528_Well Record.pdf

Disclaimer

Item 6.4

Province of British Columbia Ministry of Environment Water Investigations Branch

WATER WELL RECORD

Date 85/11/13 (YR MO DY)

Legal Description & Address

Descriptive Location

Owners Name & Address Sahtlam V.F.D. Tank on Culverton Rd. Duncan area

NTS MAP ELEV WELL No.

UTM Z E N UTM Date 19

1. TYPE OF WORK 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD 1 ☐ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☑ Rotary a ☐ mud b ☑ air c ☐ reverse 5 ☐ Other

3. WATER WELL USE 1 ☐ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Commercial & Industrial 5 ☐ Other

4. DRILLING ADDITIVES

5. MEASUREMENTS from 1 ☑ ground level 2 ☐ top of casing

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	45	Brown Silty Sand and Gravel	
45	51	Silty Brown Sand - Water Bearing	
51	64	Silty Brown Sand and Gravel - Water Bearing	
64	76	Very Silty Grey Gravel	
76	94	Cleaner Grey Sand and Gravel	

7. CONSULTANT

Address

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete 6 ☐ Other

							units
Hole Diameter	6						ins
Diameter	6						ins
from	~~+1~~ 0						ft
to	94						ft
Thickness	.250						ins
Weight							lb/ft

Pitless unit ft 1 ☐ above 2 ☐ below ground level

1 ☐ Welded 2 ☐ Cemented 3 ☐ Threaded 4 ☐ New 5 ☐ Used

Perforations:

Shoe (s): 1

Open hole, from to ft Diameter ins

Grout:

10. SCREEN: 1 ☐ Nominal 2 ☐ Pipe Size

Type 1 ☐ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre 4 ☐ Other

Material 1 ☐ Stainless Steel 2 ☐ Plastic 3 ☐ Other

Set from to ft below ground level

SCREEN & BLANKS							units
Length							ft
Diam. I D							ins
Slot Size							ins
from							ft
to							ft

Fittings, top bottom

Gravel Pack

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Jetting 3 ☑ Air 4 ☐ Bailing 5 ☐ Pumping 6 ☐ Other

12. TEST 1 ☐ Pump 2 ☐ Bail Date (YR MO DY)

Rate USgpm Temp °C SWL before test ft

ft after test of hrs mins

TIME in mins & DRAWDOWN in ft				TIME in mins & RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13. RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
	ft	USgpm

14. WATER TYPE: 1 ☑ fresh 2 ☐ salty 3 ☐ clear 4 ☐ cloudy

colour smell ; gas 1 ☐ yes 2 ☐ no

15. WATER ANALYSIS: 1 ☐ Hardness mg/ℓ 2 ☐ Iron mg/ℓ 3 ☐ Chloride mg/ℓ 4 ☐ pH

Field Date

SITE I D No

Lab Date (YR MO DY)

16. FINAL WELL COMPLETION DATA

Well Depth 94 ft Water Flowing 12 US gpm

Static Water Level 49 ft Pressure Head ft

Back filled

Well Head Completion

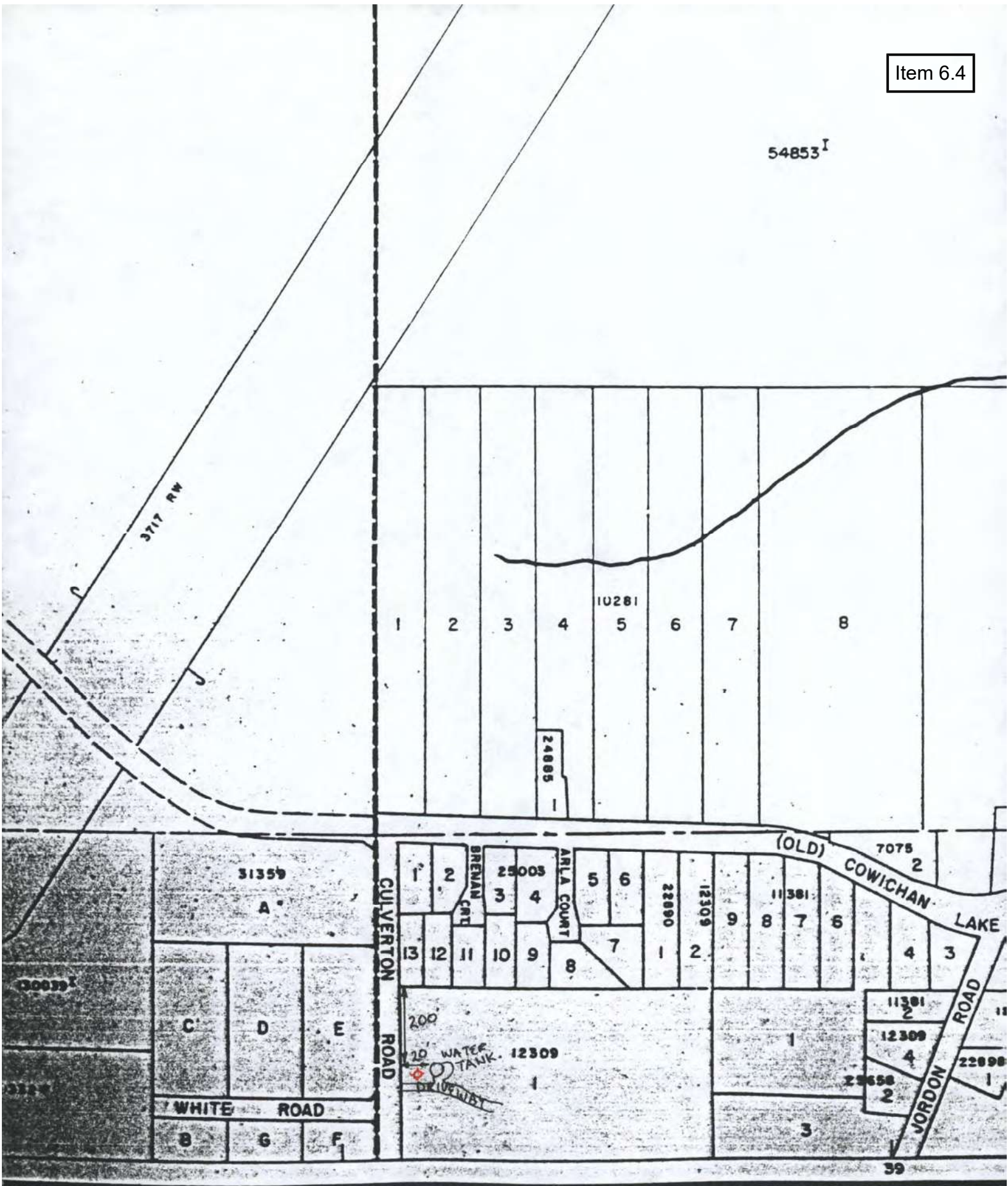
17. DRILLER (PLEASE PRINT) SURNAME POEGE FIRST NAME GARTH

Signature Garth Poege

18. CONTRACTOR, Address

DRILLWELL ENTERPRISES LTD.
KEN SLADE
R.R. 1, COWICHAN BAY, B.C.
V0R 1N0

Member, BCWWDA ☐ yes ☐ no ;



COMPILATION DATE
SEPTEMBER 1971

LATEST PLAN
198 , PLAN

COWICHAN

DEPARTMENT,
DISTRICT,

COMPILATION DATE
SEPTEMBER 1971

LATEST PLAN
198 , PLAN

COWICHAN VALLEY R

92B 071 4.4.1

WTN 55528

Item 6.4

WATER WELL RECORD

MINISTRY OF ENVIRONMENT AND PARKS, WATER MANAGEMENT BRANCH — VICTORIA, BRITISH COLUMBIA

Z ___ WELL NO. 27 36

E ___ N ___

RGE. 6 SECT. 8

Z ___ X ___ Y ___ NO. 27

NAT. TOPO. SHEET NO. ___ SAHTLAM DIST-SHEET No. 1

LEGAL DESCRIPTION: LOT 1 SEC. 8 TP. ___ R. 6 D.L. ___ LAND DISTRICT SAHTLAM PLAN 12309

DESCRIPTIVE LOCATION TANK ON CULVERTON ROAD, DUNCAN, B.C. LICENCE NO. ___ DATE ___

OWNER'S NAME SAHTLAM VOLUNTEER FIRE DEPARTMENT ADDRESS CULVERTON RD. DUNCAN, B.C.

DRILLER'S NAME DRILLWELL ENTERPRISES ADDRESS R.R.#1, WALDY, RD., COWICHAN BAY DATE COMPLETED NOV. 13 / 1985

DEPTH 94 ft. ELEVATION OF (032) ☐ ESTIMATED ☐ SURVEYED CASING DIAM. 6" LENGTH 0 to 94'

METHOD OF CONSTRUCTION ROTARY AIR CASING DIAM ___ LENGTH ___

SCREEN LOCATION ___ SCREEN ☐ SIZE ___ LENGTH ___ TYPE ___

SANITARY SEAL YES ☐ NO ☐ SCREEN ☐ SIZE ___ LENGTH ___ TYPE ___

PERFORATED CASING ☐ LENGTH ___ PERFORATIONS FROM ___ TO ___

GRAVEL PACK ☐ LENGTH ___ DIAM. ___ SIZE GRAVEL, ETC. ___

DISTANCE TO WATER 49 ft. ☐ ESTIMATED WATER LEVEL

FROM SURFACE ☐ MEASURED ELEVATION ___ ARTESIAN PRESSURE ___

DATE OF WATER LEVEL MEASUREMENT ___ WATER USE FIRE DEPARTMENT.

PRODUCTION TEST SUMMARY

DATE ___

TEST BY ___

BAIL TEST ☐ PUMP TEST ☐ DURATION OF TEST ___

RATE ___ DRAWDOWN ___

WATER LEVEL AT COMPLETION OF TEST ___

AVAILABLE DRAWDOWN ___ SPECIFIC CAPACITY ___

PERMEABILITY ___ STORAGE COEFF. ___

TRANSMISSIVITY ___

ESTIMATED WELL YIELD 12 gpm

RECOMMENDED PUMPING RATE ___

RECOMMENDED PUMP SETTING ___

LITHOLOGY

FROM	TO	DESCRIPTION
0	45	BROWN SILTY SAND & GRAVEL
45	57	SILTY BROWN SAND - WATER BEARING.
57	64	SILTY BROWN SAND & GRAVEL - WATER BEARING
64	76	VERY SILTY GREY GRAVEL
76	94	CLEANER GREY SAND & GRAVEL.

CHEMISTRY

TEST BY ___ DATE ___

TOTAL DISSOLVED SOLIDS ___ mg/l TEMPERATURE ___ °C pH ___ SILICA (SiO_2) ___ mg/l

CONDUCTANCE ___ µmhos/cm AT 25°C TOTAL IRON (Fe) ___ mg/l TOTAL HARDNESS ($CaCO_3$) ___ mg/l

TOTAL ALKALINITY ($CaCO_3$) ___ mg/l PHEN. ALKALINITY ($CaCO_3$) ___ mg/l MANGANESE (Mn) ___ mg/l

COLOUR ___ ODOUR ___ TURBIDITY ___

ANIONS	mg/l	epm
CARBONATE (CO_3)		
BICARBONATE (HCO_3)		
SULPHATE (SO_4)		
CHLORIDE (Cl)		
$NO_2 + NO_3$ (NITROGEN)		
• TKN. (NITROGEN)		
PHOSPHORUS (P)		

CATIONS	mg/l	epm
CALCIUM (Ca)		
MAGNESIUM (Mg)		
SODIUM (Na)		
POTASSIUM (K)		
IRON (DISSOLVED)		

• TKN = TOTAL KJELDAHL NITROGEN CHEMISTRY SITE NO. ___

NO_2 = NITRITE NO_3 = NITRATE

CHEMISTRY FIELD TESTS

TEST BY ___ DATE ___ EQUIPMENT USED ___

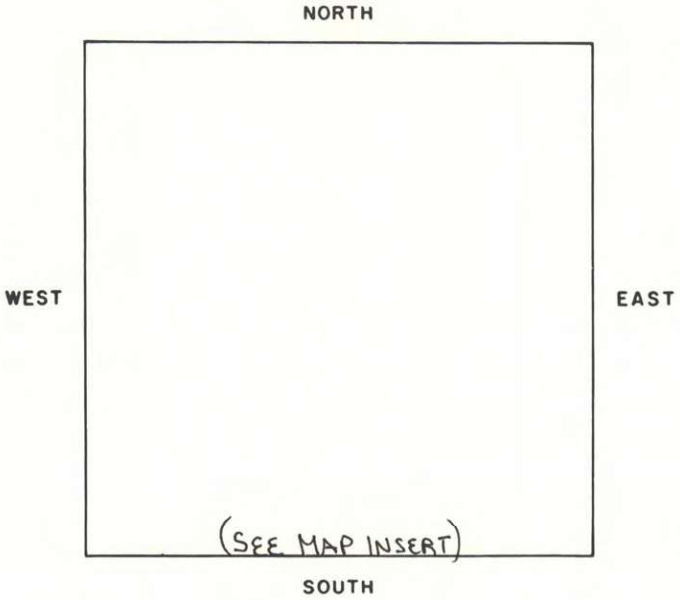
CONTENTS OF FOLDER

☑ DRILL LOG ☐ PUMP TEST DATA ☐ CHEMICAL ANALYSIS

☐ SIEVE ANALYSIS ☐ GEOPHYSICAL LOGS ☐ REPORT

OTHER ___

SOURCES OF INFORMATION ___



CARD BY Brian Epps DATE Nov. 16/1987

ADDITIONAL DATA ADDED BY _____

REMARKS

M28-1179

ENV 1995

Item 6.4

Groundwater Wells and Aquifers

Well Summary

Well Tag Number: 96740
Well Identification Plate Number:
Owner Name: ROBIN S MAYO
Intended Water Use: Private Domestic

Well Status: New
Well Class: Water Supply
Well Subclass: Not Applicable
Aquifer Number:

Observation Well Number:
Observation Well Status:
Environmental Monitoring System (EMS) ID:
Alternative specs submitted: No

Licensing Information

Licensed Status: Unlicensed
Licence Number:

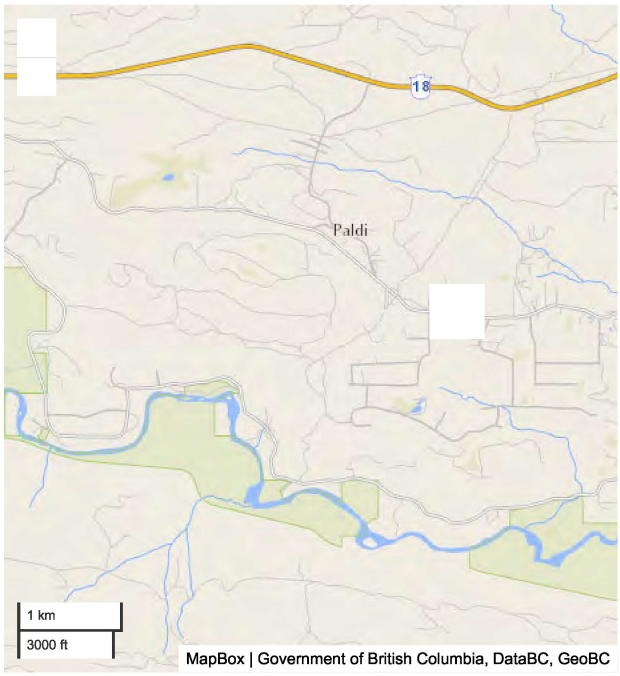
Location Information

Street Address: CULVERTON ROAD
Town/City: DUNCAN

Legal Description:

Lot	1
Plan	12309
District Lot	
Block	
Section	8
Township	
Range	6
Land District	50
Property Identification Description (PID)	

Description of Well Location: DOGWOOD CEDAR



Geographic Coordinates - North American Datum of 1983 (NAD 83)
Latitude: 48.775128
Longitude: -123.835542
UTM Easting: 438612
UTM Northing: 5402795
Zone: 10
Coordinate Acquisition Code: unknown, accuracy based on parcel size) ICF cadastre, poor or no location sketch, arbitrarily located in center of parcel

Well Activity

Activity	Work Start Date	Work End Date	Drilling Company	Date Entered
Legacy record	1996-06-20	1996-06-20	Tri-K Drilling	December 29th 2009 at 3:23 AM

Well Work Dates

Start Date of Construction	End Date of Construction	Start Date of Alteration	End Date of Alteration	Start Date of Decommission	End Date of Decommission
1996-06-20	1996-06-20				

Item 6.4

Well Completion Data

Total Depth Drilled: 116 feet
Finished Well Depth: 126 ft bgl
Final Casing Stick Up: 24 inches
Depth to Bedrock:
Ground elevation:
Static Water Level: 50.9 feet btoc
Estimated Well Yield: 80 USgpm
Artesian Flow:
Artesian Pressure:
Method of determining elevation: Unknown
Well Cap:
Well Disinfected Status: Not Disinfected
Drilling Method: Air Rotary
Orientation of Well: VERTICAL

Lithology

From (ft bgl)	To (ft bgl)	Raw Data	Description	Moisture	Colour	Hardness	Observations	Water Bearing Flow Estimate (USGPM)
0	35	SAND & GRAVEL			vari-coloured		GREY/BROWN, STARTING TO MAKE SOME WATER @ 28'	
35	90	MEDIUM COARSE SAND WITH GRAVEL						
90	116	MEDIUM COARSE SAND WITH GRAVEL, SOME STRATIFIED LAYERS OF COARSE SAND					MAKING APPROX 150 UPGPM	

Casing Details

From (ft bgl)	To (ft bgl)	Casing Type	Casing Material	Diameter (in)	Wall Thickness (in)	Drive Shoe
0	126		Steel	6		Not Installed

Surface Seal and Backfill Details

Surface Seal Material: Bentonite clay
Surface Seal Installation Method:
Surface Seal Thickness:
Surface Seal Depth:
Backfill Material Above Surface Seal:
Backfill Depth:

Liner Details

Liner Material:
Liner Diameter:
Liner from:
Liner Thickness:
Liner to:

Liner perforations

From (ft bgl)	To (ft bgl)
There are no records to show	

Screen Details

Intake Method:
Type: Pipe size
Material: Stainless Steel
Opening:
Bottom:

Installed Screens

From (ft bgl)	To (ft bgl)	Diameter (in)	Assembly Type	Slot Size
120.00	124.00			200.00

Well Development

Developed by: Air lifting
Development Total Duration:

Well Yield

Estimation Method: Pumping
Static Water Level Before Test: 45.9 ft (btoc)
Hydrofracturing Performed: No
Estimation Rate: 80 USgpm
Drawdown: 53.7 ft (btoc)
Increase in Yield Due to Hydrofracturing:
Estimation Duration: 2 hours

Well Decommission Information

Reason for Decommission:
Sealant Material:
Decommission Details:
Method of Decommission:
Backfill Material:

Comments

MEASUREMENTS FROM GROUND LEVEL. PITLESS UNIT: WELDED, NEW.

Alternative Specs Submitted: No

Documents

- WTN 96740_Well Record.pdf

Disclaimer

WTN: 96740

Province of British Columbia — BC Environment — Water Management Division

WATER WELL RECORD

Date 90 06 12 (YR MO DY)

NTS MAP | WELL No. | ELEV | Location Accuracy

UTM Z | E | N | UTM | Date 19 | Well Type

Owners Name & Address: Robin S. Mayo,

Legal Description & Address: Cherry Blossom Park Development Corp., R.R.# 2, Duncan, B.C. V9L 1N9

Descriptive Location: Dogwood Cedar, Culverton Road, Duncan, B.C.

1. TYPE OF WORK: 1 [X] New Well 2 [ ] Reconditioned 3 [ ] Deepened 4 [ ] Abandoned

2. WORK METHOD: 1 [ ] Cable tool 2 [ ] Bored 3 [ ] Jetted 4 [X] Rotary a [ ] mud b [X] air c [ ] reverse [ ] Other

3. WATER WELL USE: 1 [X] Domestic 2 [ ] Municipal 3 [ ] Irrigation 4 [ ] Comm. & Ind. [ ] Other

4. DRILLING ADDITIVES

5. MEASUREMENTS from 1 [X] ground level 2 [X] top of casing

casing height above ground level 2 ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
		Drilled 126 feet with 126 feet of casing installed.	
0	35	sand & gravel - grey/brown, starting to make some water @ 28' feet.	
35	90	medium coarse sand with gravel.	
90	116	medium coarse sand with gravel, some stratified layers of coarse sand - making aprox. 150 U.S. GPM.	

7. CONSULTANT

Address

8. WELL LOCATION SKETCH

9. CASING: Materials 1 [X] Steel 2 [ ] Galvanized 3 [ ] Wood 4 [ ] Plastic 5 [ ] Concrete [ ] Other

							units
Hole Diameter	6"						ins
Diameter							ins
from	+ 2						ft
to	126						ft
Thickness							ins
Weight							lb/ft

Pitless unit ft 1 [ ] above 2 [ ] below ground level

1 [X] Welded 2 [ ] Cemented 3 [ ] Threaded | 1 [X] New 2 [ ] Used

Perforations:

Shoe(s):

Open hole, from to ft Diameter ins

Grout: bentonite

10. SCREEN: 1 [X] Nominal (Telescope) 2 [ ] Pipe Size

Type 1 [X] Continuous Slot 2 [ ] Perforated 3 [ ] Louvre [ ] Other

Material 1 [X] Stainless Steel 2 [ ] Plastic [ ] Other

Set from 120 to 124 ft below ground level

RISER, SCREEN & BLANKS							units
Length							ft
Diam. I D							ins
Slot Size	200						ins
from							ft
to							ft

Fittings, top bottom

Gravel Pack

11. DEVELOPED BY: 1 [ ] Surging 2 [ ] Jetting 3 [X] Air 4 [ ] Bailing 5 [ ] Pumping [ ] Other

12. TEST 1 [X] Pump 2 [ ] Bail 3 [ ] Air Date 90 06 18 (YR MO DY)

Rate 80 USgpm Temp °C SWL before test 45' 11"

Water Level 53'7" after test of 2 hrs

[ ] DRAWDOWN in ft				[ ] RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING ft	RECOMMENDED PUMPING RATE USgpm

14. WATER TYPE: 1 [ ] fresh 2 [ ] salty 3 [ ] clear 4 [ ] cloudy

colour smell ; gas 1 [ ] yes 2 [ ] no

15. WATER ANALYSIS: 1 Hardness mg/L 2 Iron mg/L 3 Chloride mg/L 4 pH Field Date Lab Date (YR MO DY)

SITE I D No

16. FINAL WELL COMPLETION DATA

Well Depth 126 ft Well Yield 80 US gpm

Static Water Level 50' 9" ~~ft~~ Artesian Flow US gpm Pressure Head ft

Back filled

Well Head Completion

17. DRILLER (PLEASE PRINT) SURNAME Schmidt FIRST NAME Jason

Signature J. Kreienbrink

18. CONTRACTOR, Address: Tri-K Drilling Ltd., 3047 Glen Lake Road, Victoria, B.C. V9B 4B3

Member, BCWWDA [X] yes [ ] no ;

Area: 04 Jur: 765 Roll No: 03588.055 Neigh: 063 Sch Dist: 79

Item 6.4

Owner: CHERRY BLOSSOM PARK DEVELOPMENT CORP

No of Owners: 1
No of Pids: 1
PID: 003-851-168
Document No: EJ8846

Owner Address: 6001 PALDI RD
RR 2
DUNCAN BC
V9L 1N9

Property Address: 5611 CULVERTON RD

BC OnLine: BC Assessment Authority OWNER/LOCATION QUERY Roll Yr 1996 97/09/04
Lterm: XTSG1040 For: PW70229 MINISTRY OF ENVIRONMENT, LANDS & 11:23:56
Folio: Printer:

Legal Description: LOT 1, PLAN 12309, SECTION 8, RANGE 6, SAHTLAM LAND DISTRICT, EXCEPT PLAN 22890 23708 25003 29157.

End of Report

WTN: 96740

BCGS MAP 092B.071.4.4.1 WELL NO. 64

WATER WELL RECORD

MINISTRY OF ENVIRONMENT WATER MANAGEMENT DIVISION VICTORIA, BRITISH COLUMBIA

LEGAL DESCRIPTION: LOT 1 SEC. 8 TP. — R. 6 D.L. — LAND DISTRICT SAHTLAM PLAN 12309

DESCRIPTIVE LOCATION DOGWOOD CEDAR, CULLERTOON RD, DUNCAN LICENCE NO. — DATE —

Z 10 WELL NO. —

493861 2 E

5402795 N

Z X Y NO.

NAT. TOPO. SHEET NO. —

OWNER'S NAME MAYO, ROBIN. ADDRESS —

DRILLER'S NAME — ADDRESS — DATE COMPLETED —

DEPTH — ELEVATION OF — ☐ ESTIMATED ☐ SURVEYED CASING DIAM. — LENGTH —

METHOD OF CONSTRUCTION — CASING DIAM — LENGTH —

SCREEN LOCATION — SCREEN ☐ SIZE — LENGTH — TYPE —

SANITARY SEAL YES ☐ NO ☐ SCREEN ☐ SIZE — LENGTH — TYPE —

PERFORATED CASING ☐ LENGTH — PERFORATIONS FROM — TO —

GRAVEL PACK ☐ LENGTH — DIAM. — SIZE GRAVEL, ETC. —

DISTANCE TO WATER — ☐ ESTIMATED WATER LEVEL

FROM — ☐ MEASURED ELEVATION — ARTESIAN PRESSURE —

DATE OF WATER LEVEL MEASUREMENT — WATER USE —

PRODUCTION TEST SUMMARY

DATE —

TEST BY —

BAIL TEST ☐ PUMP TEST ☐ DURATION OF TEST —

RATE — DRAWDOWN —

WATER LEVEL AT COMPLETION OF TEST —

AVAILABLE DRAWDOWN — SPECIFIC CAPACITY —

PERMEABILITY — STORAGE COEFF. —

TRANSMISSIVITY —

ESTIMATED WELL YIELD —

RECOMMENDED PUMPING RATE —

RECOMMENDED PUMP SETTING —

CHEMISTRY

TEST BY — DATE —

TOTAL DISSOLVED SOLIDS — mg/l TEMPERATURE — °C pH — SILICA (SiO_2) — mg/l

CONDUCTANCE — μmhos/cm AT 25°C TOTAL IRON (Fe) — mg/l TOTAL HARDNESS ($CaCO_3$) — mg/l

TOTAL ALKALINITY ($CaCO_3$) — mg/l PHEN. ALKALINITY ($Ca\ CO_3$) — mg/l MANGANESE (Mn) — mg/l

COLOUR — ODOUR — TURBIDITY —

ANIONS	mg/l	epm	CATIONS	mg/l	epm
CARBONATE (CO_3)			CALCIUM (Ca)		
BICARBONATE (HCO_3)			MAGNESIUM (Mg)		
SULPHATE (SO_4)			SODIUM (Na)		
CHLORIDE (Cl)			POTASSIUM (K)		
$NO_2 + NO_3$ (NITROGEN)			IRON (DISSOLVED)		
* TKN. (NITROGEN)					
PHOSPHORUS (P)					

* TKN = TOTAL KJELDAHL NITROGEN CHEMISTRY SITE NO. —

NO_2 = NITRITE NO_3 = NITRATE

CHEMISTRY FIELD TESTS

TEST BY — DATE — EQUIPMENT USED —

LITHOLOGY

FROM	TO	DESCRIPTION

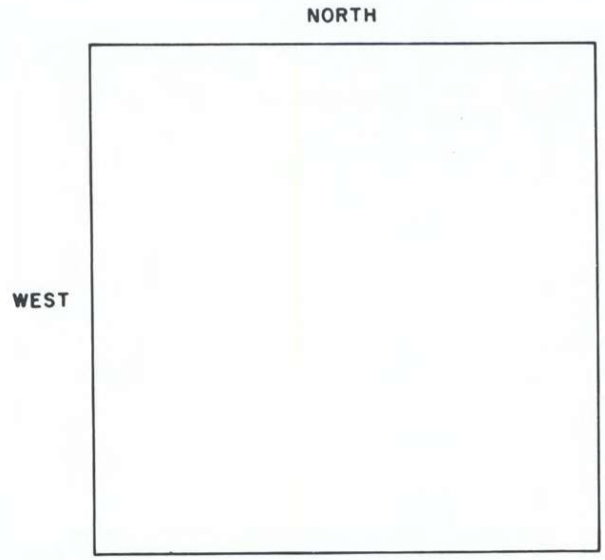
CONTENTS OF FOLDER

☐ DRILL LOG ☐ PUMP TEST DATA ☐ CHEMICAL ANALYSIS

☐ SIEVE ANALYSIS ☐ GEOPHYSICAL LOGS ☐ REPORT

OTHER —

SOURCES OF INFORMATION —



CARD BY_____ DATE_____

ADDITIONAL DATA ADDED BY_____

REMARKS

13126

ENV 1995

Contact
Jon Irving, PEng
778-762-0660
jirving@mcelhanney.com

McElhanney

CANADA BEST MANAGED COMPANIES

RYZUK GEOTECHNICAL

Geotechnical Assessment – Proposed 17 Lot Subdivision

5611 Culverton Road – Duncan, BC

Prepared for: **Client**
2020-5855 York Road
Duncan, BC V9L 3S3

Jon Irving, P.Eng., LEED Green Associate
jirving@mcelhanney.com

Prepared by: **Ryzuk Geotechnical Ltd.**
#100-771 Vernon Avenue
Victoria, BC V8X 5A7

Andrew Jackson, P.Geo., P.Eng.
andrew@ryzuk.com

CONTENTS

1. INTRODUCTION

As requested, Ryzuk Geotechnical prepared a geotechnical assessment in support of the proposed subdivision, issued January 22, 2022. Since that time, we understand that the proposed layout has been revised (from 50 to 17 lots) and that an updated report is required to reference the current proposal. Our assessment consisted of a field reconnaissance and desktop review of the geotechnical conditions at the referenced site. The following report summarizes the results of our review and associated recommendations as related to the proposed development. Our work has been carried out in accordance with, and is subject to, the attached Terms of Engagement.

2. PROPOSED DEVELOPMENT

The overall site has an area of approximately 8.25 ha and is bounded by single family residential lots to the north and east, agricultural land to the south, and Culverton Road to the west. Topographically the site slopes down gently from northwest to the southeast, for a total elevation relief of approximately 6 m. Currently, the property is vacant, lightly vegetated with intermittent mature trees scattered around.

Based on our review of the lot layout provided by McElhanney Consulting Services (dated January 13, 2025, attached for reference), we understand the proposed development consists of construction/preparation of 17 single family residential lots and will include access roadways and dedicated park and riparian areas.

We anticipate the residences will be of conventional construction and therefore anticipate relatively light foundation loads.

3. DESKTOP REVIEW

Our desktop review included an examination of the subsurface information from the environmental investigation, prepared by Next Environmental Inc., as well as a review of aerial photos, geology mapping, BC Water Atlas. Subsequently we attended site for a brief site reconnaissance on January 12, 2021.

4. SURFACE AND SUBSURFACE CONDITIONS

Historically, the site was used for industrial/agricultural use. We understand the site used to be occupied by buildings associated with a former sawmill from 1973 to 1995. Subsequently a possible automotive wrecking business occupied the site and was used as a dumping yard for waste products. Historic aerial imagery indicates substantial soil stockpiles as well.

From review of the noted environmental investigation report completed by Next Environmental Inc., we understand 48 test pits along with 9 boreholes were advanced to depths up to 12.2 mbgs (meters below ground surface). The results of this previous investigation conformed closely with the anticipated quaternary geological conditions that were identified throughout our desktop review. Based on the desktop mapping review subsurface mineral soils of the Vashon Drift unit were anticipated. These soils are typically dense to very dense and comprised of a mix of clay, silt, sand, and gravel, having been densified by glacial processes (Geology Survey of Canada by J.E. Muller, 1970, 1980). The encountered soils by Next Environmental generally consisted of disturbed silty sand/sandy silt with some wood waste and debris (drywall) up to 1.4 mbgs, underlain by native sandy silt with clay content increasing with depth. Based on our review of the prepared test hole logs, we understand the soil transitioned from brown to grey in colour.

During our site reconnaissance, we observed the surface soils to consist of a brown sandy silt, which was substantially water softened in the upper 150 mm to 300 mm. We noted a large amount of organics and wood debris overlying the surface.

In general, we understand bedrock was not observed within the boreholes which were advanced. However, based on our review of nearby water well we anticipate bedrock to be upwards of 37 mbgs. Bedrock depths may vary significantly within the site and between observed locations.

The bedrock in the area is expected to consist of the Nanaimo Group, which contains sedimentary rocks of the Cretaceous Period.

Next Environmental noted the groundwater varied between approximately 4.5 mbgs to 5.5 mbgs within a sand lens of the silt layer. In two locations they had noted a possible confined aquifer where the groundwater was noted between 8 to 9.5 mbgs.

5. GEOTECHICAL ASSESSMENT & RECOMMENDATIONS

On the basis of the above, we consider that development of the proposed building is geotechnically feasible, and we do not anticipate any unique geotechnical issues. However, due to the presence of deleterious fills and organics at depth, due care will be required for preparation of building foundations and infrastructure sensitive to settlement.

5.1 SETTLEMENT CONSIDERATIONS

Provided unsuitable soils (topsoils or deleterious soils) are removed from all building/foundation areas, and other areas of expected loading (i.e., roadways, grade sensitive utilities, etc.), we expect that settlement at this site will be minor, if any, and of minimal significance to the structural or geotechnical design.

5.2 SITE PREPARATION & EXCAVATION CONSIDERATIONS

It is expected that bulk excavations for foundations will be less than 2.0 m deep and limited to removal of topsoil, existing fills/organics, and deleterious soils, potentially with local deeper trenches for installation of buried utilities. According to WorkSafeBC guidelines,

excavations deeper than 1.2 m must be inspected and approved by a qualified geotechnical professional, unless sloped in accordance with the guidelines. We expect that temporary bulk excavation cutslopes will be stable the following configurations:

- 1 H: 1 V (Horizontal: Vertical) for fill materials,
- 0.75 H: 1 V for the brown silty sand/sandy silt,

If necessary, modifications to cutslopes may be required where groundwater seepage is encountered, as such can cause slope instability. If any seepage is observed that could affect the excavation cutslope stability, we should be contacted immediately to make adjustments and provide updated recommendations. We would recommend that poly sheeting be used to cover cutslopes that will remain exposed for more than 7 days to limit erosion and spalling from drying of the silt.

Due to the impermeable nature of the native silty soils, we expect groundwater and/or runoff may collect in low areas during the excavation and lot preparation. This water should be managed during construction to mitigate the disturbance to native subgrade, such as with conventional dewatering methods.

The site is located within a plateau well above the Cowichan River (south of the proposed location) with no major drainage pathways in nearby proximity. Stormwater drainage beyond the property line is provided by large grass covered ditch channels. Based on this hydrologic setting, the risk of flooding is deemed remote.

5.3 SEISMIC CONSIDERATIONS

Vancouver Island is situated in a region of very high seismicity. Considerable earthquake risk exists, stemming from our proximity to the Cascadia subduction zone and numerous more local faults in southwestern BC and northwestern Washington State.

Based on soil conditions reported at the site it is reasonable to expect the shear wave velocity in the upper 30 m (V_{s30}) from the surface to be between 180 m/s and 360 m/s. This corresponds to a Site Classification for Seismic Site Response of 'D', in accordance with the current BC Building Code (BCBC). It may be possible that the V_{s30} exceeds 360 m/s and that Site Class 'C' may be available, however, in the absence of additional subsurface information, at this time Site Class 'D' is considered appropriate. Further testing costs may be offset by savings in building construction costs, though would not be guaranteed and we would be pleased to offer such services upon request.

As determined from the 2020 National Building Code Seismic Hazard Calculation, for a 2% probability of exceedance in 50 years, the Peak Ground Acceleration (PGA) and Spectral Acceleration Values for Seismic Hazard values for Site Class 'C' and 'D' are shown in Table 1.

Table 1. Summary of PGA and Spectral Acceleration Values (NBCC 2020)

Period (sec)	0.2	0.5	1.0	2.0	5.0	10.0	PGA (g)	PGV (m/s)
Response (g) Site Class 'C'	**1.65**	**1.48**	**0.875**	**0.547**	**0.138**	**0.0529**	**0.706**	**0.85**
Response (g) Site Class 'D'	**1.65**	**1.87**	**1.32**	**0.867**	**0.23**	**0.0789**	**0.728**	**1.22**

5.4 BUILDING FOUNDATIONS

Provided the deleterious soils and organics are removed, we expect the most economical foundation option to be shallow spread footings bearing directly atop approved undisturbed native dense silty sand, sandy silt or approved engineered fill atop such. However, based on our discussions with the property owner during our site reconnaissance, we understand there is consideration of using helical piles to support the proposed single-family residences. If the use of deep foundations is desired, we recommend the further involvement and design review by a professional geotechnical engineer.

For foundations bearing on native silty sand/sandy silt or engineered fill atop such, we consider Serviceability Limit State (SLS) and Ultimate Limit State (ULS) bearing resistances of 145 kPa (SLS) and 220 kPa (ULS) for strip footings, and 175 kPa (SLS) and 265 kPa (ULS) for pad footings can be used for foundation design. Limit State Design values use a geotechnical resistance factor of 0.5 as per the current Canadian Foundation Engineering Manual. All foundation subgrade areas must be inspected by a geotechnical professional to confirm that the appropriate bearing resistance value has been achieved prior to placement of engineered fill or foundation elements.

We recommend minimum footing widths of 400 mm and 600 mm for strip and pad footings, respectively. A minimum foundation embedment of 450 mm is recommended in non-heated areas for frost protection. Any disturbance to the native mineral soil subgrade surface from construction activity should be rectified by cleaning the disturbed area back to approved bearing before placing engineered fill and/or footing formwork.

5.5 ENGINEERED FILL

If after removal of unsuitable soils or disturbed soils, grade is required to be re-established, engineered fill can be used. Engineered fill should be placed upon approved subgrade and should consist of select free draining granular material. The fill should be placed and compacted in suitably thin lifts under the supervision of a geotechnical professional to at least 98% of the Standard Proctor Maximum Dry Density (SPMDD) value or judged equivalent. The recommended lift thickness is dependent on both the type of material and the method of compaction (i.e., 300 mm thick lifts for 19 mm minus crushed rock fill compacted with a large vibratory diesel plate compactor). Placement methodology should

be confirmed by a geotechnical professional before commencing. Engineered fill should be placed to extend horizontally beyond the edge of the foundation by 1.0 m plus a distance equal to the depth of fill placed unless suitable splay is present within approved native soils.

5.6 SLAB CONSTRUCTION

Use of a grade supported floor slab is considered feasible provided all undesirable/deleterious material is removed below the slab. Soil beneath the slab should consist of a sub slab levelling fill layer consisting of select free draining material, such as 19 mm clear crush rock. The levelling pad is recommended to be a minimum of 150 mm thick when placed overtop of native silty sand/sandy silt. All sub slab fill should be compacted to at least 95% of the SPMDD value. A conventional sub slab polyethylene vapour barrier should be incorporated directly between the slab and free draining levelling pad fill to minimize capillary rise of moisture into the slab.

5.7 FOUNDATION & RETAINING WALL BACKFILL

Foundation walls and retaining walls should be backfilled with clean, well graded granular material, compacted in maximum 300 mm lifts to at least 95% of SPMDD. Where the grade elevation differs significantly between the two sides of a perimeter wall, and the wall is free to rotate in order to develop the active earth pressure state (rotation of 0.1% of the wall height, non-rigid wall), the wall should be designed to resist a lateral earth pressure (due to granular backfill) similar in magnitude and distribution to that of a fluid having a unit weight of 6.3 kN/m^3. Lateral earth pressures due to floor loadings and/or foundation loads from adjacent portions of the building can be calculated assuming a lateral coefficient of 0.35. Where the wall cannot rotate (rigid wall), it should be designed to resist an at rest lateral earth pressure loading, similar in magnitude and distribution to that of a fluid having a unit weight of 8.6 kN/m^3. In this case, lateral earth pressure due to floor loadings and/or foundation loads from adjacent buildings can be calculated assuming a lateral coefficient of 0.45. Equipment larger than a bobcat should not be allowed within 1.5 m of the foundation walls during backfilling.

Lateral earth pressures resulting from seismic activity can be calculated according to the following equations:

Non-Rigid Wall: $P_E = 0.375\ k_h\ \gamma\ H^2$

Rigid Wall: $P_E = 0.5\ k_h\ \gamma\ H^2$

where:

- P_E is the resultant force per unit length of wall;
- the coefficients of 0.375 and 0.5 are dimensionless;
- k_h is the design peak horizontal ground acceleration coefficient;
- γ is the moist unit weight of the backfill material, which is approximately 20.4 kN/m^3 for most granular backfill;

- H is the height of the wall

In the case of the non-rigid wall, the backfill pressure distribution resulting from the earthquake loading can be assumed to be triangular, increasing from zero at the base of the wall to a maximum of 0.75 k_h γ H at the top of the wall, with the resultant force acting at 0.67H above the base of the wall.

In the case of the rigid wall, the backfill pressure distribution resulting from the earthquake loading can be assumed to be parabolic, with the resultant force acting at 0.5H above the base of the wall.

For design purposes, the pressure distribution resulting from earthquake loading on the backfill should be added to either the active or at rest pressure distribution depending on whether or not the noted wall rotation can occur.

5.8 DRAINAGE CONSIDERATIONS

We expect that conventional perimeter foundation drainage consisting of non-woven geotextile filter fabric overtop of the perimeter drain arrangement (drain rock and perforated pipe) will be sufficient to maintain a locally low ground water table and prevent the buildup of hydrostatic pressure for the proposed houses. Final exterior surface grades should be shaped to direct surface water away from the building and foundation areas with discharge of the drain system directed to an existing drainage course or storm services designed to accommodate such.

5.9 PAVEMENT CONSIDERATIONS

In general, surficial deleterious fills and topsoil should be stripped to approved bearing soil (native silty sand/sandy silt) in all new pavement areas.

For general parking and light traffic areas, a pavement structure consisting of 50 mm of asphalt surfacing overlying at least 100 mm of 20 mm minus crushed base course and a minimum of 150 mm of 75 mm minus subbase is typically recommended. For heavier traffic areas the thickness of the asphalt surfacing should be increased to 75 mm and the base course thickened to 150 mm. Base and subbase layers should be compacted to 100% of SPMDD.

Provided surficial deleterious fills and topsoil are removed, with suitable road subbase atop approved bearing soil, adverse effects (i.e., settlement) to grade sensitive utilities will be mitigated.

6. CLOSURE

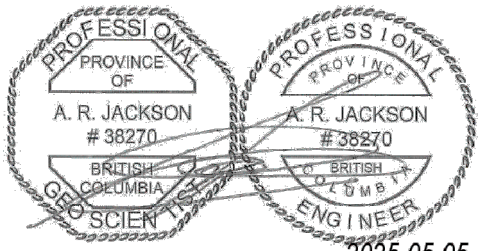
In summary we consider the proposed subdivision to be feasible from a geotechnical perspective provided the above recommendations are carried out for buildings and infrastructure. The site is

considered to be not subject to significant geohazard pursuant to Section 56 to the Community Charter. Further we did not indicate any significant transfer of risk to other/adjacent properties.

We trust the preceding is suitable for your purposes at present. Please do not hesitate to contact our office if we can be of further assistance.

Sincerely,

Ryzuk Geotechnical



2025-05-05

Andrew Jackson, P.Geo., P.Eng.
Lead Geoscientist / Engineer

Permit to Practice Number: 1002996

Attachment(s):

- Terms of Engagement
- Revised Site Plan by McElhanney Consulting Services

TERMS OF ENGAGEMENT

1. GENERAL

1.1. Ryzuk Geotechnical Ltd., its principals and employees (collectively the "Consultant") shall render the Services to the Client for the Project in accordance with the following terms of engagement (the "Engagement").

1.2. The Services, and any other associated documents, records or data, shall be carried out and/or prepared in accordance with generally accepted engineering practices commensurate with the timing and location in which the Services are performed. No other representations or warranties, expressed or implied, are made by the Consultant.

1.3. The Consultant may, at its discretion and at any stage, engage sub-consultants to perform all or any part of the Services.

2. COMPENSATION

2.1. The Consultant's rates and fees are generally based on the hourly rates of our employees. The Consultant maintains accurate records of the time we devote to the Engagement. For certain well-defined services we will be able to quote a fixed fee.

2.2. The Consultant's rates and fees are adjusted annually to reflect current levels of geotechnical experience, changes in market conditions and other factors.

2.3. All fees billed to the Client by the Consultant are payable in Canadian dollars. Invoices are due and payable by the Client on receipt of the invoice, without holdback. Interest on overdue accounts is 24% per annum.

3. REPRESENTATIVES

3.1. Each party must designate a representative who is authorized to act on behalf of that party and receive notices under this Engagement.

4. TERMINATION

4.1. Either party may terminate this Engagement without cause upon providing 30 days' written notice to the other party. On termination by either party under this section, the Client shall forthwith pay to the Consultantall fees invoiced by the Consultant for the Services performed, including all expenses and other charges incurred by the Consultant in respect of the Consultant's Engagement by the Client.

4.2. If either party is in breach of any term of this Engagement, the non-defaulting party may give written notice of the breach to the other party and thereafter terminate this Engagement forthwith if the defaulting party does not remedy said breach within 7 days' of being provided written notice of the breach. On termination bythe Consultant under this section, the Client shall forthwith pay to the Consultant all fees invoiced for the Services performed to the date of termination, including all expenses and other charges incurred by the Consultant in respect of the Consultant's Engagement by the Client.

5. ENVIRONMENTAL

5.1. The Consultant's field investigation, laboratory testing and engineering recommendations will not address or evaluate contamination or pollution of soil or groundwater. The Consultant will cooperate with any environmental consultant retained by the Client during the field work phase of the investigation.

6. PROFESSIONAL RESPONSIBILITY

6.1. The Consultant will provide the Services in accordance with the standard of care, skill and diligence required of a geotechnical consulting firm providing similar services at the same time in the same geographic location and circumstances in British Columbia. The Services will be provided in accordance with procedures customarily provided in similar circumstances by similar professionals.

7. INSURANCE

7.1 Ryzuk Geotechnical maintains Professional Indemnity Insurance as follows:

7.1.1 $2,000,000 each and every claim

7.1.2 $2,000,000 in the aggregate

7.1.3 $5,000,000 commercial/general liability coverage.

8. LIMITATION OF LIABILITY

8.1. The Consultant shall not be responsible for:

8.1.1. the negligence or failure of any contractor or other professional retained by the Client to perform work or provide services in respect of the Project in accordance with the applicable contract documents and/or advice provided by the Consultant;

8.1.2. the design of or defects in equipment or materials supplied or provided by the Client or its contractors for incorporation into the Project;

8.1.3. any cross-contamination resulting from subsurface investigations;

8.1.4. any Project decisions made by the Client if such decisions are made without the Client first seeking advice from the Consultant and/or decisions contrary to or inconsistent with advice provided by the Consultant;

8.1.5. any consequential loss, injury or damages suffered by the Client or its agents and contractors, including but not limited to loss of use, earnings and business interruption;

8.1.6. the unauthorized distribution of any confidential document or reports prepared by or on behalf of the Consultant for the exclusive use of the Client;

8.1.7. damage to subsurface structures and utilities.

8.2. The Consultant will make all reasonable efforts prior to and during subsurface site investigations to minimize the risk of damaging any subsurface utilities/mains. If, in the unlikely event that damage is incurred where utilities are unmarked and/or undetected, the Consultant will not be held responsible for damages to the Project site or surrounding areas, utilities/mains or drilling equipment or the cost of any repairs thereto.

8.3. The Consultant's total liability to the Client for any errors, omissions, breaches of contract and/or negligence arising in connection with the Services is limited to the amount of the Consultant's fees for the Services and shall not exceed that amount under any circumstances. For greater clarity, this means that if the Client makes any claim, including any claim for contribution or indemnity, or brings any claims against the Consultant, then any damages for which the Consultant may be liable cannot exceed the total amount of fees paid to the Consultant by the Client.

8.4. The Client agrees to indemnify and to save and hold harmless the Consultant from any claim, demand, litigation, expense, legal fees, liability, damage, award or cost, of any form or type whatsoever, in respect of any claim for property damage, loss, or personal injury brought by any party including the Client's contractors, other professionals, or any third party, resulting from the Consultant's provision of the Services, except for such property damage, loss or personal injury that results directly from the gross negligence of the Consultant or its employees.

8.5. No claim may be brought against the Consultant in respect of the Consultant's provision of the Services, in contract, negligence or other civil wrong more than 2 years after any claim is discoverable.

9. DOCUMENTS AND REPORTING

9.1. All of the documents prepared by or on behalf of the Consultant in connection with the Project are instruments of service for execution of the Project and the Services. The Consultant retains the property and copyright in these documents, whether the Project is executed or not. These documents may not be used on any other project without the prior written agreement of the Consultant.

9.2. Documents that have been prepared specifically for the Project are applicable and may be relied upon onlyin the case where there has been no physical alteration to, or deviation from any of the information or plans provided to the Consultant by the Client or the Client's agents. If the Client makes any changes or deviations from original plans for the Project, the Client may request that the Consultant review and revise Project documents accordingly.

9.3. Identification and classification in respect of the extent, properties, or type of soils or other materials at the Project site will be based upon investigation and interpretation of results in a manner consistent with customarily accepted standard geotechnical consulting practices in the location where the Services were performed. Due to the nature of geotechnical consulting, there is an inherent risk that all potential conditions will not be detected at the Project site and that actual subsurface conditions may vary considerably from investigation points. The Client and any other party making use of any documents prepared by the Consultant in respect of the Project acknowledges and accepts this risk.

9.4. Any conclusions and recommendations provided within any document prepared by the Consultant for the Client will be based on the scope of investigation by the Consultant and any additional information provided to the Consultant by the Client or the Client's agents. The Consultant disclaims responsibility for any deficiency or inaccuracy resulting from the Consultant being provided with inaccurate or fraudulent information by the Client or the Client's agents.

10. JOBSITE SAFETY AND CONTROL

10.1. The Client acknowledges that control of the Project site remains solely with the Client, and/or the Client's agents and/or contractors. The presence of the Consultant's personnel on the Project site does not relieve the Client, the Client's agents and/or contractors from their responsibilities for Project site safety. The Client must inform the Consultant of all hazardous or otherwise dangerous conditions at the Project site of which the Client, its agents, and/or contractors are aware.

10.2. The Client acknowledges that during the course of a geotechnical investigation a previously unknown hazard or contaminant may be discovered. Discovery and/or identification of a hazard/contaminant may necessitate procedures to ensure the safety and protection of persons and/or the environment being undertaken. The Client shall be responsible for payment of any additional expenses incurred as a result of discovery of a hazard/contaminant. The Client acknowledges that certain circumstances require governmentand/or regulatory authorities to be notified of hazardous conditions and/or contaminants. The Client shall not make any claim or bring any action against the Consultant in the event the Consultant provides any required notification of a hazard and/or contaminant to a government and/or regulatory authority.

11. FIELD SERVICES

11.1. If the Consultant is requested or required to provide field review Services for the Project and the Client declines to authorize or otherwise limits the scope of same in a manner inconsistent with the Consultant's advice or recommendations, the Consultant may provide qualified certifications in respect of any work completed by the Client and/or its contractors that was not overseen by the Consultant.

12. DISPUTE RESOLUTION

12.1. If requested in writing by either the Client or the Consultant, the Client and the Consultant shall attempt to resolve any dispute between them arising out of or in connection with this Engagement by entering into structured non-binding negotiations with the assistance of a mediator on a without prejudice basis. The mediator shall be appointed by agreement of the parties. If a dispute cannot be settled within a period of thirty (30) calendar days with assistance of a mediator, the dispute shall be referred to and finally resolved by a British Columbia Court.

13. PROVISION OF INPUT DOCUMENTS

13.1 The Client agrees to provide all relevant third-party documentation reasonably required by the Consultant in connection with the execution and performance of this Agreement. Such documents shall be provided in a timely manner to ensure the effective and uninterrupted delivery of the services contemplated herein.

This includes, but is not limited to, the timely provision of the following:

- A clear description of the project
- Documentation received from any relevant municipality, district, or governing authority
- Covenants on title;
- Site plans and/or surveys;
- Consultant design drawings such as building plans, structural plans, etc.;
- Any existing geotechnical reports or other relevant consultant reports;
- Site photographs

14. CONFIDENTIALITY

14.1. During the term of the Engagement, the Consultant shall not use or disclose any of the Client's confidential information to any third party other than the Consultants legal and/or financial advisors without authorization from the Client. The Consultant will use any confidential information for the sole purpose of carrying out the Services. The Consultant may share photos of the Project so long as such photos do not disclose any information not otherwise available or readily visible by the public. Unless already made public, the Consultant will not share Client or Project site address information on social media or with third parties.

No.	Date	Description	Drawn	Design	Appd
PB	2025-01-13	ISSUED FOR INFORMATION ONLY	RPH	RPH	JI
	2024-10-15	ISSUED FOR INFORMATION ONLY	RPH	RPH	JI

ORIGINAL DWG SIZE: ARCH D (24" x 36")

0 1:600 30

McElhanney
Suite 107
225 Canada Avenue
Duncan BC
Canada V9L 1T6
T 250 748 3335

PRELIMINARY
NOT FOR CONSTRUCTION

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

WHYNOTT HOLDINGS
2467 MILL BAY ROAD, MILL BAY, BC, V0R 2P4

5611 CULVERTON ROAD STRATA DEVELOPMENT
LOT LAYOUT PLAN
OPTION 2

Drawing No.
SK-2

Project Number
2231-02000-00

Rev.
PB

RYZUK GEOTECHNICAL

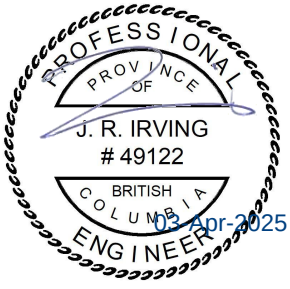
TECHNICAL MEMO

To	From
Larry Davidson Whynott Holdings	Jon Irving, P.Eng., Division Manager McElhanney Ltd.
Re	**Date**
5611 Culverton Road – Onsite Septic Suitability Letter	April 3, 2025

Following McElhanney's investigation, evaluation and monitoring of select areas within the subject site from 2020 through 2022, we are pleased to provide our preliminary assessment regarding the overall suitability for onsite septic fields.

Based on our findings, the areas studied demonstrate favorable conditions for onsite septic system installation. While our investigation was limited to specific locations, there is no indication that the remaining portions of the site would be unsuitable for similar systems. However, final suitability is still subject to site-specific investigations, including percolation testing and regulatory approvals in accordance Island Health Requirements.

Sincerely,
McElhanney Ltd.



Jon Irving, P.Eng., LEED Green Associate
jirving@mcelhanney.com
250-252-5192

PERMIT TO PRACTICE
McElhanney Ltd.
PERMIT NUMBER: 1003299
Engineers and Geoscientists of BC

APPENDIX A

Statement of Limitations

Statement of Limitations

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

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

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

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

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

Our File: 2233-02041-00

TECHNICAL MEMO

To	From
Larry Davidson Whynott Holdings	Jon Irving, P.Eng., Division Manager McElhanney Ltd.
Re	**Date**
5611 Culverton Road – Stormwater Management Strategy	April 3, 2025

1. Introduction

McElhanney Ltd. (McElhanney) was retained by Whynott Holdings (Client) to prepare a Stormwater Management Strategy for the proposed subdivision at 5611 Culverton Road, for submission to the Cowichan Valley Regional District (CVRD) and the Ministry of Transportation and Transit (MOTT) in support of a rezoning application. This memorandum summarizes the stormwater management strategy, proposed stormwater analysis, proposed design methodology, and erosion control measures to meet regulatory requirements.

The stormwater management strategy objectives align with MOTI's requirement to limit post-development flows to 5-year return period storms and CVRD Bylaw 4331, which mandates adequate drainage and stormwater control. The plan incorporates Low Impact Development (LID) practices, including on-site retention, infiltration, and controlled discharge, modeled using PCSWMM software.

2. Design Objectives

To comply with CVRD and MOTT requirements, the stormwater management strategy and ultimate design aims to:

- Ensure proper drainage for all parcels per MMCD standards.
- Analyze hydrology and hydraulics for projected runoff.
- Prevent increased downstream flooding and stream erosion.
- Implement best management practices (BMPs) such as detention storage, infiltration systems, and erosion control.
- Maintain or reduce post-development peak flows to pre-development levels for 5-year storms.

- Utilize LID strategies to enhance infiltration, improve water quality and minimize runoff.

3. Site Description

The 7.54 ha site is currently zoned R-6, with a portion designated P1 for park and institutional use. The property is bound by Culverton Road to the west and residential/agricultural lands on other sides. It is primarily flat, sloping southeast (1%-7%).

Existing drainage features include four wetlands and three streams, which are shown in **Figure 1** below:

- Wetlands #1 & #2 connected by Channel #1 (perennial)
- Wetland #3 with Channel #2 (perennial)
- Wetland #4 with Channel #3 (intermittent)

The site is divided into five primary drainage catchments, detailed in Table 1.

Table 1: Existing Catchment Parameters

Catchment	Area (ha)	Impervious	N Perv	Soil Group	SCS Curve Number	Outlet
S-W1	0.74	0	0.4	D	84	Wetland #3
S-W2	4.27	0	0.4	D	84	Wetland #4
S-W3	0.06	0	0.4	D	84	Wetland #1
S-W4	1.66	0	0.4	D	84	Wetland #2
S-S1	0.81	0	0.4	D	84	Channel #3

Figure 1: Existing Site Conditions (Pre-Development Condition)

4. Post-Development Conditions

The proposed development includes 18 residential lots (2,000-2,853 m² each), trails, and park space. Maximum impervious coverage per lot is assumed at 50%, with rock pits for infiltration. Riparian Setback Protection Areas (SPEA) will be preserved. Table 2 outlines post-development catchment characteristics.

Stormwater management incorporates underground rock pits with flow control structures to ensure no increase in peak flows downstream.

5. Stormwater Analysis & Design

At the design stage, PCSWMM will be used to compare pre- and post-development conditions. Design parameters include:

- SCS Type 1A 24-hour storm (5-year = 70.8 mm; 100-year = 106.5 mm)
- Climate change factor of 12% per Pacific Climate Impacts Consortium

The intent will be for lots to have individual rock pits to manage runoff from onsite impervious areas through detention and controlled discharge. Rock pits will be sized at the time of Building Permit in accordance with the proposed impervious area for the site. The overflow pipes from the rock pits will drain into a central storm sewer system within the Road Right-of-Way, which will ultimately drain into a centralized rock pit to manage flows from the roadway itself. All stormwater will run through an oil / grit separator to improve water quality, prior to being discharged into the downstream wetland at a controlled rate. The strategy is schematically shown in **Figure 2** below.

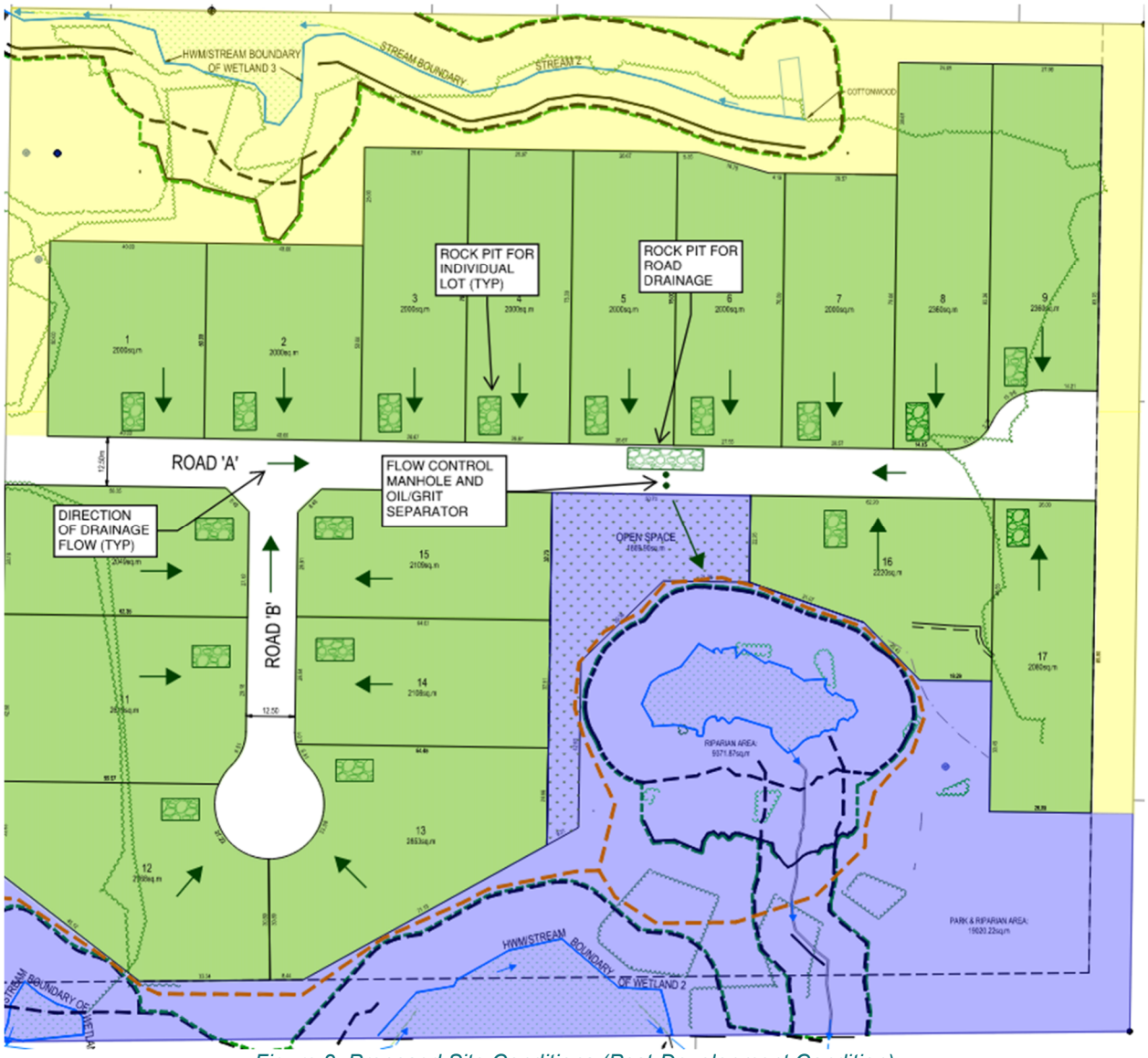


Figure 2: Proposed Site Conditions (Post-Development Condition)

6. Erosion & Sediment Control

To mitigate construction impacts the following Erosion & Sediment Control measures will be utilized:

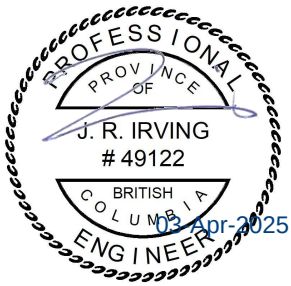
- Silt Fencing: Installed along sensitive areas.
- Sediment Basins: To trap runoff from disturbed areas.
- Construction Phasing: Limits exposed soil.
- Vegetative Cover: Temporary seeding to stabilize soil.

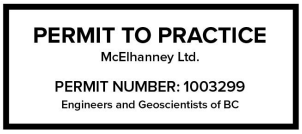
7. Conclusion

The stormwater management strategy ensures compliance with CVRD and MOTI requirements while maintaining pre-development hydrologic conditions. LID practices will minimize environmental impacts and manage stormwater effectively through on-site detention and controlled discharge. Further refinements will be made based on regulatory feedback and once design has commenced.

CLOSING

Sincerely,
McElhanney Ltd.





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APPENDIX A

Statement of Limitations

Statement of Limitations

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

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

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

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

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

5611 Culverton Road

Rezoning for Development Opportunity

STRONGITHARM CONSULTING LTD.

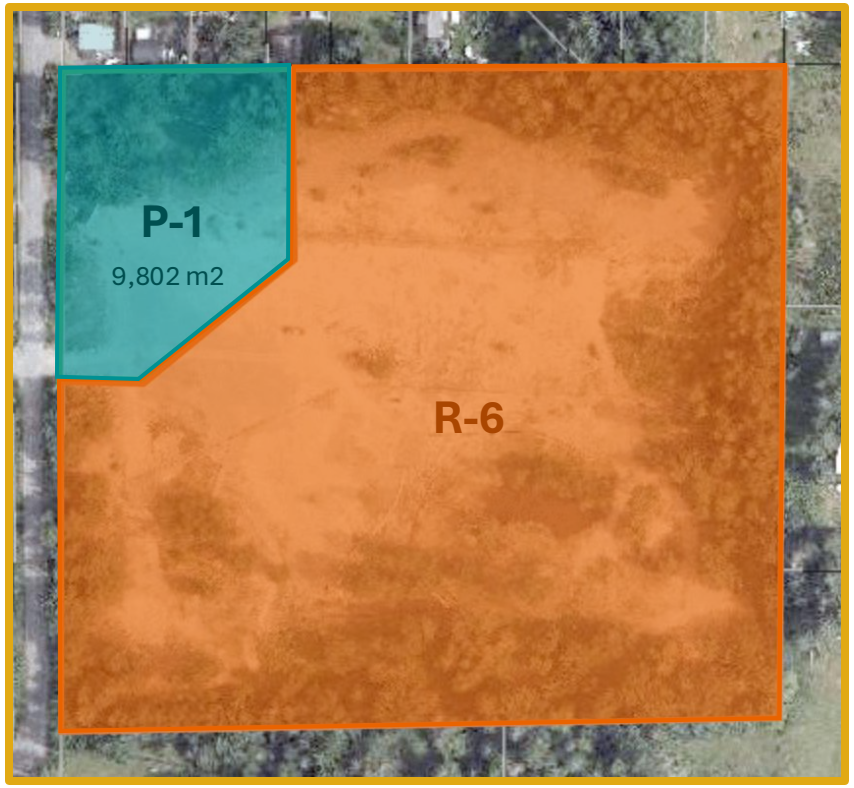
Location

- Electoral Area E of the Cowichan Valley Regional District (CVRD)
- Near the communities of Duncan and North Cowichan
- +/- 75,000m^2 (7.54 ha) parcel
- Lot is characterized by:
  - mainly open landscape
  - manmade watercourses (north and south edges)
  - mature trees along the perimeter of the property.

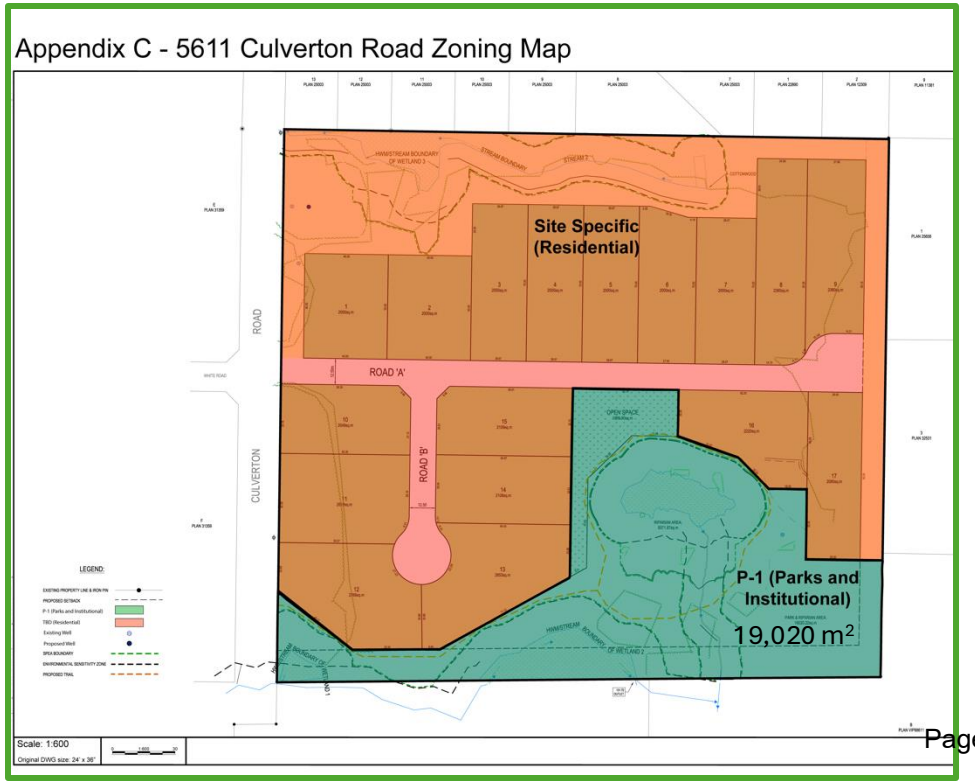
Purpose:

- To rezone the property to
- Permit the development of 17 residential lots (the current zoning permits up to 50 units)
- Realign and expand to the public open space / park to make it larger and more useable by the public.

Current Zoning



Proposed Zoning



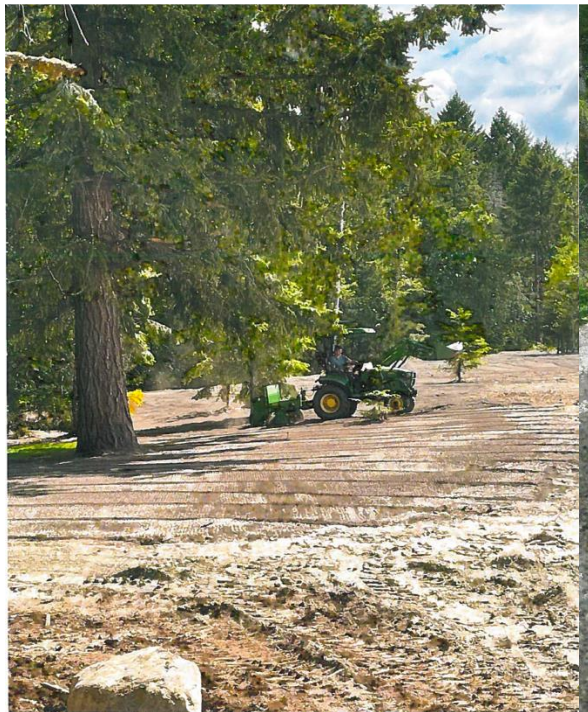
History

- Site was used as a saw/shake mill, log dump, and industrial uses (drywall recycling, auto wrecking, non-recycling of steel, etc) from approximately the 1960s to the 1990s
- Much of the site was cleared

Provincial Air photo 1979 (bcc204_153_12n)

Debris including scrap metal/tires contaminated soils were removed.

The land was cleaned, graveled, and grass was planted.



Certificate of Compliance

BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

CERTIFICATE OF COMPLIANCE
(Pursuant to Section 53 of the *Environmental Management Act*)

THIS IS TO CERTIFY that as of the date indicated below, the site identified in Schedule A of this Certificate of Compliance has been satisfactorily remediated to meet the applicable Contaminated Sites Regulation remediation standards and criteria.

This Certificate of Compliance is qualified by the requirements and conditions specified in Schedule B.

The substances for which remediation has been satisfactorily completed and for which this Certificate of Compliance is valid are listed in Schedule C.

I have issued this Certificate of Compliance based on a review of relevant information including the documents listed in Schedule D. I, however, make no representation or warranty as to the accuracy or completeness of that information.

A Director may rescind this Certificate of Compliance if requirements and conditions imposed in the Certificate of Compliance are not complied with or any fees payable under Part 4 of the Act or regulations are outstanding.

This Certificate of Compliance should not be construed as an assurance that there are no hazards present at the site.

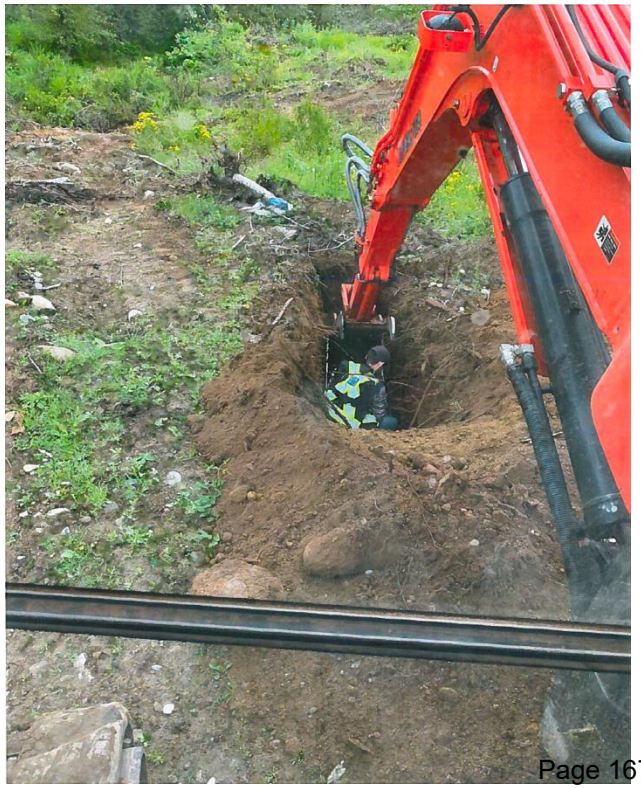
June 16, 2022
Date Issued

L. Zanini
Lavinia Zanini
For Director, *Environmental Management Act*

Site Identification Number 8281
Version 9.0 R

1 of 6

- All soil contamination was removed
- Certificate of Compliance was received in 2022

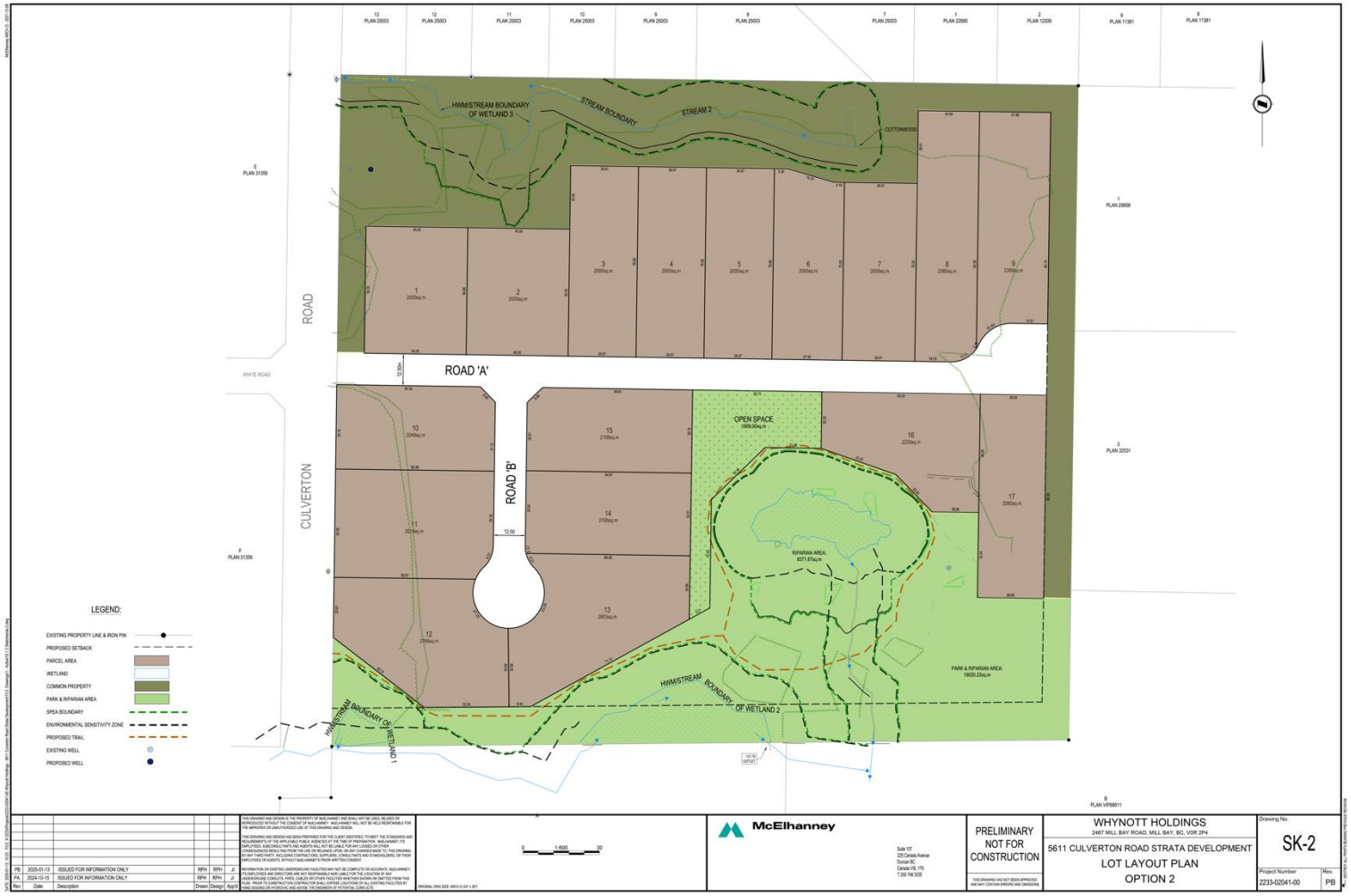


Development Application History

- Zoned for R-6 permitting 50 residential units
- Initial application for 47 residential units was disallowed because of the CVRD's request for 1 common sewage treatment system.
- A revised application for 37 units was submitted and disallowed due to change in CVRD servicing policy where a minimum of 50 service connections were required in accordance with its utility acquisition by-law & desire to reduce the # of residential units.

Proposed Project

- 17 lot fully serviced strata subdivision
- Key Features:
  - On site sewage disposal
  - Private water system (note: water rights application and preliminary investigations completed)
  - Revised park useable and public open spaces to a more suitable area
  - Incorporating public trails & seating areas within park/open space area
  - Underground wiring / ornamental streetlights / paved streets
  - Modest sized detached homes



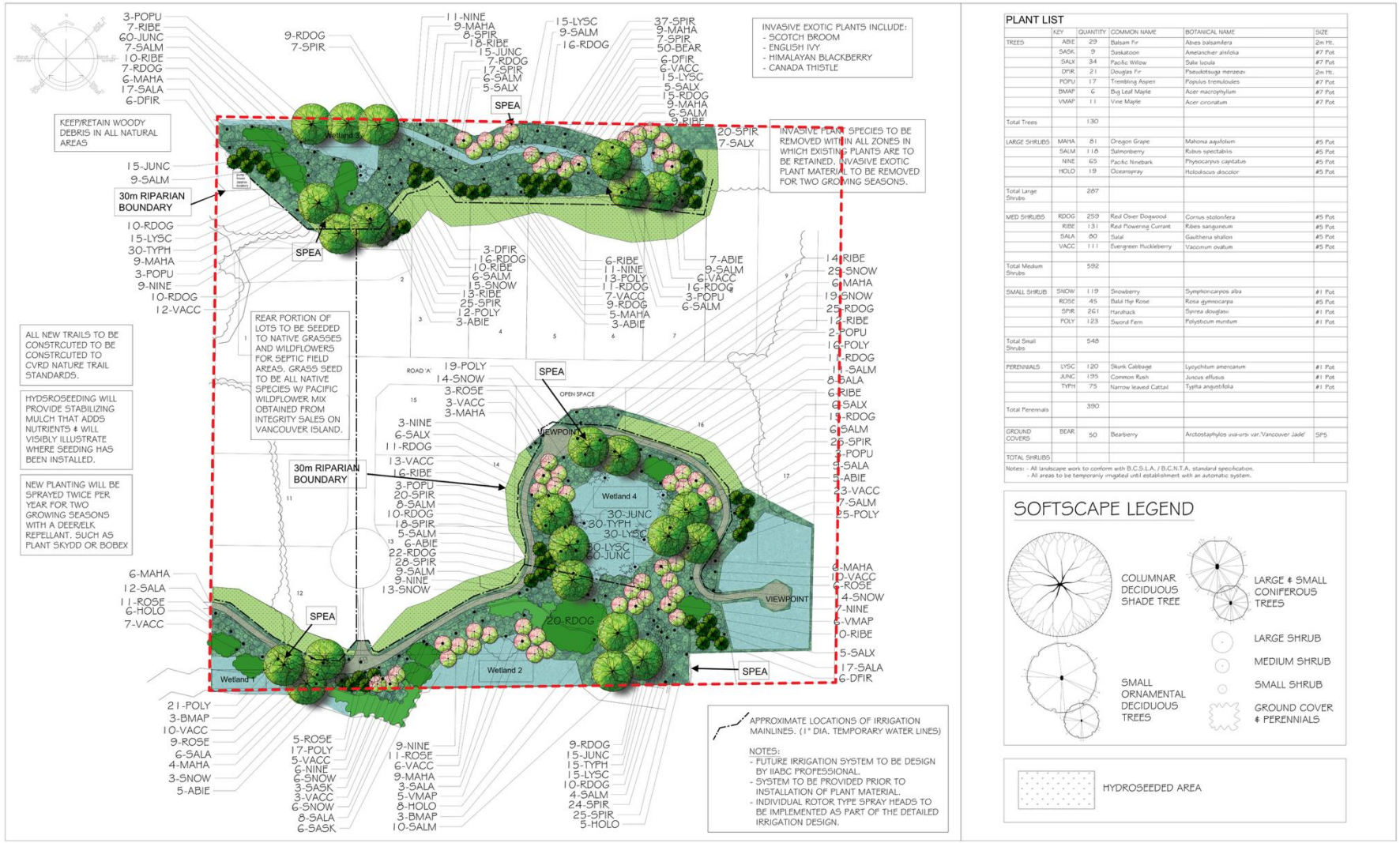
Policy & OCP

KEY ITEMS	EXISTING	PROPOSED
SITE AREA	75,400 m^2	75,400 m^2
ZONING	R-6 & P-1	Site Specific/TBD
LOTS/UNITS	Up to 50	17
AVERAGE DENSITY	6.7 units/ha	2.25 units/ha
PARKS AND OPEN SPACE	9,802 m^2 (0.9 ha)	19,020 m^2 (1.9 ha)
PARK AREA AS % OF TOTAL	13%	25%

Policy & OCP

- Land-use Policy:
  - Proposed application is consistent with the OCP "Residential" land-use designation.
- Parks Policy:
  - Encourages the provision of parkland that provides greenspace that protects sensitive areas (sensitive ecosystems).
  - Supports identification, protection, and restoration of priority ecological areas.

Landscape Plan



PLANT LIST

	KEY	QUANTITY	COMMON NAME	BOTANICAL NAME	SIZE
TREES	ABIE	29	Balsam Fir	Abies balsamifera	2m Ht.
	SASK	9	Saskatoon	Amelanchier alnifolia	#7 Pot
	SALX	34	Pacific Willow	Salix lucida	#7 Pot
	DFIR	21	Douglas Fir	Pseudotsuga menziesii	2m Ht.
	POPU	17	Trembling Aspen	Populus tremuloides	#7 Pot
	BMAP	6	Big Leaf Maple	Acer macrophyllum	#7 Pot
	VMAP	11	Vine Maple	Acer circinatum	#7 Pot
Total Trees		130			
LARGE SHRUBS	MAHA	81	Oregon Grape	Mahonia aquifolium	#5 Pot
	SALM	118	Salmonberry	Rubus spectabilis	#5 Pot
	NINE	65	Pacific Ninebark	Physocarpus capitatus	#5 Pot
	HOLO	19	Oceanspray	Holodiscus discolor	#5 Pot
Total Large Shrubs		287			
MED SHRUBS	RDOG	259	Red Osier Dogwood	Cornus stolonifera	#5 Pot
	RIBE	131	Red Flowering Currant	Ribes sanguineum	#5 Pot
	SALA	80	Salal	Gaultheria shallon	#5 Pot
	VACC	111	Evergreen Huckleberry	Vaccinium ovatum	#5 Pot
Total Medium Shrubs		582			
SMALL SHRUB	SNOW	119	Snowberry	Symphoricarpos alba	#1 Pot
	ROSE	45	Bald Hip Rose	Rosa gymnocarpa	#5 Pot
	SPIR	261	Hardhack	Spirea douglasii	#1 Pot
	POLY	123	Sword Fern	Polystichum munitum	#1 Pot
Total Small Shrubs		548			
PERENNIALS	LYSC	120	Skunk Cabbage	Lycychitum americanum	#1 Pot
	JUNC	195	Common Rush	Juncus effusus	#1 Pot
	TYPH	75	Narrow leaved Cattail	Typha angustifolia	#1 Pot
Total Perennials		390			
GROUND COVERS	BEAR	50	Bearberry	Arctostaphylos uva-ursi var.'Vancouver Jade'	5P5
TOTAL SHRUBS					

Notes: - All landscape work to conform with B.C.S.L.A. / B.C.N.T.A. standard specification.
- All areas to be temporarily irrigated until establishment with an automatic system.

SOFTSCAPE LEGEND

HYDROSEEDED AREA

4☆SITE LANDSCAPE ARCHITECTURE AND SITE PLANNING

LANDSCAPE ARCH. STAMP

BRAD D. FORTH 228

5611 CULVERTON ROAD
MILL BAY, BC

CLIENT

REV. DATE	NUMBER	DESCRIPTION
05-30-25	1	PRELIMINARY DRAFT PLAN - FOR REVIEW
06-18-25	2	REVISED PLAN
08-07-25	3	UPDATED PLAN
10-07-25	4	UPDATED PLAN

DATE OCTOBER 7, 2025
SCALE 1:350
DRAWN BY BF/RF CHECKED BY BF

LANDSCAPE RESTORATION PLAN

L100

Next Steps / Process

- Consideration of rezoning application – referral to external agencies
- Subdivision application for 17 lots
- Development Permits

5611 Culverton Road

Rezoning for Development Opportunity

STRONGITHARM CONSULTING LTD.