

COUNCIL REPORT



REPORT DATE: July 30, 2020

MEETING DATE: August 10, 2020

TO: Chair and Members

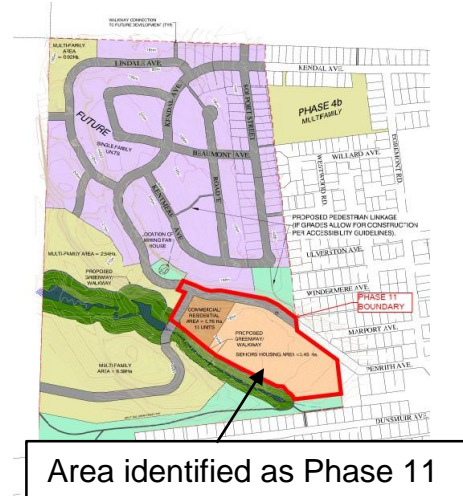
FROM: Meleana Searle, Planner

SUBJECT: Coal Valley Estates Phase 11 – Application for an Environmental Protection (DPA #1) and Wildfire Urban Interface Development Permit (DPA #4).

FILE:	2019-08-DP		
AGENT:	Chris Durupt, PEng, McElhanney	OWNER:	Coal Valley Estates
FOLIO No.:	516 000394.545	PID:	003-634-264
LEGAL DESCRIPTION:	DISTRICT LOT 24, NELSON DISTRICT, EXCEPT PARTS IN PLANS 21 RW, 522E, 3130, 3268, 4222, 4661, 4824, 4869, 6793, 6794, 11068, 12569, 13409, 13580, 13640, 14028, 15750, 23224, 19381, 19382, 19383, 20746, 21025, 22199, 23092, 23237, 23600, 23685, 24001, 24314, 24868, 25906, 26084, 26131, 26455, 26629, 26885, 27337, 27857, 29860, 30068, 30809, 32692, 35790, 36785, 35098, 50021, VIP64546 VIP65968, VIP65482, VIP67269, VIP71673 AND EXCEPT PARCEL A (DD 27356N) AND PARCEL B (DD M7897) AND EXCEPT PARTS IN PLANS VIP72020, VIP72021, VIP72022, VIP73804, VIP74156, VIP75434, EPP15708, EPP17313, EPP18594, EPP20118 EPP53358 , EPP71701, EPP79979 AND EPP90590		
CIVIC ADDRESS:	Penrith Avenue		
OCP DESIGNATION	Mixed Land Use	ZONE:	Mixed Use One (MU-1)

RECOMMENDATION

1. THAT Council receive the “Coal Valley Estates Phase 11– Residential/Commercial Development Remainder DL 24, Nelson District Development Permit Application” report dated July 30, 2020.
2. THAT Council refer the Application for a Development Permit (File 2019-08-DP) dated July 30, 2020 for property legally described as DISTRICT LOT 24, NELSON DISTRICT, EXCEPT PARTS IN PLANS 21 RW, 522E, 3130, 3268, 4222, 4661, 4824, 4869, 6793, 6794, 11068, 12569, 13409, 13580, 13640, 14028, 15750, 23224, 19381, 19382, 19383, 20746, 21025, 22199, 23092, 23237, 23600, 23685, 24001, 24314, 24868, 25906, 26084, 26131, 26455, 26629, 26885, 27337, 27857, 29860, 30068, 30809, 32692, 35790, 36785, 35098, 50021, VIP64546 VIP65968, VIP65482, VIP67269, VIP71673 AND EXCEPT PARCEL A (DD 27356N) AND PARCEL B (DD M7897) AND EXCEPT PARTS IN PLANS VIP72020, VIP72021, VIP72022, VIP73804, VIP74156, VIP75434, EPP15708, EPP17313, EPP18594, EPP20118 EPP53358 , EPP71701, EPP79979 AND EPP90590 (Shown on Schedule B) to the next Advisory Planning Commission meeting.



SUMMARY

A proposed subdivision is at the application stage on the subject property for site preparation and subdivision servicing of Phase 11 of Coal Valley Estates.

Pursuant to the ‘Official Community Plan Bylaw No. 990, 2014’ the proposed development is subject to an Environmental Protection Area Development Permit (DPA #1), Groundwater Protection (DPA #2) and a Wildfire Urban Interface Development Permit (DPA #4). “DPA 2 – Groundwater Protection” identifies the north third of the parent parcel in the groundwater aquifer. However, as previously confirmed with the Village (October 29, 2014), since the property is not within the Village water supply aquifer, a DPA response is not required.

The proposed development is also subject to “DPA 8 – Mixed Land Use” which applies to commercial developments and triggers “DPA 7 –Residential Multi-Family”. As the purpose of this Development Permit application is only for site preparation and subdivision servicing, DPA#’s 7 & 8 are not addressed herein. DPA #’s 7 & 8 requirements will be addressed at the time of development of each new lot.

Development works for Phase 11 of Coal Valley Estates will generally consist of the following:

1. Blasting and lot grading within the lot areas as shown on Schedule C.
2. Civil infrastructure construction including potable water, sanitary and storm sewer servicing.
3. Third party utilities infrastructure installation including electrical, gas and telecommunication servicing.

4. Municipal road construction including curb, gutter, sidewalk, multi-use trails and street lighting.

Phase 11 servicing overview:

- A. Potable Water Servicing: Potable water servicing will be via the existing Village transmission main fronting the proposed lots along the extension of Penrith Avenue.
- B. Sanitary Sewer Servicing: Sanitary collection system will be constructed within the proposed extension of Penrith Avenue and will discharge to the Village's existing system near the intersection of Penrith and Maryport Avenues.
- C. Storm Sewer Servicing: Existing site runoff is split with approximately half of the runoff flowing northeast towards Penrith Avenue and the Village's existing piped network. The other half flows southwest to the wetland before entering the Village's piped system on Dunsmuir Avenue. Both piped systems rejoin on Dunsmuir Avenue and ultimately discharge to Perseverance Creek at the south end of Sutton Road. Storm servicing will be designed to maintain the existing flow split. Runoff up to the 10-year return period will be conveyed in new and existing piped systems. Runoff in excess of the 10-year return period will be conveyed overland along existing and proposed Village rights-of-way.

BACKGROUND

The Developer initially proposed a subdivision in the second quarter of 2019. The application for subdivision was returned following an amendment request to the existing CDA. The developer requested the Development Permit application be placed on hold in the summer of 2019, pending the results of the CDA amendment request. Following the Committee of the Whole meeting in July, the Developer requested that the Development Permit be reactivated for the proposed subdivision.

Site Description

The currently un-subdivided area of the Coal Valley Estates development consists of aquatic and terrestrial ecosystem areas. The northern portion of the property is disturbed from previous works for water line installation and construction on the site and has little vegetation remaining. The northern boundary will be dedicated road right of way by subdivision plan. Most of the existing vegetation, where present, consists predominantly of alder saplings and invasive species (scotch broom and blackberry). The southern section of the property includes the riparian greenway surrounding a seasonal stream/wetland with intact riparian vegetation. The areas surrounding the riparian area were previously harvested and are in an immature re-generating forested state. A water transmission main was installed along the access road at the east side of this section as part of a previous phase of the development. The property is bounded by residential properties to the east, private property to the north, and a working forest to the west.

Much of the area proposed for subdivision (Phase 11) is bare earth/rocks or existing roads from previous development (blasting and earth moving) activity on the site. In 2015, a Development Permit was granted to blast a 17.6hectare area to blast and fracture the rock to the design depths and to fill other areas prior to construction of adjacent homes. Proposed blasting limits for Phase 11 can be seen on Schedule C.

Comprehensive Development Agreement (CDA)

In 2011, the Village negotiated the CDA with Coal Valley Estates (CVE) as part of the rezoning of the subject property. The CDA was registered on title of the affected property and addressed the following: plan for subdivision and uses; servicing required prior to subdivision; park dedication; highway improvements; and financial amenities.

Zoning

The subject property is zoned Mixed Use One (MU-1). This zone permits single detached, multi-family, commercial, retail, retail convenience, office, and community care facilities. This zone outlines maximum densities for each of the permitted uses, either as a unit number, a land area, and/or as gross floor area (GFA).

The following table outlines the permitted density on this parcel:

	Density	Lot Area
Multi-family (Seniors Housing)	143 units	3.45 ha
Commercial/residential	15 units	0.76 ha

Reports in Support of Development Permit Application

Strategic Natural Resource Consultants (SNRC) in their Coal Valley estates Phases 9 to 12 Aquatic Ecosystems report dated May 10, 2019 provided the following conclusions/recommendations:

“...A section 11 Water Sustainability Act notification will be required for the stream crossing for the waterway within the existing riparian greenway at least 45 days prior to the planned construction of the crossing structure. If there is surface flow at the time of the works, ensure sediment and erosion control measures are in place to protect water quality downslope.

To protect the trees within the riparian greenway, install snow fencing or similar outside of the dripline to ensure that the root area of the retained trees are protected.

Although it was determined that the small seasonal waterway flowing through the northwest edge of the property does not require ESA protection through an established ESA, it is important to maintain the drainage pattern, by not cutting off/diverting the water elsewhere. If there is surface flow at the time of the works, ensure sediment and erosion control measures are in place to protect water quality downslope.”

The entirety of the Aquatic Ecosystems report is attached as Schedule D.

A Bio-Inventory assessment was contracted out to Ursus Environmental by SNRC. Their Environmental Assessment is dated June 24 2018. The entirety of the report is attached as Schedule E. The report concludes/recommends;

“A reassessment of the bio inventory that was completed by Ursus Environmental determined that the remainder of the property has two distinct sections. The northern section is highly disturbed with no potential habitat for listed species or plant communities. The southern portion of the property is forested in predominantly young regenerating forest. There is relatively more mature vegetation (young forest) within the riparian greenway which provides most of the habitat values on the property and most of the identified potential species would utilize this portion of the property.

The following conclusions/recommendations have been provided for each of the distinct areas:

A. North Section: No further wildlife or Plant surveys are recommended for the northern section.

B. South Section:

i) The riparian greenway is Village property and no development will take place within the greenway

ii) No further plant surveys are recommended for the southern portion given the low potential for presence due to the young age of the stand on the portions of the property that will be developed.

iii) High occurrence potential of identified at risk ecosystems on the southern section are located within the riparian greenway and will not be disturbed by future development.

iv) The typical habitat for the low potential presence of the two plant species is provided within the riparian greenway and will not be disturbed by future development.

v) Wildlife Surveys for the southern section are scheduled to be completed per the recommended survey schedule. This report will be updated once the survey is complete.

Additionally, SNRC conducted a Western Screech-Owl Monitoring Report that found that, “*data collected thus far 2019 and 2018 suggests that the riparian greenway does not appear to be an active nesting territory for Western Screech-Owls.*” The entirety of the Western Screech Owl report is attached as Schedule F.

SNRC also conducted the Wildfire Urban Interface assessment. In their Wildfire Urban Interface report dated May 16, 2019 they conclude/recommend;

In its current state, the vegetation that is intended to remain after land clearing for Phases 9-12 has been assessed as moderate and high Wildfire Behaviour Threat Class. The wetland, stream and road break up the continuity of the fuels. Although Private Managed Forest Lands outside the legal property line were not assessed for the purposes of this report, ortho-imagery indicates that extensive coniferous stands in varying stages of regeneration exist. The risk of a wildfire 'spotting' (burning embers carried into the air and fall beyond the main perimeter of a wildfire and result in spot fires on receptive fuel beds) into yards and/or onto homes is a concern. For this reason, FireSmart structure and site principles are included in the recommendations below. It is noted that the above field assessment was completed at one point in time – adjacent vegetation and fuel structure and continuity may change, thereby

changing fuel hazard scores. Given the current wildland fuel hazards SNRC recommends the following practices and mitigation measures for Phases 9-12 of the Coal Valley Estates development: See Schedule A for OCP Guidelines and Requirements.

1. Regarding the guidelines in the Village of Cumberland Official Community Development Permit Area #4 Section 10.4.5:

- Guidelines (3) (a), (b), (d), (e), (f), (g), (h) and (i) are recommended. Note: (i) may not apply due to planned underground services. If there is a variance from underground services, (i) shall apply;*
- Guideline (4) is recommended;*
- Guideline (5) is recommended, in particular for lots adjacent the Private Managed Forest Land or other vegetated lands;*
- Guideline (6) is recommended;*
- Guideline (7) is recommended as compliance with the Village of Cumberland's Fire Protection Services and Regulation Bylaw #988, 2014, in particular Part 1 section 12, Part 2 section 45 and Part 3. With respect to the term "high fire hazard," this may be determined using the BC Wildfire Service Fire Danger Rating (updated daily at approximately 2pm April through December) for the Bowser fire weather station, if acceptable by the manager of protective services (as the role defined by Bylaw #988, 2014).*

2. It is recommended to allow deciduous species to naturally establish and/or continue to grow (if safe to do so) within the stands assessed for this report;

3. A wildfire threat assessment by a Qualified Professional is recommended if significant changes occur with the vegetation of Phases 9-12 (i.e. if all vegetation not removed as initially indicated by McElhanney for this report, or if vegetation within the assessed area is altered); and

4. It is recommended that local Emergency Services retain a key to gates that access the roads surrounding this subdivision development while development is occurring.

The entirety of the Wildfire Urban Interface assessment report is attached as Schedule G.

The applicant provided Revision 1 - Stormwater Management Plan Design Brief (SWMP) dated Nov, 24 2019 which is attached as Schedule H.

The proposed stormwater management system for Coal Valley Estates utilizes site specific Low Impact Development (LID) strategies including amended soil in all landscaped areas to reduce runoff, sumps to reduce Total Suspended Solids (TSS) and pollutant loading, and subsurface infiltration galleries to control peak runoff rates and runoff volumes. Performance targets have been set based on the water balance model and site constraints. Low Impact Development techniques have been sized on a per hectare basis. This will allow for a phased development approach of the 40 hectare parcel allowing the LIDs for each phase to be sized based on the recommendations of this report.

Peer review for the reports has not been requested by staff. Advisory Planning Commission (APC) may recommend peer review following their review of the application.

CITIZEN/PUBLIC RELATIONS IMPLICATIONS

Council may require that the Applicant hold a Neighbourhood Public Meeting, the cost of which will be borne by the Applicant. If a meeting is required, the meeting shall be held in an accessible venue in the Village of Cumberland.

REFERRALS

Staff is recommending that this report be referred to the APC for their comments.

FINANCIAL IMPLICATIONS

None.

OPERATIONAL IMPLICATIONS

The review of Development Permit applications are part of the services provided by the Planning Department.

Operations will be involved in reviewing design drawings ensuring that designs meet MMCD standards and reviewing deficiencies.

STRATEGIC OBJECTIVE

- ☐ Quality Infrastructure Planning and Development
- ☐ Comprehensive Community Planning
- ☐ Healthy Community
- ☐ Climate Change
- ☐ Effective communication, administrative, financial and support services

SCHEDULES

- A. Applicant's Letter for Development Permit Application (includes responses to DPA 1 & 4 OCP Guidelines and Requirements)
- B. CVE PH 11 Map
- C. CVE PH 11 Blasting Area
- D. CVE PH 11 Aquatic Ecosystems letter
- E. CVE Bio-Inventory Assessment
- F. CVE Phase 8 Western Screech Owl Monitoring Report
- G. CVE PH 11 Wildfire Urban Interface assessment
- H. CVE PH 11 Stormwater Design Brief
- I. CVE PH 11 Riparian Areas Protection letter

CONCURRENCE

Ken Rogers, Manager of Development Services _ KR

OPTIONS

- i) Refer the application for Development Permit as presented to the APC.
- ii) Refer back to staff for additional information to the application for Development Permit (provide direction to information requested).
- iii) Any other action deemed appropriate by Council.

Respectfully submitted,

Meleana Searle

Meleana Searle
Planner

Clayton Postings

Clayton Postings
Chief Administrative Officer

April 25, 2019

Our File: 2211-46871-16

Ms. Joanne Rees
Village Planner
Village of Cumberland
2673 Dunsmuir Avenue
Box 340, Cumberland, BC V0R 1S0

Dear Ms. Rees,

**COAL VALLEY ESTATES - PHASE 11 – RESIDENTIAL/COMMERCIAL DEVELOPMENT
REMAINDER DL 24, NELSON DISTRICT
DEVELOPMENT PERMIT APPLICATION**

1.0 INTRODUCTION

The enclosed Development Permit application has been prepared on behalf of Coal Valley Estates Ltd. (CVE) in support of site preparation and subdivision servicing of Phase 11 of Coal Valley Estates development. This application covers the Phase 11 area shown on the attached McElhanney Dwg CDA-2.

The proposed Phase 11 development area is zoned Mixed Use Residential (MU-1). The MU-1 zoning allows for mixed residential and commercial use. Per the Comprehensive Development Agreement, Phases 11 is slated for commercial/residential and multifamily (seniors) development, as shown on the attached CDA-2 drawing.

Development works for Phase 11 of Coal Valley Estates will generally consist of the following:

1. Blasting and lot grading within the lot areas as shown on the attached McElhanney Dwg PREP-01.
2. Civil infrastructure construction including potable water, sanitary and storm sewer servicing.
3. 3rd party utilities infrastructure installation including electrical, gas and telecommunication servicing.
4. Municipal road construction including curb, gutter, sidewalk, multi-use trails and street lighting.

Phase 11 servicing overview:

- A. Potable Water Servicing: Potable water servicing will be via the existing Village transmission main fronting the proposed lots along the extension of Penrith Avenue.



- B. Sanitary Sewer Servicing: Sanitary collection system will be constructed within the proposed extension of Penrith Avenue and will discharge to the Village's existing system near the intersection of Penrith and Maryport Avenues.
- C. Storm Sewer Servicing: Existing site runoff is split with approximately half of the runoff flowing northeast towards Penrith Avenue and the Village's existing piped network. The other half flows southwest to the wetland before entering the Village's piped system on Dunsmuir Avenue. Both piped systems rejoin on Dunsmuir Avenue and ultimately discharge to Perseverance Creek at the south end of Sutton Road. Storm servicing will be designed to maintain the existing flow split. Runoff up to the 10-year return period will be conveyed in new and existing piped systems. Runoff in excess of the 10-year return period will be conveyed overland along existing and proposed Village rights-of-way.

1.1. Enclosed in support of Development Permit Application is:

- Completed Development Permit Application Form;
- Signed Authorization for Agent;
- Current title search;
- Completed site profile;
- Drawing 46871-08 CDA-2 with Phase 11 overlain;
- Draft Phase 11 Lot Layout Plan (PLR);
- Drawing PREP-01 showing proposed blasting limits;
- Documentation for DPA 1 – Environmental Protection and DPA 4 – Wildfire Urban Interface responses within this document and the following attachments:
 - *Strategic Natural Resource Consultants*, Environmental Assessment – Coal Valley Estates Remainder (June 24, 2018), prepared by Cindy Hannah, R.P. Bio.
 - *Strategic Natural Resource Consultants*, Aquatic Ecosystems Assessment letter (May 10, 2018), prepared by Cindy Hannah, R.P. Bio
 - *McElhanney Consulting Services Ltd (MCSL)*, Stormwater Management Plan (SWMP) (November 24, 2014), Prepared by Chris Durupt, P.Eng.
 - *Lewkowich Geotechnical Engineering Ltd*, Preliminary Geotechnical Review (February 9, 2007), Prepared by Darron Clark, P.Eng.
 - *Strategic Natural Resource Consultants*, Wildfire Threat Assessment (May 16, 2018), Prepared by Leigh Stalker, RPF
 - *Strategic Natural Resource Consultants*, Coal Valley Estates Western Screech-Owl *kennicottii* subspecies (*Megascops kennicottii kennicottii*) Monitoring Report (April 15, 2019), prepared by Cindy Hannah, R.P. Bio



The Village is to provide required Development Permit application fees.

2.0 OCP DEVELOPMENT PERMIT REQUIREMENTS

The proposed development relates to the following sections of the OCP Bylaw No.990, 2014, summarized as follows:

- OCP Map E “DPA 1 – Environmental Protection” identifies the proposed development to contain “watercourses” and is within the “Connectivity Area” listed in OCP 10.1.3 2c, and thus requires a DPA 1. The DPA 1 response to the guideline requirements and the supporting documentation is discussed in the following *Section 3.0*.
- OCP Map F “DPA 2 – Groundwater Protection” identifies the north third of the parent parcel in the groundwater aquifer. However, as previously confirmed with the Village (October 29, 2014), since the property is not within the Village water supply aquifer, a DPA response is not required.
- OCP Map H “DPA 4 – Wildfire Urban Interface” encompasses the proposed development lands; the responses to the guideline requirements and supporting documentation are discussed in the following *Section 4.0*.
- OCP Map C “Development Permit Areas” identifies the proposed development area “DPA 8 – Mixed Land Use” which applies to commercial developments and triggers “DPA 7 – Residential Multi-Family”. As the purpose of this Development Permit application is only for site preparation and subdivision servicing, DPA 7 & 8 are not addressed herein. DPA 7 & 8 requirements will be addressed at the time of development of each new lot.

3.0 DPA 1 ENVIRONMENTAL PROTECTION

The OCP Map E “DPA 1 – Environmental Protection” boundary for “Connectivity Area” includes the proposed Phase 11 development area. The “Watercourse” and “Connectivity Area” within OCP 10.1.3 2c requires preparation of a DPA 1. This section provides responses to the DPA 1 OCP Guidelines and Requirements.



OCP Ref.	Response and Documentation
10.1.5 1	A biological site inventory was conducted by Cindy Hannah, R.P. Bio. of <i>Strategic Natural Resource Consultants (SNRC)</i> and is attached. The investigation was done in accordance with the <i>Develop with Care 2014</i> Guidebook (Ministry of FLNRO) and included owl call-play back surveys. SNRC's review concluded that most of Phase 11 development is vegetated in immature re-generating vegetation with a with low potential for rare flora and fauna . Exceptions to the immature re-generating vegetation include the pacific yew tree located just north of the existing Penrith road right-of-way and existing mature trees along the south and east border of Phase 11. The yew tree and trees along the southern border of Phase 11 are protected by covenants. The remaining mature vegetation will be maintained as much as is reasonably possible when considering required lot grading and subdivision servicing.
10.1.5 2	The following supporting documents were prepared by qualified professionals: Qualified biologist Cindy Hannah of <i>Strategic Natural Resource Consultants</i> conducted a bio-inventory assessment – see enclosed and discussion above for item 10.1.5 1). Qualified biologist Cindy Hannah of <i>Strategic Natural Resource Consultants</i> conducted an aquatic ecosystems assessment – see enclosed and discussion below for item 10.1.6.1. A geotechnical review by <i>Lewkowich Geotechnical Engineering Ltd</i> in 2006/2007. A professional engineer's report for Stormwater Management Plan (SWMP) by <i>McElhanney Consulting Services Ltd (MCSL)</i> November 2014.
10.1.5 3	Addressed in the bio-inventory prepared by SNRC and summarized above for item 10.1.5 1).
10.1.5 4	A bio-inventory plan is included in the bio-inventory assessment prepared by SNRC.
10.1.5 5	Wildlife surveys are ongoing as recommended in the bio-inventory report prepared by SNRC. The most recent monitoring report for Western Screech-Owl, prepared by SNRC, is attached.
10.1.5 6	The biological site inventory did not identify any environmentally sensitive areas within Phase 11 boundaries. The development will abide by the accepted standard practices for Erosion and Sediment Control (ESC) and required setbacks from adjacent environmentally sensitive areas during development so as not to adversely affect any adjacent/downstream environmental sensitive areas.
10.1.5 7	McElhanney has prepared a Stormwater Management Plan (SWMP) for the larger original 46-hectare Phase 5 site, to set a baseline for existing site runoff, develop performance targets for post-development (based on the BCSWGB and Village Guidelines), and provide preliminary sizing for the proposed mitigation techniques or Best Management Practices (BMPs) required to achieve the performance targets. Refer to enclosed report.



OCP Ref.	Response and Documentation
10.1.5 8	As noted in the bio-inventory prepared by SNRC, Phase 11 is vegetated in immature re-generating vegetation, so implementation of Best Management Practices (BMPs) outlined in the Stormwater Management Plan (SWMP), such as 300mm thickness of amended soil and landscaping will aid in the restoration of the natural system. The on-lot BMP improvements would be carried out at the building permit stage of the development. Refer to the attached SWMP for further details.
10.1.5 9	The pacific yew tree located just north of the existing Penrith road right-of-way and existing mature trees along the southern and eastern border of Phase 11 make up most of the mature vegetation within Phase 11. Both the yew tree and mature trees along the southern border are protected by covenant. The remaining mature vegetation will be maintained as much as is reasonably possible when considering required lot grading and subdivision servicing.
10.1.5 10	The proposed site design for Phase 11 does not preserve the existing vegetation which is predominantly immature vegetation. The nature of the commercial and multifamily housing layout makes it a challenge to restore historical forest densities. The existing hydrologic function mimics pre-development conditions through the use of routing and stormwater BMP strategies, to promote on-site capture of runoff and groundwater recharge. Properly employed, this approach will mitigate peak runoff rates, and provide qualitative treatment of runoff, prior to discharge.
10.1.5 11	There are no noted nesting sites and breeding areas within Phase 11 boundaries. Refer to the <i>bio-inventory prepared by SNRC</i> . Wildlife monitoring is ongoing. The biologist's recommended setbacks and construction timing of adjacent nesting/breeding areas will be followed.
10.1.5 12	Construction will be scheduled per the biologist's recommendations if there is a potential impact on wildlife; at this time there are no noted concerns within Phase 11 boundaries.
10.1.5 13	As the sites are commercial/multifamily, site clearing, development and landscaping will be mostly completed by future property owners/developers. The exception being the areas disturbed by blasting and site grading. The future property owners/developers will be encouraged to preserve native shrubs, groundcover, and tree cover of existing and potential connections to adjacent Terrestrial, Aquatic and Connectivity Areas.
10.1.5 14	Sediment and erosion control measures together with setbacks from riparian areas will be in place to prevent foreign material from entering the adjacent riparian areas.
10.1.5 15	All proposed street lighting will be in accordance with existing Village bylaws and design standards.
10.1.5 16	Any required fencing along wildlife corridors will be designed according to the guidelines described in "A Landowners Guide to Wildlife Friendly Fences: How to Build Fences with Wildlife in Mind, Montana Fish Wildlife and Parks".



OCP Ref.	Response and Documentation
10.1.5 17	MCSL has prepared a Stormwater Management Plan (SWMP) that manages rainwater based on the “British Columbia Stormwater Planning Guidebook” (BCSWPG) and “Beyond the Guidebook”, a 2007 revised publication which builds on the BCSWPG. Refer to the attached report.
10.1.5 18	The development activities will not exceed 20 m beyond the boundaries shown on the site plan approved during the development permit.
10.1.5 19	Prior to any development activity, the boundaries of restricted development and buffer zones identified in the bio-inventory will be clearly marked with a bright orange or other highly visible temporary fence with a minimum height of 1.2 metres and supported by poles a maximum distance of 2.5 metres from one another. This fence will remain in place throughout clearing, site preparation, construction, and/or any other form of disturbance.
10.1.5 20	Any trees that are to remain on the site will be protected with snow fencing. The yew tree has its own covenant and existing snow fence protection.
10.1.5 21	All trails/pedestrian walkways in Phase 11 will adhere to the Village’s trail and pathway design and construction practices for ESADP area where applicable; will be designed to prevent motorized vehicle use, and will minimize the impact of recreational use on restricted development zones and adjacent natural areas and systems.
10.1.5 22	Project specific watercourse and riparian buffer zones which consider all species have been identified by SNRC in its “ <i>Coal Valley Estates Phases 9 to 12 Aquatic Ecosystems</i> ” report. These setbacks will be followed.
10.1.6.1	Aquatic Ecosystem Areas The attached aquatic ecosystems review conducted by Cindy Hannah, R.P. Bio at <i>Strategic Natural Resource Consultants</i> addresses the DPA 1 bylaw requirements for Aquatic Ecosystems. The SWMP prepared by MCSL addresses source controls and reduction in post-development runoff. A detailed Erosion and Sediment Control Plan will be prepared as part of the subdivision servicing design.
10.1.6.2	Terrestrial Ecosystem Areas The Phase 11 development area is not within a sensitive terrestrial ecosystem area per the attached bio-inventory prepared by SNRC. The SWMP prepared by McElhanney addresses source controls and reduction in post-development runoff. A detailed Erosion and Sediment Control Plan will be prepared as part of the subdivision servicing design.



OCP Ref.	Response and Documentation
10.1.6.3	<p>Connectivity Areas</p> <p>The Phase 11 development is within the OCP designated Connectivity Area.</p> <ul style="list-style-type: none">a) The development parcel is adjacent to the existing residential development, which will reduce impact to native fauna movement between adjacent habitats. The development is outside the proposed bio-diversity corridors identified in “Map 5: CVCS Priority Ecological Areas for Conservation: Lands of the Comox Valley Conservation Strategy- Nature Without Borders document”, 2nd ed.b) New roads within the Connectivity Area are 20m wide (ROW) and will be constructed along existing resource roads to minimize impact to connectivity areas.c) The bio-inventory did not indicate any special considerations for wildlife crossing and mitigation measures for road crossing within Phase 11.d) There is one pedestrian walkway planned for this phase of development.e) The use of native and drought tolerant vegetation will be encouraged.f) Most of the proposed Phase 11 development has been previously cleared.g) There was no sensitive ecosystem identified within the proposed Phase 11 development area.

4.0 DPA 4 WILDFIRE URBAN INTERFACE

The OCP Map H “DPA 4 – Wildfire Urban Interface” includes the proposed development area. This section will respond to OCP Guidelines and Requirements.

OCP Ref.	Response and Documentation
10.4.5 1	The attached <i>Wildfire Threat Assessment</i> contains a detailed site plan which shows Wildfire Urban Interfaces, as well as the location of watercourses, existing natural vegetation and on-site topography as of October 2016. There are no existing buildings within the proposed Phase 11 development area. The proposed residential lot layout is shown, and the buildings will conform to zoning setbacks.
10.4.5 2	The attached <i>Wildfire Threat Assessment</i> includes mitigating strategies to reduce threat of wildfire which are in accordance with the DPA 4 document.
10.4.5 3	A fuel hazard assessment was conducted by L. Stalker, RPF at Strategic Natural Resource Consultants, and is presented in the attached report dated May 16, 2018. Page 7 and 8 of the report outline preventative measures to mitigate risk of wildfire spread.
10.4.5 4	The proposed asphalt road and connections to existing road network are adequate for evacuation and access for emergency response vehicles. There is also fire access to the existing gravel roads on the remainder of the property.



10.4.5 5	The setbacks from the proposed lots will have buildings with setbacks larger than 10.0m to the forest interface.
10.4.5 6	The ends of proposed roads will allow for access to the abutting forested lands, and fire hydrants will be in close proximity to the ends of the roads.
10.4.5 7	The timing of the development has not been determined, though construction adjacent to forested lands may be limited during periods of high fire hazard.
10.4.5 8	A fuel hazard assessment was conducted by L. Stalker, RPF at <i>Strategic Natural Resource Consultants</i> , and is presented in the attached report dated May 16, 2018. Page 7 and 8 of the report outline preventative measures to mitigate risk of wildfire spread.

Please advise us of any further requirements.

Yours truly,

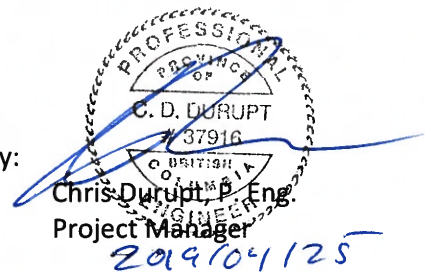
McElhanney Ltd.


Alex Fachler, ASCT.
Engineering Technologist

Enclosures

cc: Village of Cumberland, Sundance Topham, Ken Rogers, Rob Crisfield
Coal Valley Estates Ltd.

Reviewed by:


Chris Durupt, P. Eng.
Project Manager
2019/04/25



Date: May 10, 2018

To: Chris Durupt, PEng
McElhanney Consulting Services Ltd.
495 Sixth Street
Courtenay BC, V9N 6V4

From: Strategic Natural Resource Consultants Inc.
321-1180 Ironwood Street
Campbell River, BC, V9W 5P7

RE: Coal Valley Estates Phases 9 to 12 Aquatic Ecosystems

Introduction

On April 11, 2018, a site visit was completed at the proposed Phases 9 to 12 of the Coal Valley Estates property development in the Village of Cumberland. The purpose of this survey was to comment on the Aquatic Ecosystems as they relate to Phases 9 to 12, (see attached site plan). The fieldwork was conducted by Cindy Hannah, RPBio and Jacob Blanchard RBTech of Strategic Natural Resource Consultants (SNRC). Subsequent fish sampling on the drainage was conducted on May 7 and 8, 2018 to confirm fish absence.

Various assessments at the site have been completed to date. A Riparian Areas Regulation (RAR) assessment and report was initially completed during the rezoning of the property in 2007. Subsequent assessments determined that several identified waterways did not meet the definition of a stream under the RAR. In 2012, a letter was written by SNRC indicating that the waterways on the development property do not in fact trigger the RAR as they are non-fish bearing with extensive wetlands (including the Village stormwater and sanitary sewer discharge) downslope of the property. Fish bearing water is located +8km downstream of the property.

Site Description and Observations

Phases 9 to 12 include an area of 29.1ha. Phases 9 (2.8ha), 10 (3.7ha) and 11 (3.1ha) are predominantly single family residential with a small area of multifamily (in the vicinity of the waterway at the northwest corner in Phase 11). Phase 12 (19.5ha) surrounds the riparian greenway and is predominantly multifamily with some commercial development. A road crossing the drainage is planned at the location of the stream/wetland reach break where there is currently an old road that crosses it. A site plan showing the layout of the development is attached in Appendix 1.

The area has been previously cleared of vegetation in preparation of the planned development within phases 9 and 10. Phases 11 and 12 to the north of the riparian greenway were previously harvested of timber, but has a young regenerating forest. To the south of the riparian greenway, the property is vegetated in second growth timber. There are two streams/waterways within Phases 9 to 12 that have been identified and fall under Section 10.1.6.1 Aquatic Ecosystem Areas.

It was determined in 2012 that the waterways on the property do not trigger the RAR, given they are non-fish bearing and do not connect directly to fish bearing water.

Further fish sampling was conducted with a backpack electrofisher to confirm the 2012 findings. The drainage at the northwest corner of the property is intermittently scoured with sections of overland flow. It drains from a wetland area on the adjacent property to the west and drains to a poorly scoured seasonal stream that drains east into a series of wetlands downstream of Maple Lake, then through the Village's stormwater and sewage outfall to a tributary of the Trent River. Bedrock falls that are 7m high were identified +8km downstream of the property boundary (Photo 1). Sampling results are shown in Table 1 and a map with the sampling locations is attached in Appendix 2. The stream was sampled extensively immediately upstream of the identified barrier. It was also sampled in the vicinity of Royston Road, Bevan Road and on the property. No RAR fish species (salmonids, game fish or regionally significant fish) were located upstream of the barrier in 3141 electrofishing seconds over 1800m in various locations upstream of the barrier. A rainbow trout was located immediately below the barrier in 2 electrofishing seconds (Photo 2). Threespine stickleback were located in high numbers in the stream that flows into the sewage outfall channel below Royston Road (Photo 3). It should also be noted that invasive bluegill sunfish were located in the Trent River tributary upstream of the falls (Photo 4). Ten sunfish were captured and removed from the stream. Maple Lake is an isolated lake surrounded by extensive wetland areas. The lake is stocked annually (and in some years twice annually) with catchable sized fish. The rainbow trout are genetically modified to be sterile (meaning that they cannot reproduce).

Table 1. Sampling Results for fish presence/absence within the Coal Valley drainage systems

Area	Sample ID	Location (UTM) Lowest point	Length (m)	Effort (s)	Results	Comments
Trent River	1	10 353624 5499630	2	2	RB	Rainbow trout located immediately below falls
	2	10 353624 5499630	925	2142	TSBx2	Invasive sunfish were located and very low numbers of stickleback
	3	10 356885 5497536	65			
	4	10 357291 5497536	75			
Royston Rd	5	10 355027 5498424	135	91	TSBx~50	Abundant stickleback
Bevan Rd	6	10 353629 5499632	225	375	NFC	Abundant worms and other insects were noted.
	7	10 353411 5499565	150	218	NFC	
	8	10 353378 5499465	25	55	NFC	
Property	9	10 352218 5499027	200	261	NFC	

Section 10.1.6.1b of the bylaw applies: *When a site contains, or is adjacent to, a known watercourse where the presence or absence of fish is unknown.*

The subsections listed under 10.1.6.1b of the bylaw with the required information are listed in Table 2.

Table 2. Requirements under Bylaw No. 990, 2014 for Aquatic Ecosystem Areas

Section under 10.1.6.1.b.ii	Requirement	Comment
.1	A detailed site plan identifying the environmentally sensitive area within the site, location of proposed buildings and structures, new lot lines and an assessment of existing natural vegetation.	<ol style="list-style-type: none"> 1. The riparian greenway with stream and wetland identified during the assessment for the rezoning of the property is clearly shown on the site plan. For the most part the drainage is within a well defined vegetated draw. 2. The waterway at the northwest corner of the property does not require a specific riparian area as it is a poorly scoured, seasonal, non-fish bearing drainage, but the waterway needs to maintain the current drainage pattern by ensuring the waterway connection upslope and downslope of the property is preserved. The proposed plan is to infill the area with large coarse rock to allow the water to flow through the site subsurface. An example of a cross section is included in Appendix 3. The surface was previously cleared and stripped and is vegetated in predominantly alder saplings with a high number of invasive species.
.2	The criteria used to define the boundaries of the environmentally sensitive area.	<p>The environmentally sensitive area that surrounds the stream/wetland within Phase 12 has an ESA boundary that corresponds to the Riparian Areas Regulation setbacks for similar waterways. It was determined that the stream reach required a 10m wide setback and the wetland area required a 15m/30m due south setback. As part of the rezoning process the riparian greenway boundary is slightly wider in places to accommodate a trail.</p> <p>A specific ESA area adjacent to the drainage at the northwest has not been defined due to the marginal nature of the waterway on the property. It is important that the drainage itself will be maintained to ensure existing drainage patterns are maintained.</p>
.3	An inventory of wildlife species and related habitat	<p>There is no fish habitat on the property. The closest fish bearing water is +8km downstream of the property.</p> <p>The stream/wetland within the riparian greenway has limited amphibian habitat. It provides habitat for adults, but breeding would be limited due to the shallow/seasonal nature of the wetland area. During night owl surveys, chorus frogs could be heard and Red-legged adults were observed during various assessments at the site.</p>

Coal Valley Estates
Phases 9-12 Aquatic Assessment

Section under 10.1.6.1.b.ii	Requirement	Comment
		<p>The small northwest drainage does not provide suitable amphibian habitat within the property as it is a shallow swale that is seasonal and dries during low precipitation.</p> <p>For details on wildlife species and related habitat please refer to the report: "Terrestrial Assessment for Remainder of Phase 5 of Coal Valley Estates, Cumberland" prepared by Ursus Environmental, October 2014. It was noted that Western screech owls responded to call playback conducted in October 2014. It was also noted that there were no suitable cavities in the area to provide nesting habitat for this species and it was recommended to install 3 nest boxes.</p> <p>Three Western screech owl boxes were installed in February 2018. Three call playback surveys have been conducted during the 2018 breeding season. No Western screech owls have responded. A barred owl was observed and was heard. It was likely in the area for hunting as the property does not provide suitable nesting habitat within the riparian greenway. This species of owl is not native and does not require specific protection as it is expanding its territory and the population is expanding.</p>
.4	An impact statement describing the effects of proposed development or subdivision on natural conditions or any neighbouring sensitive ecosystem as identified by the best available and most up to date information including the province's Sensitive Ecosystem Inventory and the Comox Valley Regional Districts' Sensitive Habitat Atlas.	Please refer to the report: "Terrestrial Assessment for Remainder of Phase 5 of Coal Valley Estates, Cumberland" prepared by Ursus Environmental, October 2014.
.5	Guidelines for mitigating habitat degradation including limits of proposed restricted development zone.	<p>Prior to any ground disturbance in the vicinity of the riparian greenway and other park areas where there will be trees maintained, delineate the dripline (approximately 5m from the tree) with snow fencing to ensure that the root zone isn't impacted.</p> <p>This is not applicable for the small marginal waterway at the northwest edge of the property, although the drainage must maintain the flow of water between the upslope and downslope connection points. Refer to point .1 for more details.</p>

Conclusions and Recommendations

A Section 11 Water Sustainability Act notification will be required for the stream crossing for the waterway within the existing riparian greenway at least 45 days prior to the planned construction of the crossing structure. If there is surface flow at the time of the works, ensure sediment and erosion control measures are in place to protect water quality downslope.

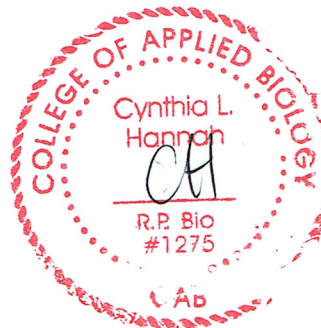
To protect the trees within the riparian greenway, install snow fencing or similar outside of the drip line to ensure that the root area of the retained trees are protected.

Although it was determined that the small seasonal waterway flowing through the northwest edge of the property does not require extra protection through an established ESA, it is important to maintain the drainage pattern, by not cutting off/diverting the water elsewhere. If there is surface flow at the time of the works, ensure sediment and erosion control measures are in place to protect water quality downslope.

If you have any further questions, feel free to contact Cindy Hannah phone at 250-616-3758 or by email at cindy.hannah@snrc.ca.



Cindy Hannah, RPBio
SNRC



COPY
Original signed and sealed on file

Coal Valley Estates
Phases 9-12 Aquatic Assessment



Photo 1: 7m high falls located +8km downstream of the property are a definable barrier to upstream fish movement from the Trent River.



Photo 2: A rainbow trout was located immediately in the pool at the base of the falls.

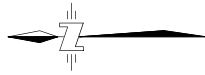


Photo 3: Stickleback were located adjacent to Royston Road.



Photo 4: Invasive bluegill sunfish were captured in the lower reaches upstream of the barrier falls.

Appendix 1



Rem. Pw B

WORKING FOREST

↓
CONTOURS ARE A COMPOSITE OF SURVEYS
COMPLETED BETWEEN 2001 AND OCTOBER, 2016
AND REPRESENT THE TOPOGRAPHY OF THE
SUBJECT PROPERTY AS OF OCTOBER 2016.

NOTE: PHASE BOUNDARIES AND AREAS ARE APPROXIMATE AND SUBJECT TO CHANGE

[illegible]

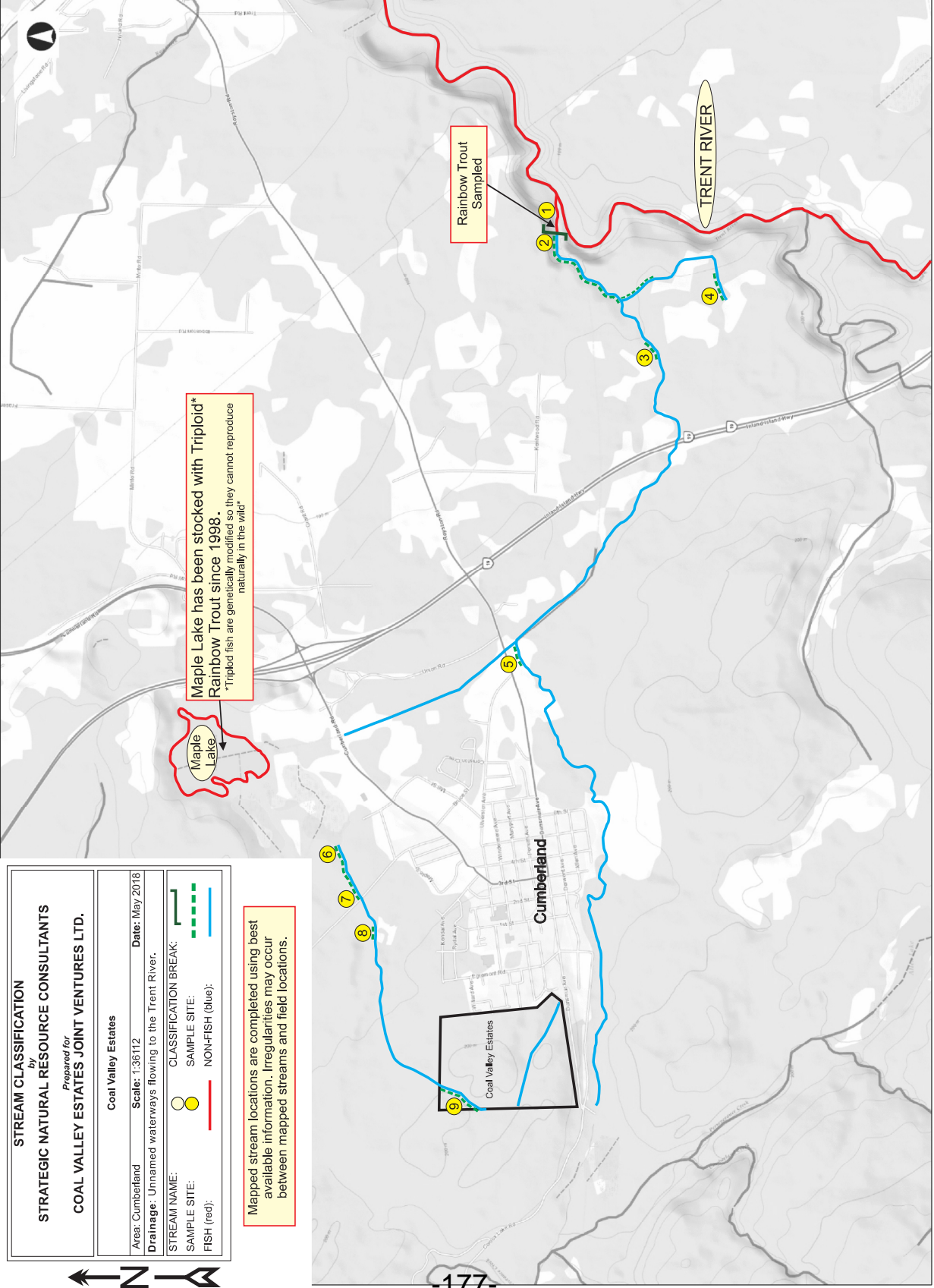
Appendix 2

STREAM CLASSIFICATION

Prepared for
STRATEGIC NATURAL RESOURCE CONSULTANTS
COAL VALLEY ESTATES JOINT VENTURES LTD.

Area: Cumberland	Scale: 1:36112	Date: May 2018
Drainage: Unnamed waterways flowing to the Trent River.		
STREAM NAME:	CLASSIFICATION BREAK:	
SAMPLE SITE:	SAMPLE SITE:	
FISH (red):	NON-FISH (blue):	

Mapped stream locations are completed using best available information. Irregularities may occur between mapped streams and field locations.



habwiz Mapping

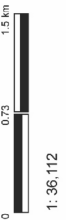
Legend

Stream Centre Line Network
WDIG_SPTFP_CODE

- 100 - Coastline
- 1000 - Single-line blue-line, main
- 1050 - Single-line blue-line, thro
- 1100 - Single-line blue-line, seco
- 1150 - Single-line blue-line, seco
- 1200 - Construction line, main fl
- 1250 - Construction line, double
- 1300 - Construction line, second
- 1350 - Construction line, double
- 1400 - Construction line, isolate
- 1410 - Construction line, networ
- 1425 - Construction line, subar
- 1450 - Construction line, constr
- 1475 - Construction line, lake ar
- 150 - Construction line, coastline
- 2000 - Single-line, man-made w
- 2300 - Single-line, man-made w
- 6010 - Construction line, coast t

Major Rivers - Colour Themed
Lakes, Man-Made Waterboc
Colour Themed (50K)
WDIG_SPTFP_CODE

- Lake
- Wetland
- Man-Made Waterbody



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Date: 14/03/2018
Project: 1004_Maps_Maintenance_Agency_Sp
Map: 1004_Maps_Maintenance_Agency_Sp

Key Map of British Columbia

•

Appendix



SCALES



ORIGINAL DWG SIZE: ANSI A (8 1/2" x 11")

[illegible][illegible]

McElhanney
McElhanney Consulting Services Ltd.

495 Sixth Street
Courtenay BC
Canada V9N 6V4
Tel 250 338 5495

COAL VALLEY JOINT VENTURES

COAL VALLEY 9 - 12 DP
DITCH DETAIL
TYPICAL SECTION

SK-02

Project Number	Rev.
2211-46871-12	0



June 24, 2018

Environmental Assessment – Coal Valley Estates Remainder

Cindy Hannah, RPBio (#1275)

Project #: 18-1044-06

PROFESSIONALLY RESOURCEFUL

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1.0 Introduction and Background

A wildlife bio-inventory assessment was completed on behalf of Coal Valley Estates for the remainder of the property of the Coal Valley Estates residential development. Various site visits to the property have been made between February and June 2018 by Cindy Hannah, RPBio, Jacob Blanchard, RBTech and Stephen Johnston, BIT of Strategic Natural Resource Consultants Inc. (SNRC). The Village of Cumberland has requested that the bio-inventory of the remainder of the property be updated prior to the issuance of future development permit applications. A complete bio-inventory was conducted by Ursus Environmental prior to the rezoning of the property in 2006 and was updated in 2014.

The remainder of the proposed development area (29.6 ha) is located in the Village of Cumberland and the land parcel is identified under REM. D. L. 24, NELSON DISTRICT, PLAN EPP53358. The remainder of the proposed development consists of 4 phases. Refer to Figure 1 for a locator map showing the development site.

Preliminary site plan maps showing the development area were provided by McElhanney Consulting Services Ltd. (McElhanney) prior to the assessment (dated 2018-03-23).



Figure 1: Google Earth image showing the Coal Valley Estates Subdivision development site (Imagery Date: 5/8/2015).

Previous discussions between Cindy Hannah of SNRC, Chris Durupt, PEng of McElhanney, and Dave Atkinson (Coal Valley Estates) as well as the guidelines within The Ministry of Environment Develop with Care (MOE DWC) Bio-Inventory Approach (BC Ministry of Environment, 2014) were used to outline the project expectations and scope of work. These initial discussions provided the basis for the methodologies used within this report.



1.1 Project Objectives

The following project objectives were determined for the field assessment:

Objective #1:

- Review previous URSUS assessment report from 2014. Summarize various site assessments to determine the habitat types and condition present on the property. Note any wildlife observations including the results of the Western screech-owl play callback surveys.

Objective #2:

- Using the ecotypes identified in the previous assessments on the site, determine the red and/or blue listed species (animals, plants and ecological communities) that may be present on the property and determine a likelihood of occurrence based on the site conditions.

Objective #3:

- Provide survey timing and methods needed for any red and/or blue listed species potentially occurring onsite. Provide mitigation measures for species identified as potentially occurring onsite.

2.0 Methodology

The Bio-Inventory of the Property has been completed to the standards outlined in Appendix B of the Ministry of Environment Develop with Care document (BC Ministry of Environment, 2014a). This methodology requires a preliminary assessment to identify any Environmentally Valuable Resources (EVR) that have the potential to occur on the Property. This is followed by a detailed site inventory, based upon the results of the preliminary assessment which establishes the on-site presence or absence of specific EVRs. Identified EVRs are mapped. The results from this assessment were used to adjust and design the final development plan.

EVRs are described in the MOE DWC document as “all features, sites and species whose presence enhances the natural biodiversity of the area and support free ecosystem services” (BC Ministry of Environment, 2014a. P 4-3). Some of the features that may be included are individual trees, rock outcroppings and cliffs, meadows, ungulate winter range, fish spawning or rearing areas, ponds, wetlands, den sites, wildlife corridors, areas of high wildlife use, rare plant and animals species and rare plant communities (BC Ministry of Environment, 2014a).

The site assessment to determine habitat types and condition was conducted by reviewing previous visits to the site to determine the different types of habitat available (trees with cavities, coarse woody debris, areas of dense understory etc). The intent of the habitat type assessment was to be able to refine the list of potential red and/or blue listed species. A map has been provided in Appendix 1 showing the noted observations of specific wildlife species.

The biogeoclimatic (BEC) zones identified in the 2014 Ursus report were used for identifying the potential species at risk. To determine the list of potential red and blue species (animals, plants and ecological communities), ecosystem explorer was utilized



(<http://a100.gov.bc.ca/pub/eswp/>) to generate a list. To narrow the search down to the specific geographic area and BEC subzone the following criteria were selected:

- Species at Risk, Red (Species Extirpated, Endangered, or Threatened) OR Blue Listed Species (Species of Special Concern), and/or Legally Designated (Federal SARA)
- Habitat Type: Forest (for animals)
- Regional District: Comox Valley, and
- BGC Zone, Subzone, Variant, CWHxm.

Once the list was generated the site was analyzed to determine whether the animals, plants or plant communities exist on the site or what the likelihood of them being present may be. Regionally important species within Develop with Care were also included. Existing databases (Wildlife Tree Stewardship Atlas, Habitat Wizard, iMap BC) with species occurrences were also reviewed to determine other features on or near the property to compare with the results noted in the 2014 Ursus Environmental report.

For the animal species, various sources were used including the BC Species and Ecosystems Explorer (<http://a100.gov.bc.ca/pub/eswp/>), Conservation Data Centre, E-Fauna BC reports and iMap data sources to determine the habitat needs and distributions of each species. The habitat needs were compared with the habitat available and the likelihood of occurrence was ranked (nil, low, moderate). Mitigation measures for species with a moderate potential to be present are provided.

For determining the likelihood of plant species occurrences, the UBC E-Flora BC website (<http://ibis.geog.ubc.ca/biodiversity/eflora/index.shtml>) was utilized to determine site characteristics favourable to each plant species. Many plant species could simply be ruled out given they grow on very different sites as compared to the development area (e.g. rocky cliffs, sand dunes, meadows, wetland types, etc.). If the plant species had the potential to occur but was not identified on the site, it was given a low potential for occurrence.

Call playback surveys were conducted for Western Screech-owls following the methods outlined in Resources Information Standards Committee's Inventory Methods for Owl Surveys (RISC, 2006). For the site, 3 call playback stations were established to ensure full coverage of the area. The call playback stations are shown on the wildlife observations map included in Appendix 1.



3.0 Results / Discussion / Recommendations

3.1 Objective 1: Site Assessment

The remainder of the Coal Valley Estates development consists of two distinct areas. The northern portion of the property is highly disturbed from previous works on the site and has little vegetation remaining. Most of the existing vegetation, where present, consists of alder saplings and various invasive species. The southern portion of the property is vegetated in a young re-generating forest with small areas of retained trees. There are two Village park areas associated with the southern portion of the property which were established during the rezoning of the property. These park areas include a riparian greenway (stream/wetland) within a steeply sided draw with intact young seral forest vegetation and a forested area with older mature vegetation. These areas provide the most habitat values on the property.

The property is bounded by residential properties to the east, undeveloped private property to the north and a working forest to the west. Figure 2 shows the location of the development and the riparian greenway.

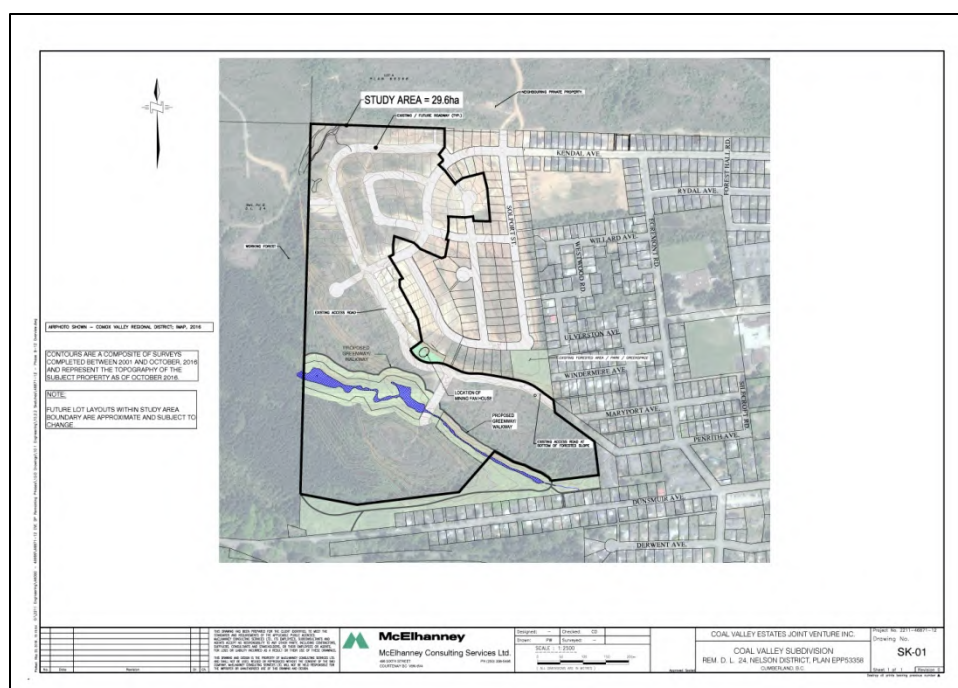


Figure 2: Development area and riparian greenway location.

A map is included in Appendix 1 showing the wildlife observation locations and locations of habitat types.

Northern Section

The northern section of the property includes an area of approximately 12ha (Figure 3). This area has minimal vegetation and what is present is predominantly alder saplings and invasive species (scotch broom and blackberry). Much of the area is bare earth/rocks or existing roads from previous activity on the site (Figure 4). There is a drainage located at the northwest corner of the site that has been addressed in an aquatic assessment of the site. It was determined that the marginal drainage is not fish bearing and does not contribute to downstream fish habitat



(located +8km away) (SNRC 2018). This area is bounded by a working forest to the west and undeveloped private property to the north. No specific wildlife observations were made during various visits to the site, although deer likely utilize the surrounding vegetated areas for foraging.

The habitat values in this area would be considered low due to the disturbed state. There may be limited nesting of song birds within the vegetated areas that use ground cover as nesting sites. The available tree habitat is marginal with very young immature trees present.



Figure 3: Google Earth image showing approximate boundary of northern section.



Figure 4: View of typical habitat available within northern section. Picture showing some surface runoff during heavy precipitation.



Southern Section

The southern section of the property includes an area of approximately 17.6ha (Figure 5). This area includes the riparian greenway surrounding a seasonal stream/wetland with intact riparian vegetation (Figure 6). The areas surrounding the riparian area were previously harvested and are in an immature re-generating forested state (Figures 7-9). A water transmission main was installed along the access road at the east side of this section as part of a previous phase of the development. A Pacific yew tree that was identified in the previous bio-inventory work was marked and protected during the works (Figure 10) and will be retained during future development. Three Western screech-owl nest boxes were constructed and installed within the riparian greenway to provide suitable nesting structures for the blue listed owl species (Figure 11).



Figure 5: Google Earth image showing approximate location of the southern portion.

The riparian greenway provides suitable habitat for a variety of forest dwelling birds and mammals as well as amphibians.

During various visits to the site for other assessments it was noted that there is abundant deer sign throughout this area. Deer, tracks, scat, beds and trails were noted. Pacific treefrogs were heard within the riparian greenway during owl call playback surveys. No other amphibians were observed or egg masses noted during the site assessments, although specific surveys for amphibians were not conducted. The seasonal nature of the stream and shallow wetland area would limit success by red-legged frog or Western toad breeding, but the riparian area does provide suitable habitat for juveniles/adults of both species. The area also provides suitable habitat for Wandering salamanders. A Barred owl was observed and heard during the owl surveys. Other bird observations included raven (visual and auditory), robin (visual and auditory), dark eyed junco (visual and auditory), chestnut backed chickadee (visual and auditory).





Figure 6: The riparian greenway provides young seral forest vegetation.



Figure 7: Most of the southern portion is vegetated in immature re-generating vegetation.



Figure 8: Most of the southern portion was previously harvested and is re-generating.



Figure 9: Most of the southern portion has young vegetation.



Figure 10: A Pacific yew identified in 2014 has been delineated to ensure it is protected.



Figure 11: Three Western screech-owl boxes have been installed within the riparian greenway.



Three call playback surveys were completed in May/June, 2018. No responses from Western screech-owls were elicited, but there was a response from a barred owl on two of the surveys with a visual observation of a barred owl on the second survey.

The habitat values in this area would be considered low to moderate considered the disturbed state. Most of the habitat values are within the riparian greenway which was also noted in the Ursus report. The regenerating forest areas provide nesting habitat of song birds and limited habitat for larger birds due to generally small size of trees that are required for larger bird nests and/or cavities. There is ample foraging habitat for deer. The riparian greenway provides a natural wildlife corridor through the property to the forested area to the west.

3.2 Objective 2: Potential Presence of Listed Species

Database Queries

The majority of sources consulted during the database queries either lacked data for the Property location or showed no occurrences of EVRs.

A review of all applicable IMap BC layers and databases only identified an occurrence of the Western screech-owl on the property prior to the positive response during the Ursus assessment in 2014 (Figure 12). No other occurrences within 100m of the property were identified (All fish points layer, BC Frogwatch layers, Endangered species and ecosystems layer, Wildlife Species Inventory layers; Government of British Columbia, Data BC branch, 2018). Review of the Sensitive Ecosystem Inventory (SEI) Mapping layer found no known sensitive ecosystems on or within 100m adjacent to the Property, with the closest terrestrial SEI polygons approximately 200m distance from the Property boundaries (Government of British Columbia, Data BC branch, 2018). Review of Karst Potential and Likelihood layers did not retrieve any occurrences within the vicinity of the Property or in the Village of Cumberland (Government of British Columbia, Data BC branch, 2018).

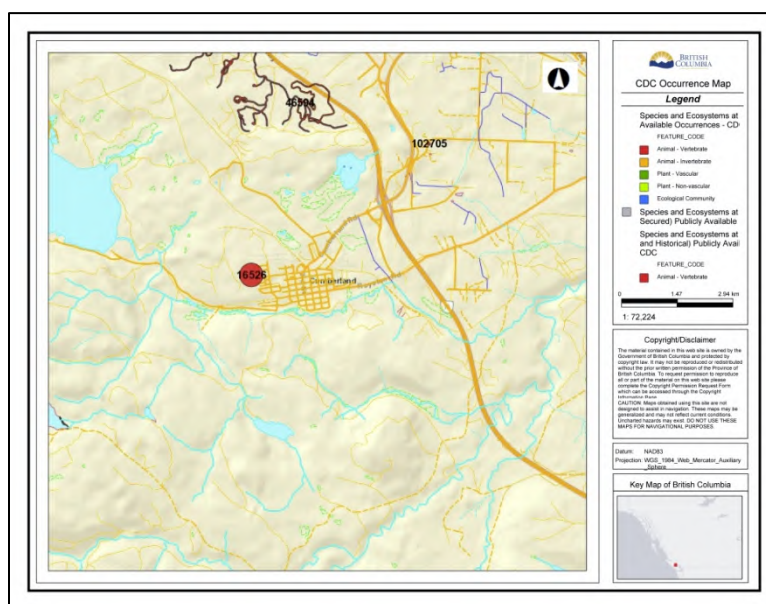


Figure 12: Western screech-owl is the only species at risk with a documented occurrence on the property within the database.



The review of Habitat Wizard did not identify any watercourses on the Property (BC Ministry of Environment, 2018). The closest fish-bearing waterway identified in Habitat Wizard is the unnamed stream that flows parallel to Dunsmuir Street and is utilized by threespine stickleback (not considered a fish under provincial legislation).

IMap BC identified several occurrences of invasive species around the property (Figure 13; IMap BC, 2018). Invasive species noted include American bullfrog (orange dot), scotch broom, St. John's wort and common tansy (green dots).

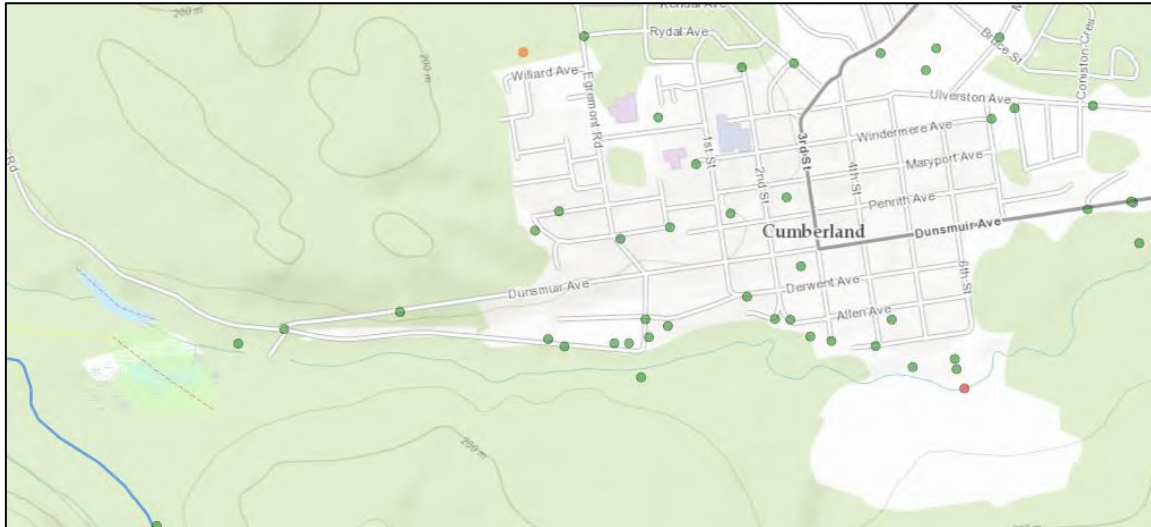


Figure 13: Documented occurrences of invasive species on and adjacent to the property.

A review of the Wildlife Tree Stewardship program's Bald Eagle (*Haliaeetus leucocephalus*) and Osprey (*Pandion haliaetus*) nest registry located two eagle nests, 2.8km and 4km from the edge of the Property (Figure 14).



Figure 14: WITS atlas results showing closest documented eagle nest locations.



The review of eBird Canada point locations found sightings of band tailed pigeon in 2018 and an olive sided flycatcher in 2011 within the Cumberland Marsh near the property (Figure 15; Cornell Lab of Ornithology, 2018).

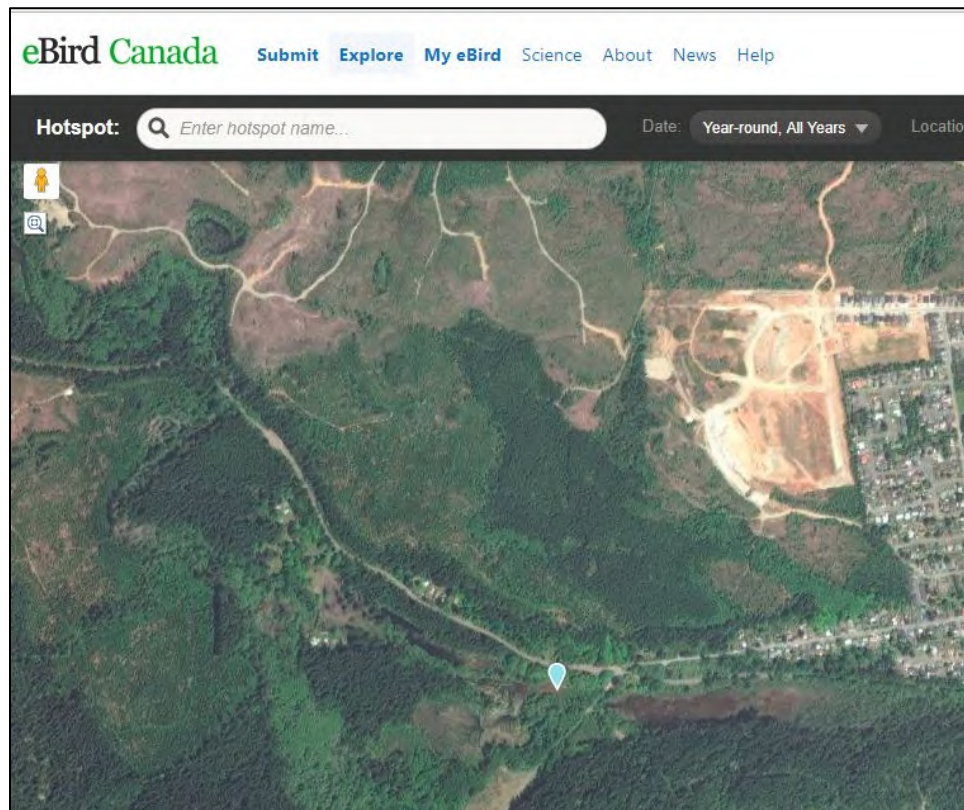


Figure 15: Cumberland Marsh eBird site location.

The Property is not within any Important Birding Area (IBA) identified by IBA Canada (IBA Canada, 2018).

Animal Species Analysis

An ecosystems explorer search of following criteria resulted in 37 records:

- Species at Risk, Red (Species Extirpated, Endangered, or Threatened) OR Blue Listed Species (Species of Special Concern), or
- Legally Designated (Federal Species and Risk Act E-Endangered, T-Threatened, SC-Special Concern)
- Habitat Type: Forest, Riparian, Stream/River, Wetland
- Regional District: Comox Valley, and
- BGC Zone, Subzone, Variant, CWHxm

This included 16 bird species, 6 mammal species, 3 reptiles or amphibians, and 12 invertebrates. These are listed in Appendix 2, along with the assessed potential of occurrence. The potential of occurrence is based on literature review of distribution and habitat requirements of each species. ***Some of the rationale behind each potential is based on numerous site surveys, as outlined below.***



Additional species were added to the list based on a review of the MOE DWC Section 5.8, which describes regionally important or rare species and ecosystems for the West Coast Region (BC Ministry of Environment, 2014a). This included 1 bird, 1 mammal, 2 reptiles and 3 fish.

The MOE DWC document specifies that detailed site surveys should be completed for EVRs that are likely to occur on the Property. Background habitat and BEC ecotype information were used to make preliminary assessments on the potential of occurrence. Some of the possible but unlikely species did not have specific detailed surveys conducted, but were being looked for during numerous site visits to the property for other species, should there be an incidental observation.

The habitat requirements were reviewed for each species and 14 of the species were eliminated from potentially occurring on the site. For 8 species they were given a low to nil likelihood of occurrence and are unlikely to be present on the property. Refer to Appendix 2 for the search results and analysis/rationale used for the potential occurrence of each of the listed species. The remaining 7 species are listed below with a description of the habitat needs.

1. Ermine, anguinae subspecies (*Mustela ermine*) – This species is **blue** listed provincially and is not a listed species under the Species At Risk Act. There is little information relating to this species, but they do den in cavities and these are present on the property particularly in the areas with a high deciduous component. The small size of the property makes it unlikely that they would be present in large numbers. They are solitary animals with home ranges of ~40ha. There is a **low** potential for this species to be present.
2. American Water Shrew, *brooksi* subspecies (*Sorex navigator brooksi*) – This shrew is **blue** listed provincially and is not a listed species under the Species at Risk Act. It is a large shrew that is semi-aquatic that lives along streams. There is little data on this mammal, but studies have shown that the shrews tend to live at the water/land interface. The stream/wetland within riparian greenway would provide suitable habitat and there is a **moderate** potential for this species to be present.
3. Olive-sided Flycatcher (*Contopus cooperi*) – This species is **blue** listed provincially and is listed 1-T (2010) under the Species At Risk Act. This song bird is associated with open habitats such as forest openings or open mature forest stands. They require tall trees or snags for perching. (COSEWIC, 2007). There are portions of the property that meet the habitat needs of these birds particularly within the riparian greenway. This bird has an easily recognized call “Quick Three Beers” and it was not heard during various visits to the property, although there are documented sightings of this bird in Cumberland in 2011. There is a **moderate** potential for this species to be present.
4. Northern Pygmy-owl, *swarthi* subspecies (*Glaucidium gnoma swarthi*) – This species is **blue** listed provincially and is not a listed species under the Species At Risk Act. This small owl occupies forested stands, both second growth and old growth. They require suitable nesting cavities (Darling, 2003). The property does have suitable forest structure within the riparian greenway. If there is a barred owl using this area it may be unlikely to have this species present. It has a **low to moderate** potential for being present.



5. Western Screech-owl, *kennicottii* subspecies (*Megascops kennicottii kennicottii*) – This species is **blue** listed provincially and is listed 1-T under the Species At Risk Act. This small owl is found in most types of low elevation forest or woodland and require large trees with cavities such as black cottonwood (COSEWIC, 2012) for nesting. There has been a positive response of this species in previous assessments, although there were no responses in 2018. Three nest boxes have been placed within the riparian greenway to provide nesting opportunities. If there is a barred owl using this area it may be unlikely to have Screech-owls present. There is a **moderate** potential for Screech-owls being present given the previous occurrences.
6. Band-tailed Pigeon (*Patagioenas fasciata*) – This species is **blue** listed provincially and is listed 1-SC (2011) under the Species At Risk Act. This bird nests in a variety of forest types and use diverse habitats for forage. Their nesting habitat is usually situated close to a mineral site. They nest in trees or shrubs. (NatureServe, 2014a). There is potential habitat on the property within the riparian greenway, but there are no known mineral sites nearby. There is a **low** potential for this species being present.
7. Wandering Salamander (*Aneides vagrans*) – This species is **blue** listed provincially and is listed 1-SC (2018) under the Species At Risk Act. This terrestrial salamander are typically found under the bark in decaying conifer trees. They are mostly found at <600m elevation in forests dominated by western hemlock or Douglas fir. This property does have suitable habitat within the riparian greenway. Previous sampling for this species in 2014 did not locate any. There is a **low to moderate** potential for this species to be present.

Additional species that are regionally important within the West Coast Region that are listed in the Develop with Care methods include the following:

1. Vancouver Island Marmot (*Marmota vancouverensis*): Occurs in subalpine meadows (COSEWIC, 2008b). Habitat does not exist on Property (nil potential).
2. Bald Eagle (*Haliaeetus leucocephalus*): The closest documented eagle nest is 2.8km away. The trees on the property are generally too small for eagle nests, but there are 2 veteran fir trees south of the riparian greenway in the vicinity of the property line which could be utilized for perching (low potential).
3. Northern Red -legged frog: see above.
4. Sharp Tailed Snake (*Contia tenuis*): Has only been documented to occur in the Coastal Douglas-fir (CDF) BEC zone (Sharp-tailed snake recovery team, 2008). The Property occurs within the CWHxm (nil potential).
5. Northern Alligator Lizard (*Elgaria coerulea*): Occur in dry woodlands, grasslands, creek banks and ocean beaches, rocky outcrops, talus slopes and some disturbed sites. Require rock crevices for hibernation and retreat sites for cover (Rutherford, 2014). No rock crevices on site, but may have limited opportunity within riparian greenway, no documented occurrences near the property (low to nil potential).
6. Western Brook Lamprey (Morrison Creek population) (*Lampetra richardsoni pop. 1*): The property is not within the Morrison Creek drainage (nil potential).
7. Coastal Cutthroat Trout, *clarki* subspecies (*Oncorhynchus clarki clarki*): The closest salmonids are located in Maple Creek immediately adjacent to Trent River located +8km away. Fish sampling located rainbow trout downstream of a set of falls and only



stickleback and invasive bluegill sunfish were located upstream (nil potential). Refer to the Aquatic Assessment for further details.

8. Rainbow trout (Steelhead) (*Oncorhynchus mykiss*): The closest salmonids are located in Maple Creek immediately adjacent to Trent River located +8km away. Fish sampling located rainbow trout downstream of a set of falls and only stickleback and invasive bluegill sunfish were located upstream (nil potential). Refer to the Aquatic Assessment for further details.

Vegetation Analysis:

An ecosystems explorer search of following criteria resulted in 27 records for ecosystems and 6 records for plants or fungi:

- Species at Risk, Red (Species Extirpated, Endangered, or Threatened) OR Blue Listed Species (Species of Special Concern), or
- Legally Designated (Federal Species and Risk Act E-Endangered, T-Threatened, SC-Special Concern)
- Regional District: Comox Valley, Cumberland, and
- BGC Zone, Subzone, Variant, CWHxm1

The results of the vegetation component is included in Appendix 3 along with the assessed potential of occurrence. The potential of occurrence is based on literature review of distribution and habitat requirements of each species. The site analysis completed in 2014 by Ursus is relevant to the current condition of the non-developed areas of the property. Only one ecosystem has been added to the listed species since the 2014 assessment was conducted (trembling aspen/Pacific crab apple/slough sedge was added in 2018).

There are two components to meeting a specific plant community type. First, the associated biogeoclimatic (BEC) Subzone and site series must be present and secondly, the indicator plants (shrub / herbaceous spp. and mosses) and timber types must be fairly representative of the plant community. To be considered a representative plant community, the site must be relatively undisturbed, consisting of either old growth timber (>250 years), second growth timber with scattered veteran overstory trees, or a stand of trees that has reached the climax state for the ecosystem it is found in where trees naturally cycle at an age less than 250 years. For the most part, the stand should have minimal disturbance and have a well established layer of understory plants. Additionally where site series complexes occur (e.g. two or more site series within an eco-type) there is often a mixture of site characteristics (plants, timber, soil types) that represent a combination of the site series present. These site series complexes are often not truly representative of one particular plant community unless there is one significantly dominant site series present. Most of the property is in a young state (regenerating forest and young forest) therefore minimizing the potential for these ecosystems to be present.

Through the ecosystem explorer application, 27 red and blue listed ecological plant communities have the potential to exist within the Comox Valley Regional District (CVRD), Cumberland area. Based on the office analysis it was determined that the majority of the plant communities could be ruled out and had a Nil potential for occurrence on the site. Three had a nil to low potential for occurrence based on the young age and disturbed (previously harvested) state. Two communities were identified in 2014 as being present at the site. Both occur within the riparian greenway and therefore will not be impacted during future development at the site.



The ecosystem explorer search resulted in 6 red and blue listed plants that have the potential to exist on the property. Based on the 2014 Ursus assessment and subsequent office analysis it was determined that the majority of the listed plant species could be ruled out and had a Nil potential for occurrence on the site. Only 2 plant species (Vancouver Island beggar ticks and Macoun's meadow-foam) have a low potential for occurrence as they were not observed during the field assessment but they could potentially grow within the site types within the development.

Additional species were added to the list based on a review of the MOE DWC Section 5.8, which describes regionally important or rare species and ecosystems for the West Coast Region (BC Ministry of Environment, 2014a). Two plant species are included:

1. Vancouver Island Beggarticks: see above
2. Phantom Orchid: This plant grows in shade on rich soils in mixed mature and old growth forests. Has not been found on Vancouver Island outside of Greater Victoria and Saanich Peninsula (nil potential).

3.3 Objective 3: Further Assessments and Mitigation Measures

Further Assessment Recommendations and Timing:

The northern section of the property is highly disturbed with no identified environmentally valuable resources. No additional surveys for this area are being recommended at this time.

The southern section of the property includes the riparian greenway and surrounding young/regenerating forest. This section of the property provides suitable habitat for a variety of species, particularly within the riparian greenway.

Prior to a development permit application for the southern section of the property presence/not detected surveys for the bird species listed in section 3.2 is recommended to determine appropriate mitigation measures to be implemented during development (timing windows etc). Surveys for the wandering salamander are also recommended within the areas outside of the riparian greenway with suitable habitat.

The other species/plant communities with a low to high potential of occurring on site would be within the riparian greenway and the existing riparian buffer would be sufficient to protect these species/plant communities.

The survey timing for the bird species should be within the breeding period. Multiple surveys are needed if no detections are noted, but if the species is confirmed subsequent assessments are not necessarily required.

Survey Schedule

The following table shows the necessary surveys to be completed and the approximate date in which to conduct them, based on the recommended survey methods.



Species	March	April	May	June	July
Pigeon/Flycatcher			X	X	X
Owls *		X			X
Amphibians ⁺		X	X	X	

*Owl surveys would utilize an Autonomous Recording Unit (ARU), which is set up to record sounds and is then analyzed to detect species. This method differs from the traditional call playback surveys, but can be more accurate at detecting use by owls. Survey timing refers to setting up and retrieving the unit.

⁺an amphibian survey can also be conducted in October during moist conditions.

Mitigation Measures:

Specific mitigation measures for each individual potential species are not warranted, but there are general mitigation measures that should be implemented during the development process to minimize the potential impacts to the species at risk that are potentially utilizing the site.

The nesting window for migratory birds in Canada begins on April 1 and ends August 15 as per the Government of Canada Migratory Bird Nesting website. Additionally, Section 34 of the Wildlife Act indicates the legal requirements to protect birds and their nests while occupied. Cavity, branch or ground nesting birds can be negatively impacted through development activities. It is highly recommended to conduct all vegetation removal works outside of the nesting window (between August 16 to March 31). Any vegetation removal within the nesting window would require nest scans, which would be difficult given the site characteristics.

Although not a protected species, the site is highly utilized by deer and likely utilized by black bear. The Riparian greenway provides an intact wildlife corridor through the property connecting to the working forest to the west.

4.0 CONCLUSIONS

A reassessment of the bioinventory that was completed by Ursus Environmental determined that the remainder of the property has two distinct sections. The northern section is highly disturbed with no potential habitat for listed species or plant communities. The southern portion of the property is forested in predominantly young regenerating forest. There is relatively more mature vegetation (young forest) within the riparian greenway which provides most of the habitat values on the property and most of the identified potential species would utilize this portion of the property.

The following conclusions/recommendations have been provided for each of the distinct areas:

- A. North Section: No further wildlife or Plant surveys are recommended for the northern section.
- B. South Section:
 - i. The riparian greenway is Village property and no development will take place within the greenway.

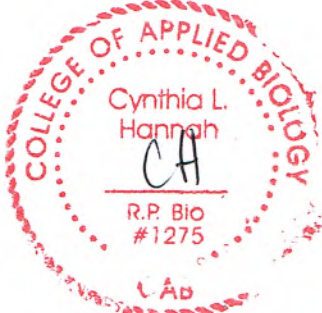
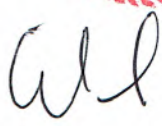


- ii. No further plant surveys are recommended for the southern portion given the low potential for presence due to the young age of the stand on the portions of the property that will be developed.
- iii. High occurrence potential of identified at risk ecosystems on the southern section are located within the riparian greenway and will not be disturbed by future development.
- iv. The typical habitat for the low potential presence of the two plant species is provided within the riparian greenway and will not be disturbed by future development.
- v. Wildlife Surveys for the southern section are scheduled to be completed per the recommend survey schedule. This report will be updated once the surveys are complete.

5.0 Signature and Professional Seal

Field work completed by: Cindy Hannah, RPBio (#1275) and Jacob Blanchard, RBTech (#31).

Report completed by: Cindy Hannah, RPBio (#1275).

Signature and Seal	
 	
2018-06-24	
Date (dd/mm/yy)	

COPY
Original signed and sealed on file



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Appendix 1 – Wildlife Observations



Appendix 2 – Potential Listed Wildlife Species



Red and Blue Listed Animals Analysis (CWHxm)

Animal (Common Name)	Animal (Scientific Name)	SARA List	BC List	Occurrence Potential	Comments
Mammals					
Roosevelt Elk	<i>Cervus elaphus roosevelti</i>		Blue	low - nil	Abundance of deer sign, no elk sign noted. Not common in more urban areas.
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>		Blue	nil	Typically use caves or old buildings for roosting, neither of which occurs on the property.
Wolverine <i>vancouverensis</i> subspecies	<i>Gulo gulo vancouverensis</i>		Red	nil	Associated with a variety of forests and tundra, require boulders, deadfall or snow tunnels for dens and persistent snow cover during denning. Vancouver Island population very low or extirpated. (COSEWIC, 2003a)
Ermine, <i>anguinae</i> subspecies	<i>Mustela erminea</i>		Blue	low	There is little information relating to this species, but they do den in cavities and these are present on the property. The small size of the property makes it unlikely that they would be present in any numbers. They are solitary with home ranges of ~40ha.
Keen's Myotis	<i>Myotis keenii</i>		Blue	low - nil	Found foraging in old growth forests, estuaries, riparian and urban environments. Roosts in rock crevices, under boulders, under man-made structures and occasionally in tree cavities (COSEWIC, 2003b). Some cavities on Property, however do not match typical roosting habitat.
American Water Shrew	<i>Sorex navigator brooksi</i>		Blue	moderate	Occurs in intact riparian habitats, along permanent or ephemeral streams (Craig, 2004). They appear to prefer the water/land interface. The stream/wetland within the riparian greenway provides suitable habitat for this species.
Birds					
Northern Goshawk, <i>laingi</i> subspecies	<i>Accipiter gentilis laingi</i>	1-T (2003)	Red	nil	No contiguous mature forest to provide potential nesting habitat on the property (BC MOE, 2004). There is an urban interface around most of the property. There is a working forest to the west of the property that may provide suitable goshawk habitat.
Great Blue Heron, <i>fannini</i> subspecies	<i>Ardea herodias fannini</i>	1-SC (2010)	Blue	low - nil	No large stick nests were observed and no herons were observed or heard during the assessments. Herons are colony nesters with only occasional solitary nests noted (COSEWIC 2008a).
short-eared Owl	<i>Asio flammeus</i>	1-SC (2012)	Blue	nil	Require open areas such as grasslands, marshes, tundra, bogs, or agricultural fields, however will use any area with sufficient prey availability (COSEWIC, 2008b). No specific habitats available on Property.
Marbled Murrelet	<i>Brachyramphus marmoratus</i>	1-T (2003)	Blue	nil	No continuous old growth forest for nesting habitat (NatureServe, 2014b).

Green Heron	<i>Butorides virescens</i>		Blue	low - nil	Will use sloughs, lakes and marshes during breeding season, and will nest in tall shrubs or trees, even in rural and urban areas (Fraser and Ramsay, 1996). May nest 1km from foraging area. Property is 2km from Comox Lake.
Olive-sided Flycatcher	<i>Contopus cooperi</i>	1-T (2010)	Blue	moderate	Associated with open habitats such as forest opening or open mature forest stands. Requires tall trees or snags for perching. (COSEWIC, 2007b). Riparian greenway area provides suitable habitat on the property.
Black Swift	<i>Cypseloides niger</i>		Blue	nil	They nest near or behind waterfalls and in caves, located in canyons and sometimes on sea cliffs. Their nest sites are characterized by presence of flowing water, high relief, inaccessibility, darkness, and an unobstructed flight path. (COSEWIC, 2015a).
Pererine Falcon, <i>pealei</i> subspecies	<i>Falco peregrinus pealei</i>	1-SC (2003)	Blue	nil	Requires cliff face or similar for nesting (Cooper and Beauchesne, 2004). Property does not provide nesting habitat.
Northern Pygmy-owl, <i>swarthi</i> subspecies	<i>Glaucidium gnoma swarthi</i>		Blue	low - moderate	Occupies forested stands, both second growth and old growth. Require suitable nesting cavities (Darling, 2003). Property does have suitable cavities. Unlikely if Barred owl territory.
Barn Swallow	<i>Hirundo rustica</i>	1-T (2017)	Blue	nil	Nests are constructed on man-made structures (e.g. barns and bridges), cliffs or caves (BC CDC, 2014a). No nesting sites on Property.
Caspian Tern	<i>Hydroprogne caspia</i>		Blue	nil	Nests on sandy or gravelly beaches and shell banks along coasts or large inland lakes; sometimes with other water birds (BC CDC, 1994).
Western Screech-owl, <i>kennicottii</i> subspecies	<i>Megascops kennicottii kennicottii</i>	1-T	Blue	moderate	Found in most types of low elevation forest or woodland, require large trees with cavities such as black cottonwood (COSEWIC, 2012). Positive call playback in 2014 and prior to 1999. Unlikely if Barred owl territory.
Band-tailed Pigeon	<i>Patagioenas fasciata</i>	1-SC (2011)	Blue	low	Nest in a variety of forest types, use diverse habitats for forage, usually situated close to a mineral site. Nest in trees or shrubs. (NatureServe, 2014a). Potential habitat on Property, no mineral sites known.
Double-crested Cormorant	<i>Phalacrocorax auritus</i>		Blue	nil	Most nesting occurs on flat, bare rocky islands with sparse vegetation. This property does not provide suitable habitat. Tree nesting is very uncommon.
Purple Martin	<i>Progne subis</i>		Blue	nil	All known nests in British Columbia in man-made nest boxes. Historically used natural cavities and woodpecker holes in snags, however no documented use of natural habitats in recent years (Cousens and Lee, 2012). No nest boxes on Property.
Barn Owl	<i>Tyto alba</i>	1-SC (2003)	Red	low - nil	Requires low elevation open habitats (grasslands, meadows, marshes, agricultural fields) with sufficient cavities and prey (BC MOE, 2014d). Potential nesting cavities available on Property but lacks open habitat. Unlikely if Barred owl territory.
Amphibians and Reptiles					
Wandering Salamander	<i>Aneides vagrans</i>	1-SC (2018)	Blue	low - moderate	higher potential in the riparian greenway, as they typically are found under the bark in decaying conifer trees. They are mostly found at <600m elevation in forest dominated by western hemlock or douglas fir. None were located in 2014.

Painted Turtle - Pacific Coast population	<i>Chrysemys picta pop.1</i>	1-E (2007)	Red	nil	This species is highly aquatic, spending very little time on land (COSEWIC 2016). The stream and wetland are seasonal and do not provide suitable aquatic habitat.
Northern Reg-legged Frog	<i>Rana aurora</i>	1-SC (2005)	Blue	low - nil	adults possible, but no aquatic environments for breeding as the shallow wetlands dry in spring.
Invertebrates					
Western Pine Elfin, <i>sheltonensis</i> subspecies	<i>Callophrys eryphon sheltonensis</i>		Blue	low - nil	This butterfly requires a larval foodplant of pine and this is not a common plant type on the property.
Western Thorn	<i>Carychium occidentale</i>		Blue	low - nil	Usually found in undisturbed leaf litter of big leaf maple. In relatively undisturbed low elevation (≤ 80 m a.s.l.) deciduous and mixedwood forests. Bigleaf Maples are usually present. Colonies are found sporadically in deep litter areas, and nearly always in moist hollows, near seeps or along riparian zones. Big leaf maple are present, but not a dominant species. Moist hollows/seeps are limited on the property which lowers the potential.
Common Wood-nymph, <i>incana</i> subspecies	<i>Cercyonis pegala incana</i>		Red	nil	Common Woodnymphs occur across southern BC in grassy forest openings, clearcuts, roadsides, meadows, and stream banks (eFauna). The species occurs within the fragmented Garry oak ecosystems (BC CDC 2012). There is no Gary oak ecosystems on the property.
Common Ringlet, <i>insulana</i> subspecies	<i>Coenonympha tullia</i>		Red	nil	Associated with Gary oak ecosystems and its range is from Victoria to Nanaimo.
Evening Fieldslug	<i>Deroceras hesperium</i>		Red	nil	This species has not been collected since 1887 and may be extirpated from BC (BC CDC 2007)
Proterius Duskywing	<i>Erynnis proterius</i>		Red	nil	Garry oak is the foodplant. No Garry oak on property.
Western Branded Skipper, <i>oregonia</i> subspecies	<i>Hesperia colorado oregonia</i>		Red	nil	Oregon Branded Skipper habitat can be grouped into two types: 1) sparsely vegetated areas, including coastal sand and gravel spits and 2) scrub oak habitats. (COSEWIC 2013). Neither of these habitats are present on the property.
Threaded Vertigo	<i>Nearctula sp.1</i>	1-SC (2012)	Blue	low - nil	Occurs in deciduous and mixed forests, rich sites with leaf litter, old growth and mature second growth rich forests (COSEWIC, 2010). Property is a rich site with mostly immature or immature to mature forest. Extreme northern extent of range with no known occurrences in Courtenay.
Blue Dasher	<i>Pachydiplax longipennis</i>		Blue	nil	Often common at ponds and lakes with abundant vegetation in the water and along the shore (eFauna 2017). Pond and lake habitat is not present on the property.
Greenish Blue, <i>insulanus</i> subspecies	<i>Plebejus saepiolus insulanus</i>	1-E (2003)	Red	nil	Little habitat data available, require foodplant of clover (<i>Trifolium</i> spp.), similar species found in open areas with clovers such as bogs and meadows. Unknown if can use non-native clover. No known records of species since 1979 (Garry Oak Invertebrates Recovery Implementation Group, 2007).

Broadwhorl Tightcoil	<i>Pristiloma johnsoni</i>		Red	low - nil	Found in leaf litter of old growth and older second growth deciduous, coniferous and mixed-wood forests to an elevation of over 1300 m in the subalpine (CDC, 2007). This habitat is not prevalent on the property, but there is limited potential within the riparian greenway.
Autumn Meadowhawk	<i>Sympetrum vicinum</i>		Blue	nil	lives in ponds, slow streams and lakes, none of which are on the property.

Search Type: Animal

AND BC Conservation Status: Red (Extirpated, Endangered, or Threatened) OR Blue (Special Concern)

AND Regional Districts: Comox Valley (CXRD) (Restricted to Red, Blue, and Legally designated species)

AND Habitat Types: Forest, Riparian, Stream/River, Wetland (Restricted to Red, Blue, and legally designated species

Appendix 3 – Potential Listed Ecosystems and Plant Species



Plant Community (Common Name)	Plant Community (Scientific Name)	BEC Subzone and Site Series	Red or Blue Listed	Occurrence Potential	Comments
arbutus / hairy manzanita	<i>Arbutus menziesii</i> / <i>Actostaphylos columbiana</i>	CWHm1/00	Red	NI	This plant community does not exist within the development area due to differing timber types and lack of plant indicator species.
blender sedge - white bark rush	<i>Carex lasiocarpa</i> - <i>Rhynchospora alba</i>	CWHm1/W653.CWHm2/W653	Red	NI	This plant community type does not exist within the development area.
Sitka sedge - Pacific water parsnip	<i>Carex stichensis</i> - <i>Oenanthe sarmentosa</i>	CWHm1/Wm50	Blue	NI	This marsh plant community type does not exist within the development area.
buffed hair grass - Henderson's checker-mallow	<i>Pseudotsuga cephalosa</i> - <i>Sidalcea hendersonii</i>	CWHm1/00	Red	NI	This plant community does not exist within the development area.
burne wildrice - beach pea	<i>Lymnaea tereticaur</i> ssp. <i>aralis</i> - <i>Lathyrus japonicus</i>	CWHm1/CWHm2	Red	NI	This plant community type does not exist within the development area.
sweet gale / Sitka sedge	<i>Myrica gale</i> / <i>Carex stichensis</i>	CWHm1/W652.CWHm2/W652	Red	NI	This plant community type does not exist within the development area.
Sitka spruce / salmonberry	<i>Picea stichensis</i> / <i>Rubus spectabilis</i> Very Dry Maritime	CWHm2/08	Red	NI	This plant community does not exist within the development area.
lodgepole pine / peat-mosses	<i>Pinus contorta</i> / <i>Sphagnum</i> spp. Very Dry Maritime	CWHm2/11	Blue	NI	This plant community does not exist within the development area.
trembling aspen / Pacific crab apple / slough sedge	<i>Populus tremuloides</i> / <i>Malus fusca</i> / <i>Carex obnupta</i>	CWHm1	Red	NI	This plant community does not exist within the development area.
black cottonwood - red alder / salmonberry	<i>Populus trichocarpa</i> - <i>Alnus rubra</i> / <i>Rubus spectabilis</i>	CWHm1/09.CWHm2/09	Blue	NI	This plant community does not exist within the development area.
black cottonwood / Sitka willow	<i>Populus trichocarpa</i> / <i>Salix alba</i>	CWHm1/10.CWHm2/10	Blue	NI	This plant community does not exist within the development area.
Douglas-fir - lodgepole pine / grey rock-moss	<i>Pseudotsuga menziesii</i> - <i>Pinus contorta</i> / <i>Racomitrium canescens</i>	CWHm1/02	Red	NI	This plant community does not exist within the development area.
Douglas-fir / sword fern	<i>Pseudotsuga menziesii</i> / <i>Polystichum munitum</i>	CWHm1/04.CWHm2/04	Blue	NI	This plant community does not exist within the development area.
Douglas-fir - western hemlock / salal	<i>Pseudotsuga menziesii</i> / <i>Tsuga heterophylla</i> / <i>Gaultheria phillyifolia</i> Dry Maritime	CWHm1/08.CWHm2/08	Blue	NI	This plant community does not exist within the development area.
labrador-tea / western bog laurel / peat-mosses	<i>Rhododendron groenlandicum</i> / <i>Kalmia microphylla</i> / <i>Sphagnum</i> spp.	CWHm1/W650.CWHm2/W650	Blue	NI	This bog plant community type does not exist within the development area.
hard-stemmed bulrush / Deep Marsh	<i>Sagittaria arifolia</i> / <i>Scirpus americanus</i>	CWHm1/Wm06	Blue	NI	This marsh plant community type does not exist within the development area.
Wallace's sedge / reinder sedge	<i>Sagittaria wallacei</i> / <i>Cladonia</i> spp.	CWHm1/CWHm2	Blue	NI	This plant community was identified during the 2014 Ursus assessment and is located within the riparian greenway.
western redcedar / slough sedge	<i>Thuja plicata</i> / <i>Carex obnupta</i>	CWHm1/15.CWHm2/15	Blue	High	This plant community does not exist within the development area as the vegetation present more closely meets the 13 site series.
western redcedar / black twinberry	<i>Thuja plicata</i> / <i>Lonicera involucrata</i>	CWHm1/14.CWHm2/14	Red	NI	This plant community does not exist within the development area.
western redcedar - Sitka spruce / skunk cabbage	<i>Thuja plicata</i> - <i>Picea stichensis</i> / <i>Lysichiton americanus</i>	CWHm1/12.CWHm2/12	Blue	NI	This plant community does not exist within the development area.
western redcedar / sword fern - skunk cabbage	<i>Thuja plicata</i> / <i>Polystichum munitum</i> - <i>Lysichiton americanus</i>	CWHm1/W653.CWHm2/12.CWHm2/W653	Blue	NI	The swamp and 12 site series plant community type do not exist within the development area.
western redcedar / sword fern	<i>Thuja plicata</i> / <i>Polystichum munitum</i> Very Dry Maritime	CWHm1/05.CWHm2/05	Blue	NI to Low	This plant community is not represented in the riparian greenway, but could occur in the regenerating younger stands although these areas would not have the complexity/structure of a more mature stand. There is low to nil potential for this plant community to occur (immature stands and the lack of mature to old growth cedar which is indicative of the plant community).
western redcedar / salmonberry	<i>Thuja plicata</i> / <i>Rubus spectabilis</i>	CWHm1/13.CWHm2/13	Red	High	Plant species of this plant community were identified within the lower riparian greenway by Ursus in 2014.
western redcedar / three-leaved foamflower	<i>Thuja plicata</i> / <i>Tharalia pifilata</i> Very Dry Maritime	CWHm1/07.CWHm2/07	Blue	NI to Low	This plant community is not represented in the riparian greenway, but could occur in the regenerating younger stands although these areas would not have the complexity/structure of a more mature stand. There is low to nil potential for this plant community to occur (immature stands and the lack of mature to old growth cedar which is indicative of the plant community).
western hemlock - Douglas-fir / Oregon bleaked-moss	<i>Tsuga heterophylla</i> - <i>Pseudotsuga menziesii</i> / <i>Eurhynchium argenteum</i>	CWHm1/01.CWHm2/01	Red	NI to Low	This plant community is not represented in the riparian greenway, but could occur in the regenerating younger stands although these areas would not have the complexity/structure of a more mature stand. There is low to nil potential for this plant community to occur (immature stands and the lack of mature to old growth cedar which is indicative of the plant community).
western hemlock - western redcedar / deer fern	<i>Tsuga heterophylla</i> - <i>Thuja plicata</i> / <i>Blechnum spicant</i>	CWHm1/06.CWHm2/06	Red	NI	This plant community does not exist within the development area due to differing timber types and lack of plant indicator species.
common cattail Marsh	<i>Typha latifolia</i> Marsh	CWHm1/Wm05.CWHm2/Wm05	Blue	NI	This marsh plant community type does not exist within the development area.

See with Type Ecological Communities AND BC Conservation Status Red (Extirpated, Endangered, or Threatened) OR Blue (Special Concern) AND Regional Distinctness (Covey Valley ORHQ) AND BCDC Zone, Subzone, Vn Unit, Ph and C Series

Red and Blue Listed Plants Analysis (CWHxm)

Date: April 15, 2019

To: Chris Durupt, P.Eng.
McElhanney Consulting Services Ltd.
1211 Ryan Road
Courtenay BC, V9N 3R6

From: Strategic Natural Resource Consultants Inc.
321-1180 Ironwood Street
Campbell River, BC, V9W 5P7

RE: **Coal Valley Estates Western Screech-Owl *kennicottii* subspecies (*Megascops kennicottii* *kennicottii*) Monitoring Report**

INTRODUCTION

Under the development permit for Phase 8 of the Coal Valley Estates development in the Village of Cumberland there is a requirement to conduct call playback surveys to determine if there are Western Screech-Owls (*Megascops kennicottii kennicottii*) in the area that may require specific mitigation measures during the development through the breeding season. Call playback surveys were completed three times in 2018 with no positive responses. Call playback surveys recommenced in February 2019.

There had been a positive Western Screech-Owl detection by Ursus Environmental within the riparian area of the stream to the south of Phase 8 in October 2014¹. Within the Ursus report it was noted that there were few nesting cavities of sufficient size for western screech owl use and as such recommended the installation of three nest boxes during the development. The nest boxes were installed on February 16, 2018 by SNRC and are being monitored in 2019 to assess if they are occupied by the target species.

Based on a peer review of the project by Tania Tripp, M.Sc., R.P.Bio., of Madrone Environmental Services Ltd., it was recommended that an Automated Recording Unit (ARU) be deployed to record any owl vocalizations during the sampling/monitoring period. ARU's allow for non-invasive and more continuous monitoring. The ARU was deployed on March 13, 2019 and has been collecting data continuously since.

This monitoring report has been prepared to present data collected thus far in the 2019 breeding season including results of call playback surveys, nest box inspections and ARU data collection and analysis.

Western Screech-Owl Description

The Western Screech-Owl is considered threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), is considered blue listed (special concern) provincially and is ranked as threatened under the Species at Risk Act (SARA). The primary cause of population declines of this subspecies is thought to be from predation of Barred Owls² although urban/suburban development and expansion (loss of low elevation riparian forest), roads and railways (direct mortality), logging and forest

¹ Ursus Environmental. 2014. Terrestrial Assessment for Remainder of Phase 5 of Coal Valley Estates, Cumberland.

² COSEWIC Status Report on the Western Screech Owl *kennicottii* subspecies and the Western Screech Owl *macfarlanei* subspecies in Canada. Retrieved online from:
http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_western_screech-owl_1012_e.pdf

(loss of low elevation riparian forest) are also thought to play role's in the species' decline³.

Western Screech-Owl's live in low elevation coniferous or mixed coniferous forests >30 years old provided there are sufficient older larger structures available to meet their nesting and roosting requirements. They are common in riparian habitats. They prefer moderate groundcover with low understory and relatively open canopies⁴. They are a small owl with ear tufts and yellow eyes. They are grey-brown in colour with dark irregular lines on their light coloured breast. They have a varied diet that includes small mammals, songbirds, insects, crayfish, frogs and fish. Western Screech-Owls nest and roost in tree cavities often reusing cavities created by Northern flickers and pileated woodpeckers, and will use nest boxes. Nests are generally in trees that are >25cm diameter at breast height (dbh) and are located 2 to 6m above the ground (but may be up to 15m in height). Females typically lay eggs in April. Eggs are incubated for approximately 26 days and young fledge approximately 35 day after they hatch. They are non-migratory and nocturnal occupying territories year round⁵.

WESTERN SCREECH-OWL 2019 MONITORING SUMMARY

Call playback surveys following the methods outlined in Resources Information Standards Committee's Inventory Methods for Owl Surveys⁶ were conducted to assist in determining if Western Screech-Owls are present in or near the development area. The methods recommend at least 3 survey repetitions per year from mid-April to August, although it has been found that in BC Western Screech-Owls are often responsive from February through May and unresponsive in June and July. The surveys in 2019 commenced in late February as Western Screech-Owls are known to begin pair formation in January and February, resulting in physical courtship and mating in March and April⁴. Surveys were completed on the nights of February 21, March 6 and March 26, 2019. Surveys began at least 30 minutes after sunset. At each call playback station a bouncing ball call was broadcast for one minute, followed by a minimum of four minutes of listening for responses. This sequence is repeated three times at each station, resulting in a minimum of 15 minutes spent at each station. Stations are spaced approximately 250-350m apart and travel between stations is completed on foot. Each survey commences at a different station. Stations were located to focus on the riparian greenway.

Western Screech-Owl Survey 1

The first call playback survey was completed on February 21, 2019. The weather was overcast with no wind. Temperature was 2°C and there was 10-15cm of snow on the ground. The survey began at 6:26pm.

There was an immediate unknown response to the first and second call playback set at the first station. It was suspected that it was either a Vancouver Island Northern Pygmy Owl (*Glaucidium gnoma swarthy*) or a Northern Saw-whet Owl (*Aegolius acadicus acadicus*), but could not be confidently confirmed. A barred owl (*Strix varia*) responded >5mins after the first set, and the call originated from the south, off site. A barred owl also responded to the first and second call playback set at station two and moved closer to the playback station by the second set. There were no responses at the third call playback station.

³ BC Ministry of Environment. Recovery Plan for the Western Screech-Owl kennicottii subspecies (*Megascops kennicottii kennicottii*) in British Columbia. 2013.

⁴ Cannings, R. J., T. Angell, P. Pyle, and M. A. Patten (2017). Western Screech-Owl (*Megascops kennicottii*), version 3.0. In *The Birds of North America* (P. G. Rodewald, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. <https://doi.org/10.2173/bna.wesowl1.03>

⁵ Western Screech Owl (*Megascops kennicottii*) - Information, Pictures, Sounds - The Owl Pages. Retrieved online from: <https://www.owlpages.com/owls/species.php?s=840>

⁶ Resources Information Standards Committee. Inventory Methods for Owl Surveys. 2006.



Western Screech-Owl Survey 2

The second call playback survey was completed on March 6, 2019. The weather was mostly clear with no wind. Temperature was 1°C. The survey began at 6:58pm. There were no responses at the first or third call playback stations. A barred owl responded at the second call playback station, during the third set. The owl was calling from the south, off site.

Western Screech-Owl Survey 3

The third call playback survey was completed on March 26, 2019. The weather was overcast with a slight and intermittent drizzle/mist and no wind. Temperature was 11°C. An additional two survey stations were added to increase the search area and sampling effort outside of the riparian greenway. There were no responses at the first, second, third or fifth call playback stations. A barred owl was heard calling prior to the commencement of the first call playback set at the second station, but had no response to the call playback. A barred owl was heard calling between the second and third call playback set at station four and the call was originating from the second call play back site.

See attached map for station locations and direction of responses.

Nest Box Monitoring

Nest box monitoring commenced on February 21, 2019. Nest box monitoring consists of an initial visual inspection from the ground. If no signs of activity are observed (e.g. birds flying out of the box, sign on the ground, etc.) then an iPhone attached to a painter's pole is used to record a video of the inside of the nest boxes in order to assess if the boxes are being used, while attempting to minimize disturbance to the nest box and possible nest box occupants.

February 21, 2019

All nest boxes were in good condition, and there was no indication that any maintenance was required. Nest box one and two had no signs of activity. Nest box three is being filled up with fresh, green moss but there was no indication on what animal was adding the moss to the box (this is not a typical sign of Western Screech-Owl use).

March 6, 2019

All nest boxes were in good condition, and there was no indication that any maintenance was required. Nest box one had no signs of activity. Nest box two had an unidentified bird exit the box when lifting camera up. The video was subsequently reviewed and did not provide any other evidence of use. The box was then observed for a few minutes after taking the video and the bird returned. Positive identification of the bird was not possible due to the lack of light at the time of the assessment, but the wing beat was loud and noisy, which is not common for owls. Nest box three continues to be filled up with fresh moss, but there was still no indication on what animal was adding the moss to the box.

March 13, 2019

All nest boxes were in good condition, and there was no indication that any maintenance was required. Nest box one had no signs of activity. At nest box two, a northern flicker (*Colaptes auratus*) was observed in the nest box (visual observation) and this is likely the bird observed during the previous assessment. Nest box three continues to be filled up with fresh moss. The nest box was observed for 30 minutes, but there were no signs of any animals in the area utilizing the box. This box needs to be revisited to confirm what is utilizing the box.

March 25, 2019

All nest boxes were in good condition, and there was no indication that any maintenance was required. There were no signs of activity at any of the nest boxes. The northern flicker was not observed at the second nest box. Moss was still being added to nest box three, but still no confirmation on what animal is utilizing the nest box.

April 11, 2019

All nest boxes were in good condition, and there was no indication that any maintenance was required. There were no signs of activity at any of the nest boxes. The northern flicker was not observed at the second nest box. Moss is beginning to brown and decay in nest box three, but still no confirmation on what animal is utilizing the nest box.

Automated Recording Unit Results

The automated recording unit was deployed on March 13, 2019 by nest box one. The unit is a Song Meter SM4 manufactured by Wildlife Acoustics. The ARU was programmed to record from 30 minutes before sunset to midnight and then again from two hours before sunrise to 30 minutes after sunrise.

The ARU was downloaded on March 25, 2019, and redeployed by nest box three. The ARU was again downloaded on April 11, 2019 and redeployed by nest box two.

At the time of this report, data analysis is ongoing. Data is being analyzed using Kaleidoscope Pro 5 software. Currently, Barred Owls are the only owl species that have been positively identified in the ARU recordings.

DISCUSSION REGARDING SURVEY RESULTS TO DATE

There have been no responses to the call playback from Western Screech-Owls during the 2019 surveys. Similar to 2018, there have been positive responses from Barred Owls in 2019 on the February 21, March 6 and March 25 surveys. Barred Owls are larger than Western Screech-Owls requiring larger cavities for nesting. Given that the stand structure was noted to be insufficient for the smaller Western Screech-Owl, it is unlikely that Barred Owls are nesting in the riparian area. It is more likely being used as a hunting/foraging area. Barred Owls are known to prey on smaller owls (e.g. Western Screech-Owls), it is possible that the Barred Owls are deterring Western Screech-Owl responses to call playback surveys and/or deterring Western Screech-Owl use of the site. Barred owls are not native to BC and their population is increasing as they expand their range⁷.

Nest box monitoring has documented use by other species, with no indication of Western Screech-Owl use.

The ARU data analysis has not produced any owl detections other than Barred Owls. The ARU will continue to collect data on site, providing further sampling effort. Data analysis will continue to occur throughout the breeding season. If any different owl species are detected, this information will be reported.

Habitat conditions in the riparian greenway and across much of the property are generally not conducive to owl nesting habitat. The forested areas on the property typically consist of young seral

⁷ COSEWIC Status Report on the Western Screech Owl *kennicottii* subspecies and the Western Screech Owl *macfarlanei* subspecies in Canada. Retrieved online from:
http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_western_screech-owl_1012_e

Coal Valley Estates – Western Screech-Owl Monitoring Report

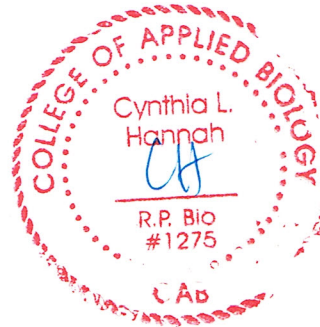
stands of regenerating to young forest stand structural stages. These stands typically have not undergone self thinning and canopy diversification, which is a significant step in forest structure development. These stands generally lack large mature trees and/or decaying trees with cavities. Trees with suitable nesting/cavity characteristics are much more common in older or more developed forests.

Data collected thus far in 2019 and 2018 suggests that the riparian greenway does not appear to be an active nesting territory for Western Screech-Owls.

If you have any further questions, feel free to contact Cindy Hannah by phone at 250-616-3758 or by email at channah@snrc.ca.



Cindy Hannah, RPBio
SNRC



COPY

Original signed and sealed on file

Date: April 15, 2019

To: Chris Durupt, P.Eng.
McElhanney Consulting Services Ltd.
1211 Ryan Road
Courtenay BC, V9N 3R6

From: Strategic Natural Resource Consultants Inc.
321-1180 Ironwood Street
Campbell River, BC, V9W 5P7

RE: **Coal Valley Estates Western Screech-Owl *kennicottii* subspecies (*Megascops kennicottii kennicottii*) Monitoring Report**

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¹ Ursus Environmental. 2014. Terrestrial Assessment for Remainder of Phase 5 of Coal Valley Estates, Cumberland.

² COSEWIC Status Report on the Western Screech Owl *kennicottii* subspecies and the Western Screech Owl *macfarlanei* subspecies in Canada. Retrieved online from:
http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_western_screech-owl_1012_e.pdf

(loss of low elevation riparian forest) are also thought to play role's in the species' decline³.

Western Screech-Owl's live in low elevation coniferous or mixed coniferous forests >30 years old provided there are sufficient older larger structures available to meet their nesting and roosting requirements. They are common in riparian habitats. They prefer moderate groundcover with low understory and relatively open canopies⁴. They are a small owl with ear tufts and yellow eyes. They are grey-brown in colour with dark irregular lines on their light coloured breast. They have a varied diet that includes small mammals, songbirds, insects, crayfish, frogs and fish. Western Screech-Owls nest and roost in tree cavities often reusing cavities created by Northern flickers and pileated woodpeckers, and will use nest boxes. Nests are generally in trees that are >25cm diameter at breast height (dbh) and are located 2 to 6m above the ground (but may be up to 15m in height). Females typically lay eggs in April. Eggs are incubated for approximately 26 days and young fledge approximately 35 day after they hatch. They are non-migratory and nocturnal occupying territories year round⁵.

WESTERN SCREECH-OWL 2019 MONITORING SUMMARY

Call playback surveys following the methods outlined in Resources Information Standards Committee's Inventory Methods for Owl Surveys⁶ were conducted to assist in determining if Western Screech-Owls are present in or near the development area. The methods recommend at least 3 survey repetitions per year from mid-April to August, although it has been found that in BC Western Screech-Owls are often responsive from February through May and unresponsive in June and July. The surveys in 2019 commenced in late February as Western Screech-Owls are known to begin pair formation in January and February, resulting in physical courtship and mating in March and April⁴. Surveys were completed on the nights of February 21, March 6 and March 26, 2019. Surveys began at least 30 minutes after sunset. At each call playback station a bouncing ball call was broadcast for one minute, followed by a minimum of four minutes of listening for responses. This sequence is repeated three times at each station, resulting in a minimum of 15 minutes spent at each station. Stations are spaced approximately 250-350m apart and travel between stations is completed on foot. Each survey commences at a different station. Stations were located to focus on the riparian greenway.

Western Screech-Owl Survey 1

The first call playback survey was completed on February 21, 2019. The weather was overcast with no wind. Temperature was 2°C and there was 10-15cm of snow on the ground. The survey began at 6:26pm.

There was an immediate unknown response to the first and second call playback set at the first station. It was suspected that it was either a Vancouver Island Northern Pygmy Owl (*Glaucidium gnoma swarthy*) or a Northern Saw-whet Owl (*Aegolius acadicus acadicus*), but could not be confidently confirmed. A barred owl (*Strix varia*) responded >5mins after the first set, and the call originated from the south, off site. A barred owl also responded to the first and second call playback set at station two and moved closer to the playback station by the second set. There were no responses at the third call playback station.

³ BC Ministry of Environment. Recovery Plan for the Western Screech-Owl kennicottii subspecies (*Megascops kennicottii kennicottii*) in British Columbia. 2013.

⁴ Cannings, R. J., T. Angell, P. Pyle, and M. A. Patten (2017). Western Screech-Owl (*Megascops kennicottii*), version 3.0. In *The Birds of North America* (P. G. Rodewald, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. <https://doi.org/10.2173/bna.wesowl1.03>

⁵ Western Screech Owl (*Megascops kennicottii*) - Information, Pictures, Sounds - The Owl Pages. Retrieved online from: <https://www.owlpages.com/owls/species.php?s=840>

⁶ Resources Information Standards Committee. Inventory Methods for Owl Surveys. 2006.



Western Screech-Owl Survey 2

The second call playback survey was completed on March 6, 2019. The weather was mostly clear with no wind. Temperature was 1°C. The survey began at 6:58pm. There were no responses at the first or third call playback stations. A barred owl responded at the second call playback station, during the third set. The owl was calling from the south, off site.

Western Screech-Owl Survey 3

The third call playback survey was completed on March 26, 2019. The weather was overcast with a slight and intermittent drizzle/mist and no wind. Temperature was 11°C. An additional two survey stations were added to increase the search area and sampling effort outside of the riparian greenway. There were no responses at the first, second, third or fifth call playback stations. A barred owl was heard calling prior to the commencement of the first call playback set at the second station, but had no response to the call playback. A barred owl was heard calling between the second and third call playback set at station four and the call was originating from the second call play back site.

See attached map for station locations and direction of responses.

Nest Box Monitoring

Nest box monitoring commenced on February 21, 2019. Nest box monitoring consists of an initial visual inspection from the ground. If no signs of activity are observed (e.g. birds flying out of the box, sign on the ground, etc.) then an iPhone attached to a painter's pole is used to record a video of the inside of the nest boxes in order to assess if the boxes are being used, while attempting to minimize disturbance to the nest box and possible nest box occupants.

February 21, 2019

All nest boxes were in good condition, and there was no indication that any maintenance was required. Nest box one and two had no signs of activity. Nest box three is being filled up with fresh, green moss but there was no indication on what animal was adding the moss to the box (this is not a typical sign of Western Screech-Owl use).

March 6, 2019

All nest boxes were in good condition, and there was no indication that any maintenance was required. Nest box one had no signs of activity. Nest box two had an unidentified bird exit the box when lifting camera up. The video was subsequently reviewed and did not provide any other evidence of use. The box was then observed for a few minutes after taking the video and the bird returned. Positive identification of the bird was not possible due to the lack of light at the time of the assessment, but the wing beat was loud and noisy, which is not common for owls. Nest box three continues to be filled up with fresh moss, but there was still no indication on what animal was adding the moss to the box.

March 13, 2019

All nest boxes were in good condition, and there was no indication that any maintenance was required. Nest box one had no signs of activity. At nest box two, a northern flicker (*Colaptes auratus*) was observed in the nest box (visual observation) and this is likely the bird observed during the previous assessment. Nest box three continues to be filled up with fresh moss. The nest box was observed for 30 minutes, but there were no signs of any animals in the area utilizing the box. This box needs to be revisited to confirm what is utilizing the box.

March 25, 2019

All nest boxes were in good condition, and there was no indication that any maintenance was required. There were no signs of activity at any of the nest boxes. The northern flicker was not observed at the second nest box. Moss was still being added to nest box three, but still no confirmation on what animal is utilizing the nest box.

April 11, 2019

All nest boxes were in good condition, and there was no indication that any maintenance was required. There were no signs of activity at any of the nest boxes. The northern flicker was not observed at the second nest box. Moss is beginning to brown and decay in nest box three, but still no confirmation on what animal is utilizing the nest box.

Automated Recording Unit Results

The automated recording unit was deployed on March 13, 2019 by nest box one. The unit is a Song Meter SM4 manufactured by Wildlife Acoustics. The ARU was programmed to record from 30 minutes before sunset to midnight and then again from two hours before sunrise to 30 minutes after sunrise.

The ARU was downloaded on March 25, 2019, and redeployed by nest box three. The ARU was again downloaded on April 11, 2019 and redeployed by nest box two.

At the time of this report, data analysis is ongoing. Data is being analyzed using Kaleidoscope Pro 5 software. Currently, Barred Owls are the only owl species that have been positively identified in the ARU recordings.

DISCUSSION REGARDING SURVEY RESULTS TO DATE

There have been no responses to the call playback from Western Screech-Owls during the 2019 surveys. Similar to 2018, there have been positive responses from Barred Owls in 2019 on the February 21, March 6 and March 25 surveys. Barred Owls are larger than Western Screech-Owls requiring larger cavities for nesting. Given that the stand structure was noted to be insufficient for the smaller Western Screech-Owl, it is unlikely that Barred Owls are nesting in the riparian area. It is more likely being used as a hunting/foraging area. Barred Owls are known to prey on smaller owls (e.g. Western Screech-Owls), it is possible that the Barred Owls are deterring Western Screech-Owl responses to call playback surveys and/or deterring Western Screech-Owl use of the site. Barred owls are not native to BC and their population is increasing as they expand their range⁷.

Nest box monitoring has documented use by other species, with no indication of Western Screech-Owl use.

The ARU data analysis has not produced any owl detections other than Barred Owls. The ARU will continue to collect data on site, providing further sampling effort. Data analysis will continue to occur throughout the breeding season. If any different owl species are detected, this information will be reported.

Habitat conditions in the riparian greenway and across much of the property are generally not conducive to owl nesting habitat. The forested areas on the property typically consist of young seral

⁷ COSEWIC Status Report on the Western Screech Owl *kennicottii* subspecies and the Western Screech Owl *macfarlanei* subspecies in Canada. Retrieved online from:
http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_western_screech-owl_1012_e

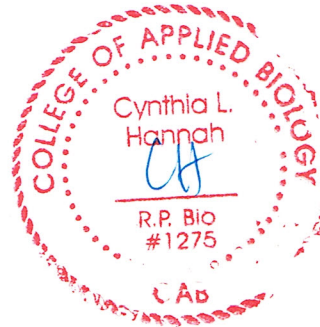
Coal Valley Estates – Western Screech-Owl Monitoring Report

stands of regenerating to young forest stand structural stages. These stands typically have not undergone self thinning and canopy diversification, which is a significant step in forest structure development. These stands generally lack large mature trees and/or decaying trees with cavities. Trees with suitable nesting/cavity characteristics are much more common in older or more developed forests.

Data collected thus far in 2019 and 2018 suggests that the riparian greenway does not appear to be an active nesting territory for Western Screech-Owls.

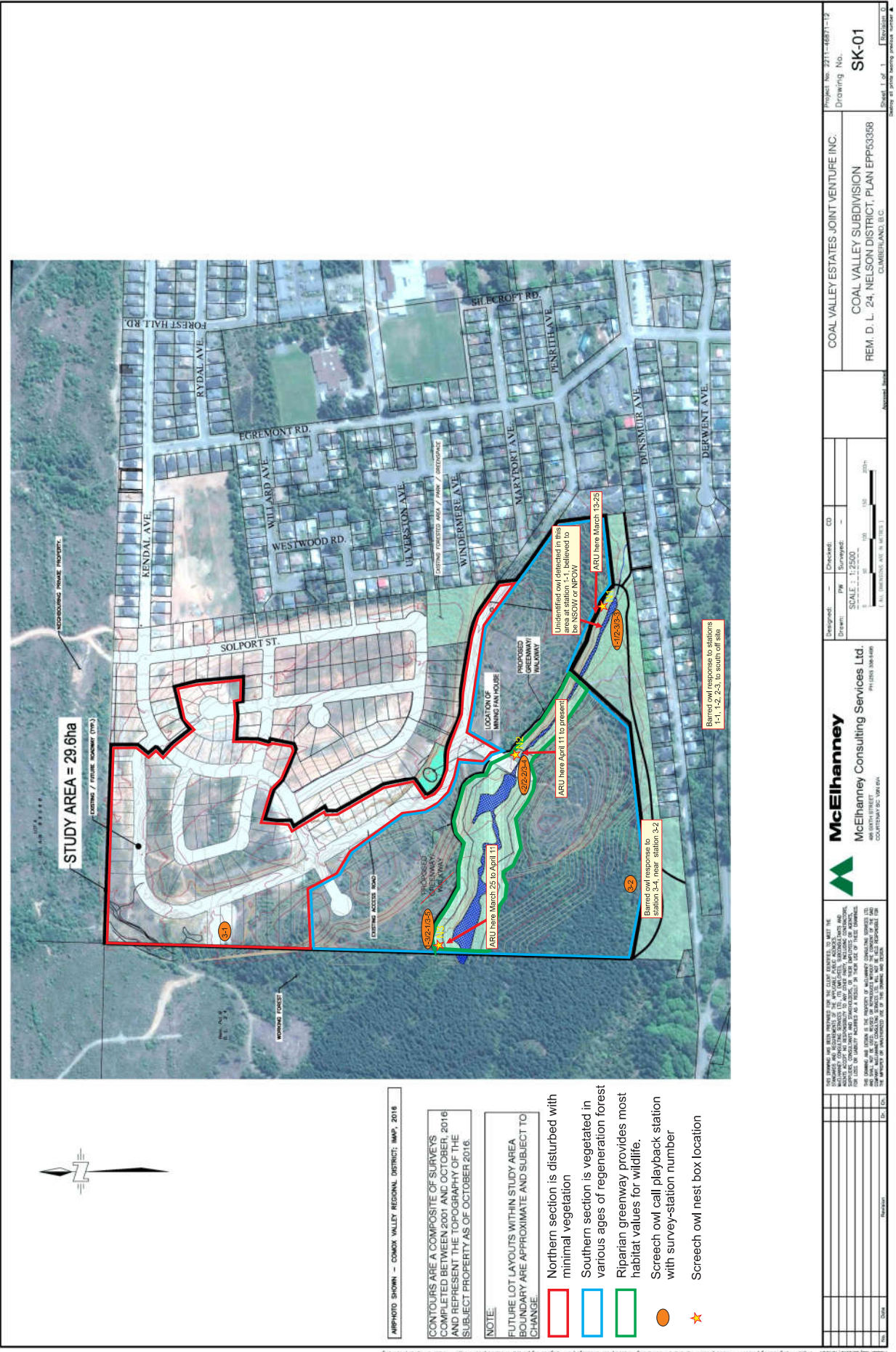
If you have any further questions, feel free to contact Cindy Hannah by phone at 250-616-3758 or by email at channah@snrc.ca.

Cindy Hannah, RPBio
SNRC



COPY

Original signed and sealed on file



NOTE

FUTURE LOT LAYOUTS WITHIN STUDY AREA BOUNDARY ARE APPROXIMATE AND SUBJECT TO CHANGE.

Northern section is disturbed with minimal vegetation

Southern section is vegetated in various ages of regeneration forest

Riparian greenway provides most habitat values for wildlife.

Screech owl call playback station with survey-station number

Screech owl nest box location

McElhanney
McElhanney Consulting Services Ltd.
COASTAL DISTRICT, BC
PH: 250-388-8489

COAL VALLEY ESTATES JOINT VENTURE INC.
COAL VALLEY SUBDIVISION
REM. D. L. 24, NELSON DISTRICT, PLAN EPP63358
CURRIEMOUNT, B.C.

Project No. 2371-46871-12
Drawing No. SK-01
Sheet 2 of 1
Scale of plan being presented 1:1000

Date: 16 May 2018

To: McElhanney Consulting Services Ltd.

From: Strategic Natural Resource Consultants Inc.

Subject: Wildfire Threat Assessment and recommendations for Coal Valley Estates development Phases 9-12 to satisfy requirements for the Village of Cumberland Development Permit Area #4: Wildland Urban Interface.

To Whom it May Concern,

Strategic Natural Resource Consultants Inc. (SNRC) was contracted by Chris Durupt, P. Eng, Project Engineer of McElhanney Consulting Services Ltd. (McElhanney) to perform a wildfire threat assessment for the Coal Valley Estates Development Phases 9-12 in Cumberland, BC and to provide recommendations to mitigate identified hazards. A Wildland Fire Threat Assessment is a requirement to satisfy the guidelines associated with the Village of Cumberland Official Community Plan, Development Permit Area # 4: Wildland Urban Interface.

Methodology

SNRC understands that, as part of Coal Valley Estates Phases 9-12 development application to the Village of Cumberland, all vegetation will be removed with the exception of the green space associated with a riparian feature running in a northwest to southeast direction in the southern half of the development area. For the purposes of this report, the linear park within the Coal Valley development and a neighbouring park were assessed (see attached Map). A small park associated with Phases 6-8 was assessed as part of a previous report completed for McElhanney in 2017. Adjacent Private Managed Forest Lands were not assessed.

Methods for the assessment were in accordance with the 2012 Wildland Urban Interface Wildfire Threat Assessments in BC¹. General vegetation types were identified in the office using ortho-imagery and then verified on-site. Each vegetation type was assessed using the Wildland Urban Interface Wildfire Threat Assessment Worksheet. The assessment process reviews three key components: fuels (surface/ground fuels, vegetation, woody debris, canopy cover and overall forest health), weather (biogeoclimatic zone and historical wildfire occurrence) and topography (slope, terrain and aspect). Points are given to each component and the sum of the

¹ Morrow, B., K. Johnston and J. Davies. 2013. Wildland Urban Interface Wildfire Threat Assessments in BC. Accessed 30 April 2018. <http://fness.bc.ca/wp-content/uploads/2017/07/WTI-Guide-2012-Update.pdf>).

points determines the Wildfire Behavior Threat Class as Low, Moderate, High or Extreme. One plot was conducted in each general vegetation type.

Results

The site assessed was divided into four general vegetation types in three areas: North Park, South Park, Central Park East and Central Park West. All areas are the result of previous disturbance (timber harvesting) and consist of varying stages of regenerating forest. The Central Park area contains a wetland component (West) and a stream (East). An existing, driveable gravel road dissects the West and East areas, creating a “fuel break” approximately 5 metres wide.

NORTH PARK

The North Park (see attached map) is a regenerating conifer forest. The forest is predominantly 3 to 5 m tall (with some scattered, taller overstory stems) comprised mostly of conifer species (western hemlock (*Tsuga heterophylla*), Douglas-fir (*Pseudotsuga menziesii*), western redcedar (*Thuja plicata*) and western white pine (*Pinus monitcola*). Some red alder (*Alnus rubra*) exists). The canopy closure is variable between 40 and 100% with some open areas.

The duff depth was shallow (less than 2 cm) and had nearly 100% surface fuels continuity. The open areas contained salal (*Gaultheria shallon*), bracken fern (*Pteridium aquilinum*) and Scotch broom (*Cytisus scoparius*) whereas the dense conifer areas contained salal and/or minimal herbs/shrubs. The biogeoclimatic zone is the Very Dry Maritime Coastal Western Hemlock subzone, zonal (01) site series.

Due to the young age of the stand, the crowns were generally 1 to 2 m from the ground, with some edge affected areas less than 1 m.

A majority of the park has a somewhat flat (<16%), east facing slope while the southern area is steeper with a south aspect.

This park was assessed in a similar report in 2017. Field data collected at the time was input into the 2012 worksheet used for this report. The overall Wildfire Behaviour Threat Score was 89 out of a possible total of 240 resulting in a Moderate Threat Class. Figures 1 to 2 below are representative photographs of the vegetation in the North Park.





Figures 1-2. From left to right: regenerating conifers and open area with salal, bracken fern and Scotch broom; dense conifer stand with small diameter overstory.

CENTRAL PARK - WEST

The Central Park – West area (see attached map) is a second growth conifer forest with a deciduous component. The forest is approximately 25 to 30 years old, comprised predominantly of conifers (grand fir (*Abies grandis*), Douglas-fir, western redcedar and western hemlock) and some deciduous species (Poplar (*Populus* sp.), and red alder). The canopy closure is greater than or equal to 80% with approximately 60% conifer and 40% deciduous. Estimated height of the stand is 12-14 m.

The duff depth was shallow (2 cm) and although a negligible herb and shrub layer, the surface fuels continuity was nearly 100%. Vegetation included Oregon grape (*Mahonia nervosa*), salal, Vanilla-leaf (*Achlys triphyllyla*) and Oregon beaked moss (*Kindbergia oregana*) as well as suppressed western hemlock and western redcedar. The biogeoclimatic zone is the Very Dry Maritime Coastal Western Hemlock subzone, zonal (01) site series.

Though the crown base of the trees is less than one metre from the ground, the branches are dead, very small and sparse and therefore not a robust ladder fuel source which would make it difficult for a ground fire to climb up into the canopy.

The slope is somewhat flat (<16% slope) with rolling terrain. The aspect is variable but generally south.

The overall Wildfire Behaviour Threat Score was 99 out of a possible total of 240 resulting in a High Threat Class. Figures 3 to 5 below are representative photographs of the vegetation in the Central Park - West.





Figures 3-5. From left to right: thin duff layer; surface fuels; 80%+ coniferous crown closure with deciduous component.

The wetland has standing water and has lush, riparian vegetation around its perimeter for approximately 5 m. The wetland and surrounding vegetation could act as a fuel break, and likely provides a summer water source for wildfire suppression. Figures 6 to 7 are representative photographs of the vegetation in wetland portion of the Central Park - West area.



Figures 6-7. From left to right: standing water and deciduous tree and shrub species; wetland and riparian vegetation as well the break in forest cover.

CENTRAL PARK - EAST

The Central Park - East (see attached map) is a mixed forest. The overstory is nearly 100% red alder (with the occasional cottonwood) which is approximately 20 to 25 m high, 60-80% crown



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closure and with crown base height around 10 to 12 m. 4 to 6 m high immature western hemlock and western redcedar makes up the understory.

The duff depth was shallow (2 cm) and the surface fuels continuity of great than 80%. There is minimal fine and large woody debris (<10% ground cover). Surface fuels consisted of vegetation dominated by sword fern (*Polystichum munitum*), vanilla leaf, salal, salmonberry (*Rubus spectabilis*), and Oregon beaked moss. The biogeoclimatic zone is the Very Dry Maritime Coastal Western Hemlock subzone, rich (05) site series.

Topographically this area is in a draw with a small stream. Slopes are gentle with the exception of a rock cliff approximately 10 to 12 m high on the south facing slope in one area. The aspect is variable with southwest facing on the north side of the stream and northeast on the south side of the stream.

This area has a Wildfire Behavior Threat score of 67 out of a possible 240 resulting in a Moderate Wildfire Behaviour Threat Class. Figures 6 to 8 below are representative photographs of the vegetation in the East Area.



Figures 6-8. From left to right: ground cover; overstory red alder with immature hemlock in the understory; rock cliff with some large woody debris.

SOUTH PARK

The South Park – (see attached map) is an old second growth conifer forest made up of predominantly of Douglas-fir with the occasional western redcedar and big-leaf maple. The canopy closure is greater than 90% with almost 100% conifer. Some of the trees were 40 + m high, with the canopy starting between 3-5 m.

The duff depth is shallow (<5 cm) with an abundant herb and shrub layer making close to 100 percent surface fuels continuity. Vegetation included Oregon grape, snowberry (*Symphoricarpos*



albus), Vanilla-leaf, bleeding heart (*Dicentra formosa*), sword fern, salal. The biogeoclimatic zone is the Very Dry Maritime Coastal Western Hemlock subzone, (05) site series.

The south facing slope is a consistent, moderately steep (30-44%) slope.

At the south end of the park there is the remanence of an old orchard (see map) composed of predominantly grass, apple and cherry trees, with scattered Scotch broom that had been cut and piled at the time of the site visit.

The area has a Wildfire Behaviour Threat score of 74 out of 240 resulting in a Moderate Threat Class. Figures 9-11 5 below are representative photographs of the vegetation in the South Park.



Figures 9-11. The south park from left to right: ground cover; Douglas -fir overstory with big-leaf maples; the understory.



Conclusion and Recommendations

In its current state, the vegetation that is intended to remain after land clearing for Phases 9-12 has been assessed as moderate and high Wildfire Behaviour Threat Class. The wetland, stream and road break up the continuity of the fuels. Although Private Managed Forest Lands outside the legal property line were not assessed for the purposes of this report, ortho-imagery indicates that extensive coniferous stands in varying stages of regeneration exist. The risk of a wildfire 'spotting' (burning embers carried into the air and fall beyond the main perimeter of a wildfire and result in spot fires on receptive fuel beds) into yards and/or onto homes is a concern. For this reason, FireSmart structure and site principles are included in the recommendations below.

It is noted that the above field assessment was completed at one point in time – adjacent vegetation and fuel structure and continuity may change, thereby changing fuel hazard scores.

Given the current wildland fuel hazards SNRC recommends the following practices and mitigation measures for Phases 9-12 of the Coal Valley Estates development:

1. Regarding the guidelines in the Village of Cumberland Official Community Plan Development Permit Area #4 Section 10.4.5:
 - Guidelines (3) (a), (b), (d), (e), (f), (g), (h) and (i) are recommended. Note: (i) may not apply due to planned underground services. If there is a variance from underground services, (i) shall apply;
 - Guideline (4) is recommended;
 - Guideline (5) is recommended, in particular for lots adjacent the Private Managed Forest Land or other vegetated lands;
 - Guideline (6) is recommended;
 - Guideline (7) is recommended as compliance with the Village of Cumberland's Fire Protection Services and Regulation Bylaw #988, 2014, in particular Part 1 section 12, Part 2 section 45 and Part 3. With respect to the term "high fire hazard," this may be determined using the BC Wildfire Service Fire Danger Rating (updated daily at approximately 2pm April through December) for the Bowser fire weather station, if acceptable by the manager of protective services (as the role defined by Bylaw #988, 2014).
2. It is recommended to allow deciduous species to naturally establish and/or continue to grow (if safe to do so) within the stands assessed for this report;
3. A wildfire threat assessment by a Qualified Professional is recommended if significant changes occur with the vegetation of Phases 9-12 (i.e. if all vegetation not removed as



initially indicated by McElhanney for this report, or if vegetation within the assessed area is altered); and

4. It is recommended that local Emergency Services retain a key to gates that access the roads surrounding this subdivision development while development is occurring.

Sincerely,
Strategic Natural Resource Consultants Inc.

Prepared by:



Alex Walton, P. Ag, Cert Arb.

Signing Professional:



Leigh Stalker, RPF (#4744)

"I certify that the work described herein fulfills the standards expected of a member of the Association of British Columbia Forest Professionals and that I did personally supervise the work."

Map attached



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DESIGN BRIEF – STORMWATER MANAGEMENT PLAN

RE: Revision 1 - Storm Water Management Plan
Coal Valley Estates
Remainder, D.L. 24, Nelson District, Cumberland, BC

MCSL FILE: 2211-46871-5

PREPARED BY: Chris Durupt, P.Eng.

REVIEWED BY: Bob Hudson, P.Eng.

DATE: November 24, 2014

1.0 INTRODUCTION

The following Stormwater Management Plan (SWMP) has been prepared on behalf of Coal Valley Estates Ltd., in support of ongoing development permit applications for the above noted parcel. The intent of this plan is to set a base line for pre-development (2007) site runoff, develop per hectare performance targets for post-development (based on the BCSWGB and Village Guidelines), and provide preliminary sizing for the proposed mitigation techniques or Best Management Practices (BMPs) required to achieve the performance targets.

2.0 SITE DESCRIPTION

The 46 hectare subject property legally identified as the Remainder of District Lot 24, Nelson District, is located adjacent the western edge of existing development within the Village of Cumberland. The subject property, zoned CDMU-6, is bordered to the east by existing residential developments, to the south by parkland, to the west by a working forest zoned UR-1 and to the north by forested lands zoned RU-1. The CDMU-6 zoning allows for mixed residential and multifamily use.

The rolling topography of the site ranges from 170 – 213 metres above sea level and is bisected east to west by a wetland which drains to the south east. A review of existing flora and fauna, conducted by *Ursus Environmental* in October 2006 shows that the property is located in the Coastal Western Hemlock Biogeoclimatic Zone. The upland areas contain regenerating forest with underbrush consisting of salal, vanilla leaf, blackberry, swordfern, salmonberry and Oregon grape. Vegetation in the moister, low lying area consists of juvenile western red cedar, red alder and salmonberry.



Soil stratigraphy was examined by *Lewkowich Geotechnical Engineering Ltd.* who logged 34 test pits within the subject property during their October 2006 field investigation. Lewkowich's February 2007 Preliminary Geotechnical Assessment states:

The soil conditions consisted generally of a layer of organics, overlying silty sand with some gravel, over dense silty sand glacial till. Bedrock was encountered in most test pits at depths varying from ground surface (TP06- 32) to 2.0m (TP06-12). Several test pits were terminated in very dense glacial till.

The upper sand material (overburden) was generally found to be silty, compact to dense, with some gravel. This material should be suitable for infiltration of storm water infiltration. Further permeability testing would be necessary to determine the permeability characteristics of this material.

Ground water seepage was not encountered during the testpits.

3.0 EXISTING RUNOFF

Most of the site is located within the Maple Creek Watershed, with a small portion of the south west corner located within the Perseverance Creek Watershed. The northern half of the property drains to the Maple Lake wetlands, and the southern portion of the site to the Maple Creek Watershed. A small remaining area within the south west quadrant of the site drains to Perseverance Creek.

A hydraulic model was developed using SWMM software, enabling analysis of existing site response to a variety of design rainfall events. Simulations were completed for the MAR (Mean Annual Rainfall), and synthetic, 24-hour SCS Type 1A distribution, for 2, 5, and 10 Year rainfall events (derived from 32 years of data from Environment Canada's Puntledge rain gauge (1021990)). For simplicity, a single 1.0 hectare catchment has been modeled to set a base line for existing site runoff, define post-development performance targets, and provide preliminary sizing for the proposed mitigation techniques, all on a per unit area basis. This method allows runoff for each phase of the development to be analyzed on a volumetric discharge of *cubic metres per hectare* (m^3/ha) and a peak discharge of *litres per second per hectare* (lps/ha).

Model input parameters, based on existing soils information (provided by *Lewkowich Geotechnical Engineering Ltd.* in their February 2007 Preliminary Geotechnical Assessment), are summarized in **Table 1** overleaf. Results of the modeled, pre-disturbed (2007) site response are indicated in **Figure 1** overleaf, and summarized in **Table 2** double overleaf.



Table 1: Existing Site-Specific Storm Water Modeling Parameters for a 1 hectare sample area

Parameter	Existing
Area (ha)	1.0
Width (m)	50
Slope (%)	12
% Impervious	15
N Imperv	0.013
N Perv	0.2
Dstore Imperv (mm)	2
Dstore Perv (mm)	7
Zero % imperv	25
Curve #	70
Drying time (days)	7
Subarea routing	PERV

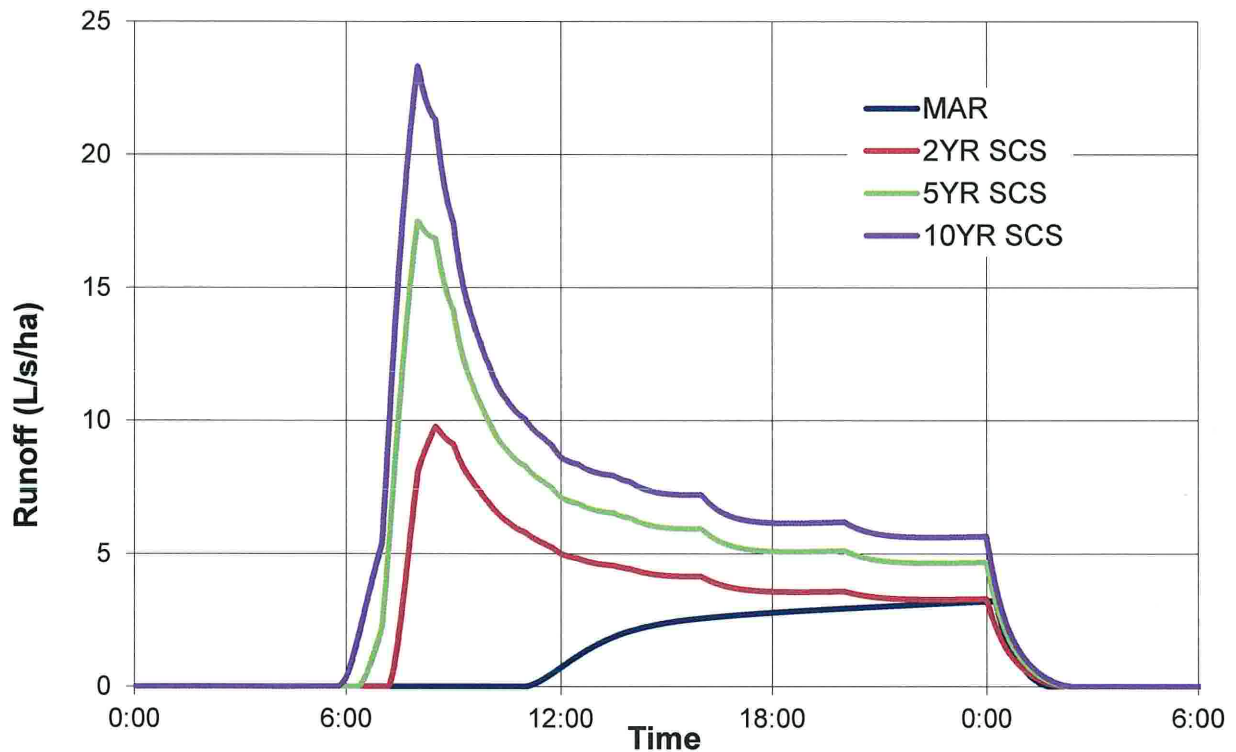


Figure 1: Hydrographs for the MAR, 2, 5, and 10 Year Rainfall Event under Present Day Site Conditions



Table 2: Existing Runoff Quantities for a 1 hectare sample area

24-hour Distribution	Total Precipitation (mm)	Existing Runoff	
		Total (m ³ /ha)	Peak (lps/ha)
MAR	48	120	3.2
2-Year	73	285	9.8
5-Year	95	445	17.5
10-Year	110	560	23.3

Peak discharge (runoff) from the site is high when compared to other sites within the Valley. Higher than normal discharge rates can be attributed to steep slopes, minimal soil cover atop bedrock and the intense rainfall patterns unique to the Cumberland area.

4.0 PERFORMANCE TARGETS

Performance targets have been developed based on the Village of Cumberland Bylaw No. 990, Section 10.1.5.17) which requires rainwater management in accordance with the Water Balance Model. The British Columbia Stormwater Planning Guidebook (BCSWPG), and Beyond the Guidebook, a 2007 revised publication which builds on the BCSWPG are the baseline for the Water Balance Model.

The BCSWPG suggests that the complete spectrum of rainfall events should be evaluated with the goal that post development flow rates should mimic pre-development rates. The BCSWPG also recognizes that the rainfall capture targets will depend on the site and watershed-specific conditions. Beyond the Guidebook introduces the following three performance targets to facilitate implementation of the integrated strategy for managing the complete rainfall spectrum:

Rainfall Capture – “Rainfall capture” measures include infiltration, evapotranspiration, or re-use.

Runoff Control – delay overflow runoff by means of detention storage with ‘runoff control’ and release into a receiving body at a rate that mimics pre-development flow rates.

Flood Mitigation – reduce flooding by providing sufficient hydraulic capacity to “contain and convey” ensuring that large storm events are safely conveyed by the storm drainage system.

The BCSWPG targets have been developed based on the statistical distribution of rainfall intensities in British Columbia. The datum used to measure hydrological impact is the so-called “Mean Annual Rainfall” (MAR). The MAR is defined as the rainfall event which is exceeded, on average, once per year. Rainfall events up to and including the MAR, equate to approximately 95% of annual rainfall volume. Conversely, extreme storms in excess of the MAR typically account for less than 0.4% of all rainfall events.



Based on the results of the SWMM analysis and the design objectives outlined above, the Performance Targets for the remainder of the Coal Valley development are as follows:

Table 3 – Performance Targets

	Small Storm Goal	Medium Storm Goal		Large Storm Goal
	MAR 24hr rainfall event	2 year, 24hr rainfall event	5 year, 24hr rainfall event	10 year, 24hr rainfall event
Target peak runoff rate (l/s/ha)	3.2	9.8	17.5	23.3
Target peak volume rate (m ³ /ha)	120	285	445	560

5.0 DESIGN ELEMENTS

The proposed Low Impact Development (LID) strategies to be implemented for this project have been developed to promote onsite capture of runoff and groundwater recharge. Properly employed, this approach will mitigate peak runoff rates, and provide qualitative treatment of runoff, prior to discharge. The following LIDs are proposed for the site:

5.1. Amended Soil

The use of amended soils will be fundamental to achieving a water balance for this site. Properly functioning amended soil can significantly increase the amount of initial abstractions of the pervious area of the site. Initial abstractions reflect the depth of rainfall lost to depression storage and evapotranspiration. A minimum of 300 mm of topsoil which meets the revised MMCD Specification outlined below should be placed on all pervious areas of the site. This soil can either be stripped from the site and re-used (if available) or imported.

To account for compaction and clogging over time, the post-development mitigated model has assumed 12 mm of initial abstractions, for all pervious surfaces. This reflects the long term performance of 300 mm of amended soil inclusive of a FOS of 2. All amended soils should conform to the MMCD specification for growing medium, with the following amendments:

- Lawn Areas: topsoil should meet or exceed the MMCD specification for growing medium with the organic content amended to be 8%; and,
- Planters, Shrub and Groundcover Areas: topsoil should meet the MMCD specification for growing medium with organic content of 8 to 15%.

Refer to MMCD and *Green Infrastructure Partnership, "Topsoil: Just How Do You Obtain a Performing Topsoil Layer, to Advance Rainwater Management & Water Conservation"* for more information on amended soils.



5.2. Retention of Native Vegetation

Wherever possible, the native vegetation should be retained and/or re-established post development. Vegetation reduces runoff by retaining, evapotranspiring and aiding in infiltration.

5.3. Infiltration Galleries

Runoff from buildings and streets will be directed to infiltration galleries where existing topography and soil stratigraphy allow. **Figure 2** overleaf, shows a typical lot level infiltration gallery to collect and infiltrate runoff from buildings. Lot level infiltration galleries will be sized dependant on the building footprint and the soil stratigraphy of the lot. Each lot level gallery will be equipped with a grit sump upstream of the gallery and an overflow connected directly to the municipal sewer. Catchbasins will also be connected to infiltration galleries via underflow piping. The catchbasin will serve as a grit sump, adding longevity to the infiltration gallery and the overflow will be connected to the municipal sewer. **Figure 3** overleaf, shows a typical catchbasin infiltration gallery. Lot level and catchbasin infiltration galleries will filter sediment and hydrocarbons from runoff, introduce additional infiltration and provide additional storage volume for larger, less frequent events.

Infiltration galleries have been modeled with an estimated saturated hydraulic conductivity for the site of 40 mm/hr, an average base area of 30 m² per hectare and an average effective storage area of 10 m³/hectare. The galleries will be filled with drain rock (porosity approximately equal to 0.4) and lined with filter fabric. A longevity factor of 0.75 was used in this analysis to account for plugging of pore spaces and degradation over time. To ensure long term function, each gallery will be situated downstream of a grit sump manhole or catchbasin.

5.4. Wetland Attenuation

Per the Village's Stormwater Drainage Master Plan, wetlands within the subject property, as well as the larger Maple Creek and Perseverance Creek water sheds will form an integral part of managing runoff from this site. Minimal overburden atop shallow bedrock, characteristic of the upland areas of this site make for limited storage potential, or onsite capture/retention of runoff. Wetland storage, as was used for previous phases of development, will continue to be used to attenuate peak volume and discharge in excess of that which can be retained onsite through the implementation of the above noted LIDs. Wetland attenuation has not been modeled at this time. The vast capacity of the downstream wetlands is estimated to be immensely greater than the slight increase in runoff due to the proposed Low Impact Development strategies to be implemented for this development.



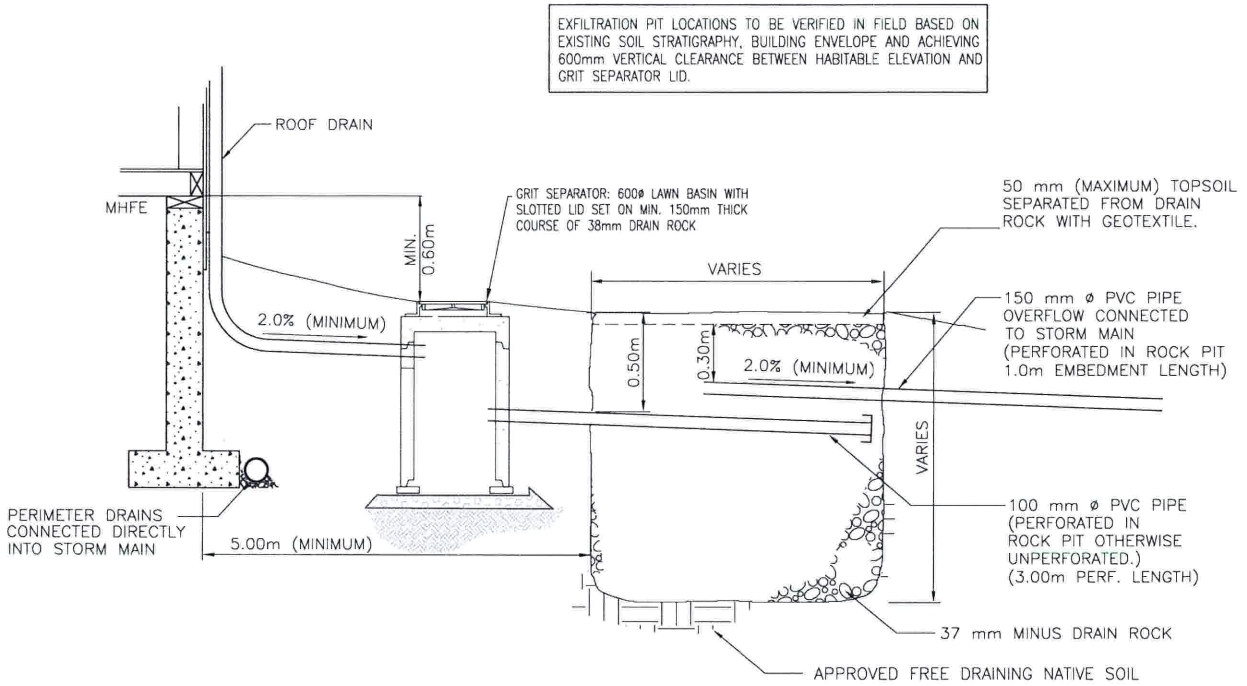


Figure 2: Typical Lot Level Infiltration Gallery

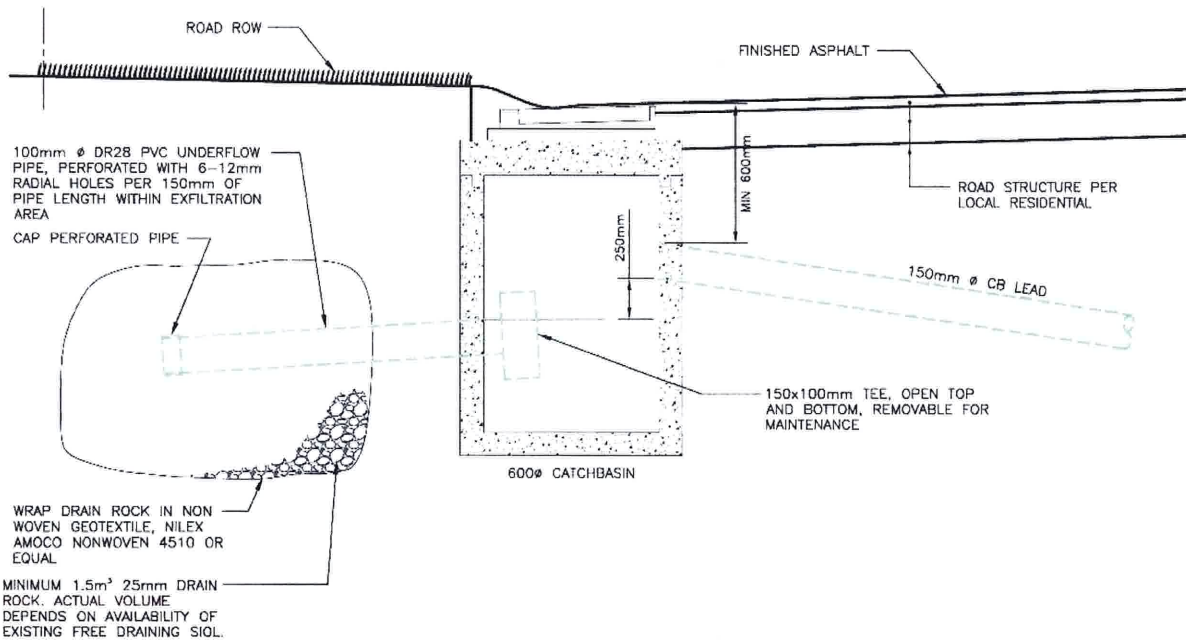


Figure 3: Typical Catchbasin Infiltration Gallery



6.0 QUALITY

Removal of Total Suspended Solids (TSS) will be achieved by catchbasin sumps and grit sumps upstream of all infiltration galleries. Groundwater recharge through infiltration galleries will serve to further improve/polish this surface runoff prior to release into the Village's downstream stormwater infrastructure and wetlands.

7.0 POST-DEVELOPMENT RUNOFF

A 1.0 hectare post-development sample site was modeled using SWMM software. Simulations for both mitigated and non-mitigated site response were completed for the MAR and synthetic, 24-hour SCS Type 1A distribution 2, 5, and 10 Year rainfall events (derived from 32 years of data from Environment Canada's Puntledge rain gauge (1021990)). Model input parameters derived are summarized in **Table 4** overleaf. The post development mitigated model includes the LIDs design elements described above. Results of the modeled site response are indicated in **Figures 4 to 7** double overleaf.



Table 4: Site-Specific Storm Water Management Parameters for a 1 hectare sample area

Parameter	Existing	Post-Development	Post-Development Mitigated
Area (ha)	1.0	1.0	1.0
Width (m)	50	280	280
Slope (%)	12	5	5
% Impervious	15	60	60
N Imperv	0.013	0.013	0.013
N Perv	0.2	0.15	0.15
Dstore Imperv (mm)	2	2	2
Dstore Perv (mm)	7	5	12
Zero % imperv	25	25	25
Curve #	70	90	80
Drying time (days)	7	7	7
Subarea routing	PERV	OUTLET	IMPERVIOUS

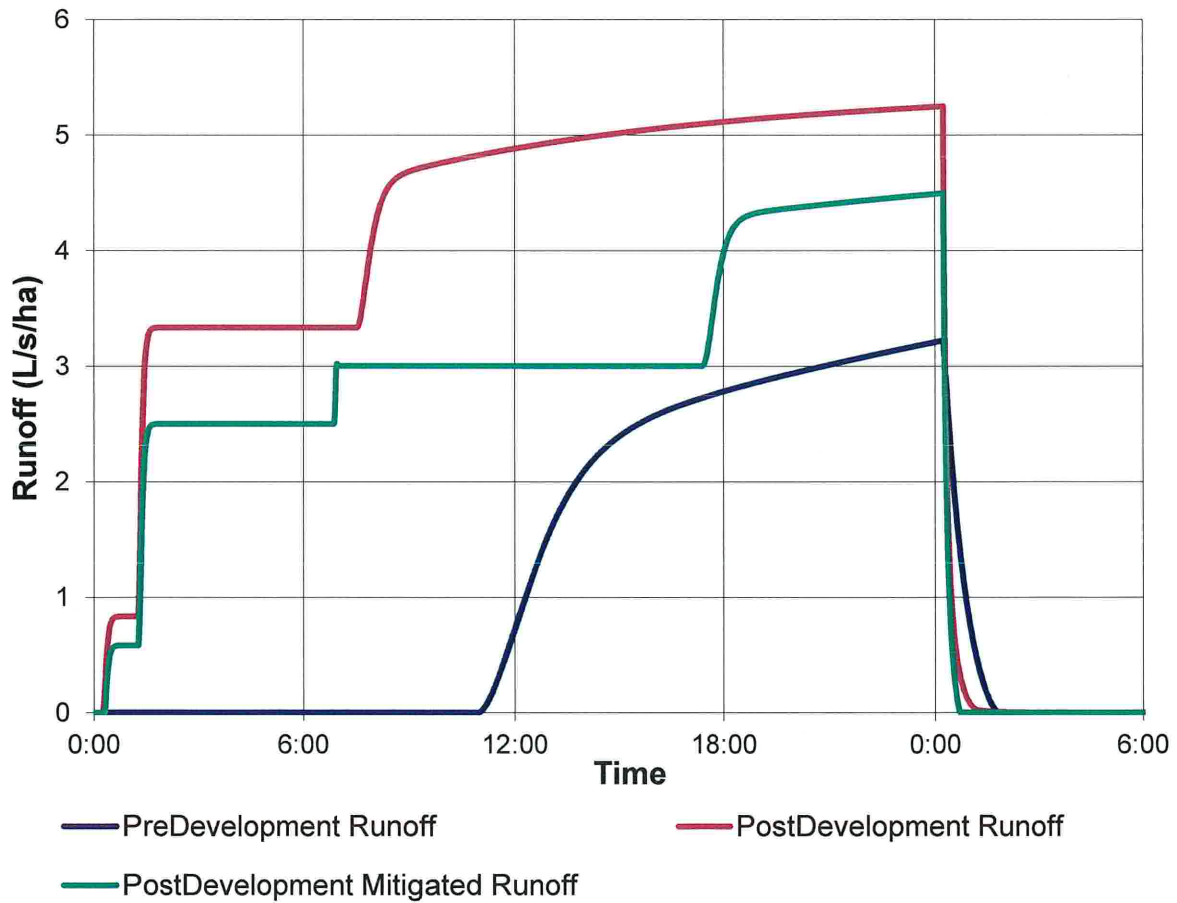


Figure 4 – LID Performance: MAR Event

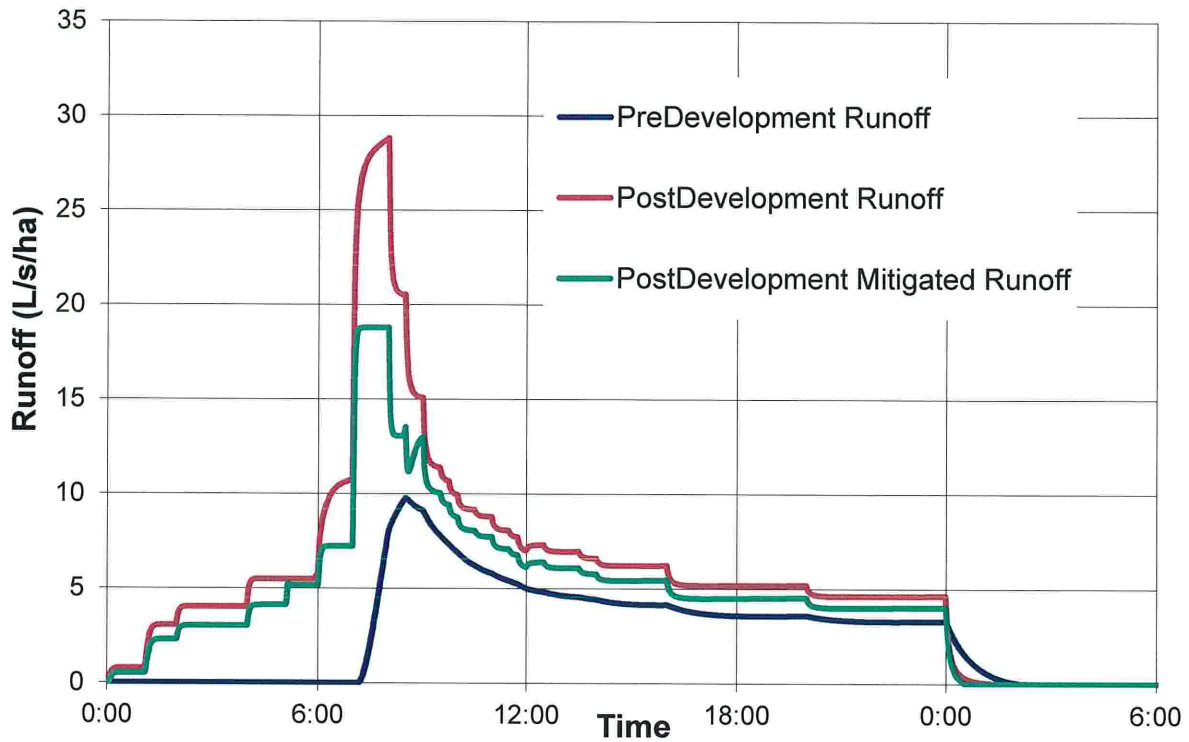


Figure 5 – LID Performance: 2YR Event

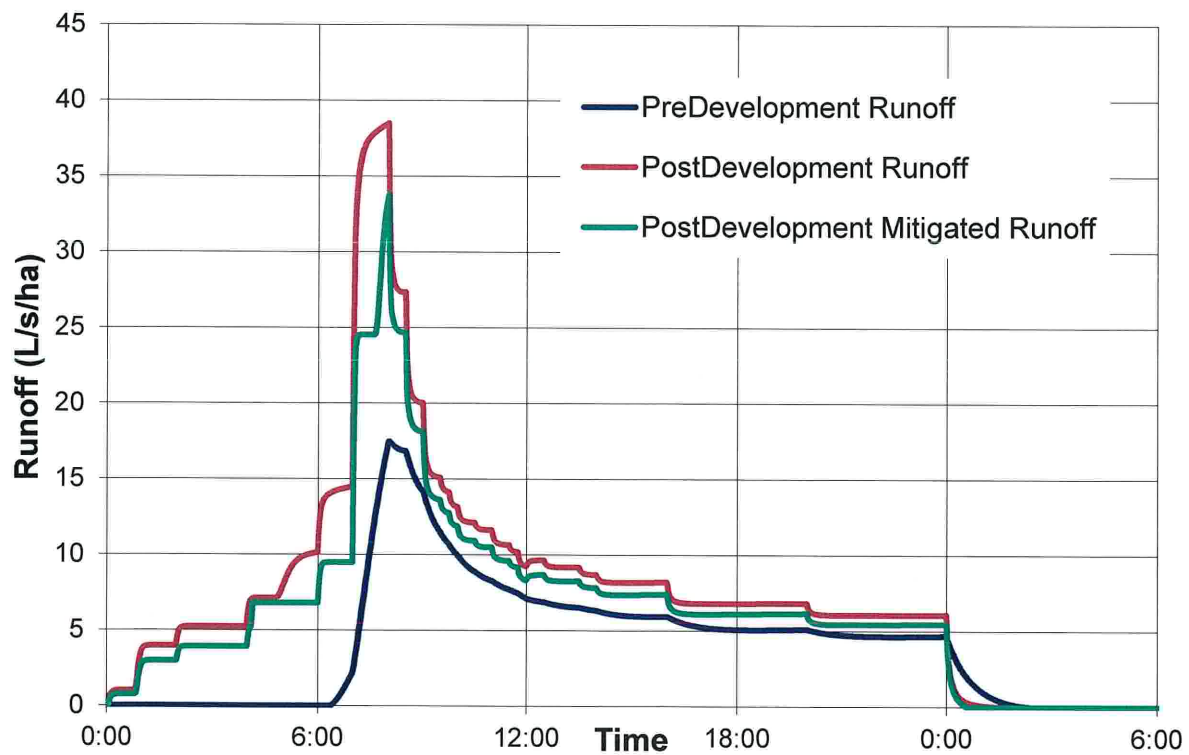


Figure 6 – LID Performance: 5YR Event

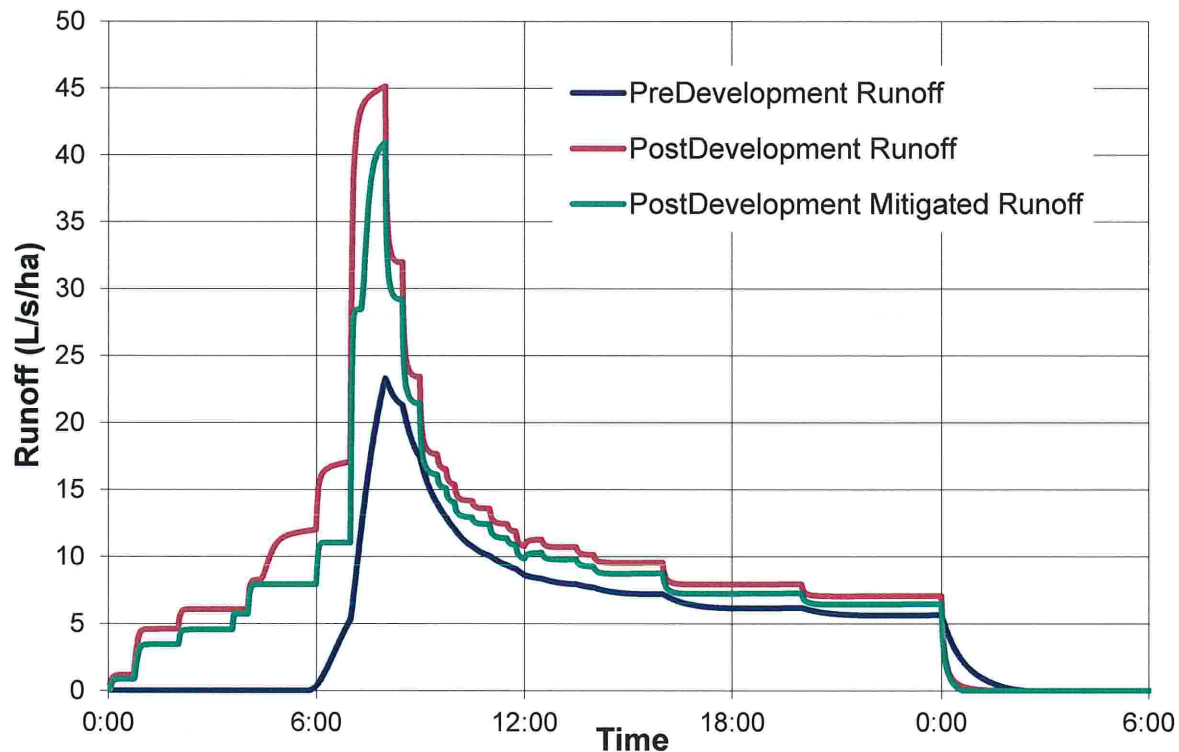


Figure 7 – LID Performance: 10YR Event

Table 5 below, compares pre- and post-development simulated runoff quantities for the site on a per hectare basis. The analyses show that with the use of LIDs as proposed herein, post-development runoff can be infiltrated, evapotranspired, detained and released at a reduced rate. Peak runoff in excess of pre-developed rates as well as increased post development runoff volume, will be attenuated by the downstream wetlands.

Runoff upto and including the 10 year peak flow will be conveyed by the minor system to the existing downstream Village infrastructure. Flows in excess of the 10 year peak will be conveyed via existing and proposed overland flood routing.

Table 5: Pre- and Post-Development Runoff Quantities per Hectare of Land

24-Hour Distribution	Total Precipitation (mm)	Existing		Post-Development (No LID)		Post-Development (With LID)	
		Total (m ³ /ha)	Peak (lps/ha)	Total (m ³ /ha)	Peak (lps/ha)	Total (m ³ /ha)	Peak (lps/ha)
MAR	48	120	3.2	380	5.3	270	4.5
2-Year	73	285	9.8	620	28.8	500	18.8
5-Year	95	445	17.5	830	38.5	700	33.8
10-Year	110	560	23.3	980	45.1	840	41.0



8.0 MAINTENANCE

The LID system will require regular maintenance. It is recommended that runoff is directed around infiltration galleries during civil and residential construction to avoid being clogged with silt laden runoff. Additionally, all private and municipal catchbasin sumps should be checked every six months for sediment/debris build-up and cleaned accordingly. This maintenance should be scheduled just before and just after the rainy season (September and April).

9.0 CONCLUSION

The proposed stormwater management system for Coal Valley Estates utilizes site specific Low Impact Development (LID) strategies including amended soil in all landscaped areas to reduce runoff, sumps to reduce Total Suspended Solids (TSS) and pollutant loading, and subsurface infiltration galleries to control peak runoff rates and runoff volumes. Performance targets have been set based on the water balance model and site constraints. Low Impact Development techniques have been sized on a per hectare basis. This will allow for a phased development approach of the 40 hectare parcel allowing the LIDs for each phase to be sized based on the recommendations of this report.

We conclude that all stormwater management goals for the site can be met through the use of the LIDs described in this document.

We trust this document is as required at this time. Should you wish to discuss the contents, please do not hesitate to contact the undersigned.

We certify this to be a report prepared by:

MCELHANNEY CONSULTING SERVICES LTD.



Chris Durupt, P.Eng.
Project Engineer

Reviewed by:
Bob Hudson, P.Eng.
Project Manager

Enclosures

CD/njg



Date: July 30, 2020

To: Dave Atkinson

From: Cindy Hannah, RPBio

RE: Coal Valley Remainder Development Permit Application and Riparian Areas Protection Regulation Changes

This letter has been written in response to a request from the Village of Cumberland to determine if the changes to the Riparian Areas Protection Regulation that came into effect in November 2019 affect the documents that were prepared for the Development Permit Application for the remainder of the Coal Valley property. The reports include the following:

- Coal Valley Remainder - Bio-Inventory Assessment 2018-06-24
- Coal Valley - Bio-Inventory Assessment – Field Survey Results 2019-10-23
- Coal Valley Estates Phase 9 to 12 Aquatic Ecosystems letter 2018-05-10

There were no changes to the assessment methodology, reporting requirements or review standards and therefore no changes to the above noted reports are needed.

A handwritten signature in black ink, appearing to read "C. Hannah", written over a horizontal line.

Cindy Hannah, RPBio
Strategic Natural Resource Consultants Inc.

