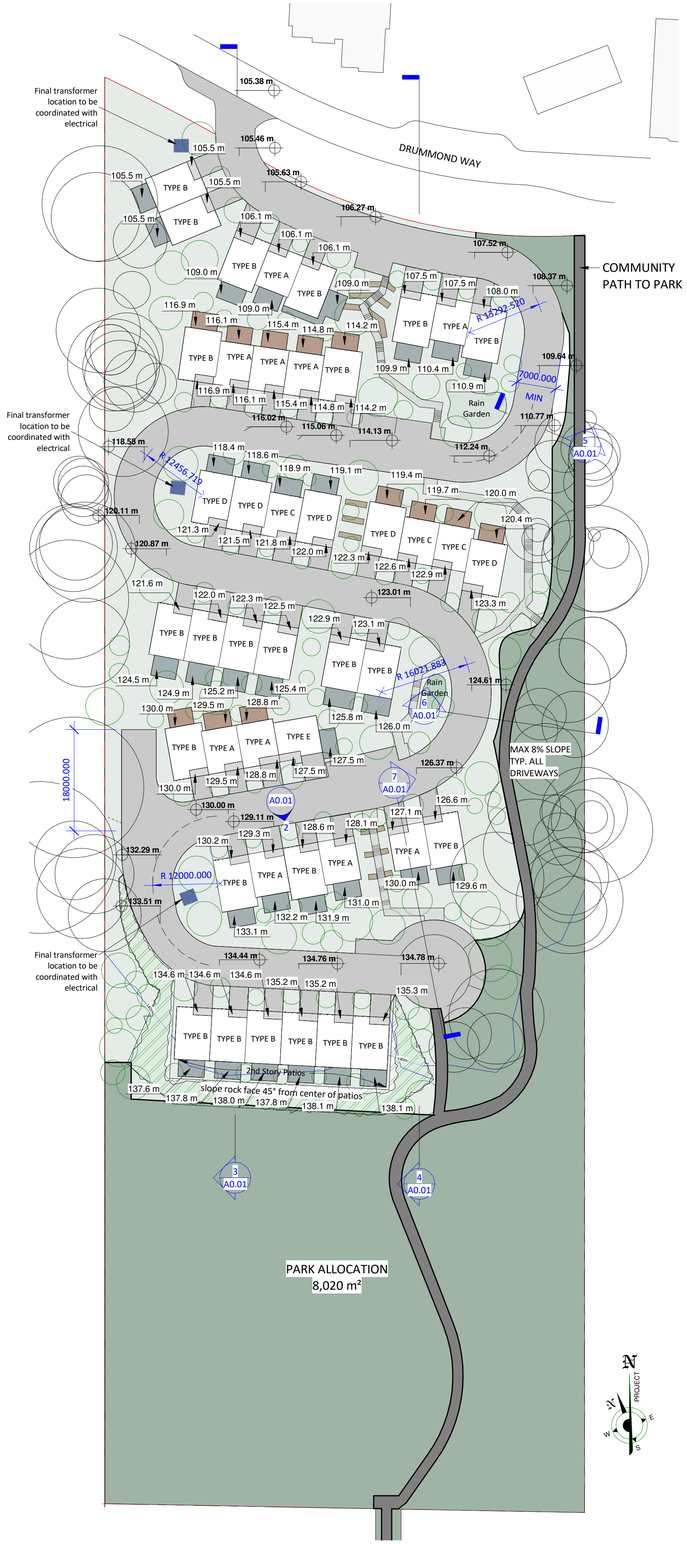


1 Site Plan - Current
1 : 500

PROJECT SUMMARY

AREAS

TOTAL SITE	20,054m2 (210,578 SQFT)
PARK DEDICATION - 40%	8,020m2 (86,295 SQFT)
DEVELOPED AREA - 60%	12,034m2 (129,485 SQFT)
BUILDING AREA	5668m2 (61010 SQFT)
FSR	0.28 TO 1

PROPOSED ZONING CLASSIFICATION

MULTIPLE FAMILY RESIDENTIAL (ATTACHED)
MAX BUILDING HEIGHT:10M (MEASURED FROM GROUND FLOOR OF DISTURBED LANDSCAPE)

REAR YARD SETBACK:	7.0 M
SIDE YARD SETBACK:	6.5 M
PARK ALLOTMENT SETBACK:	7.5 M

UNITS

TYPE A	1200 SQFT 3 STOREY	10
TYPE B	1500 SQFT 3 STORY	24
TYPE C	1200 SQFT 3 STOREY, MID-ENTRY	3
TYPE D	1500 SQFT 3 STOREY, MID-ENTRY	5
TYPE E	1200 SQFT 3 STOREY, ROTATED	1
	TOTAL:	**43**

PARKING

REQUIRED: Residential, multi-family (attached)

1.5 per dwelling unit plus 1 for each 100 m2 of building floor area exceeding 60 m2 times the number of dwelling units

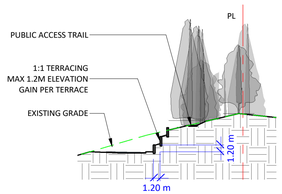
Number of Units	43
Building Area	5668m2
60m2 * 43	2580m2
Excess Area	3088m2
1.5 * 43	65 spots
3088 / 100	31 spots
TOTAL REQUIRED	96 spots

PROVIDED

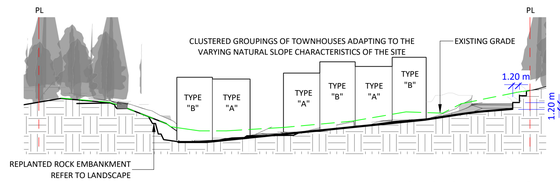
2 per unit (1 in garage, 1 on drive)	86 spots
Visitor	10 spots
TOTAL PROVIDED	96 spots

LEGEND

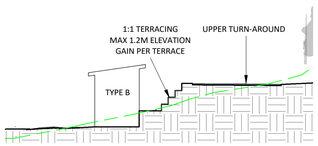
- STEPPED RETAINING WALLS-REFER TO LANDSCAPE
- RESTORED LANDSCAPE
- PARK
- PRIVATE OUTDOOR SPACE (15m2 TYP.)
- PRIVATE OUTDOOR DECK (15m2 TYP.)
- PUBLIC TRAIL
- INTER-RESIDENCE WALKWAY
- EXISTING GRADE LINE



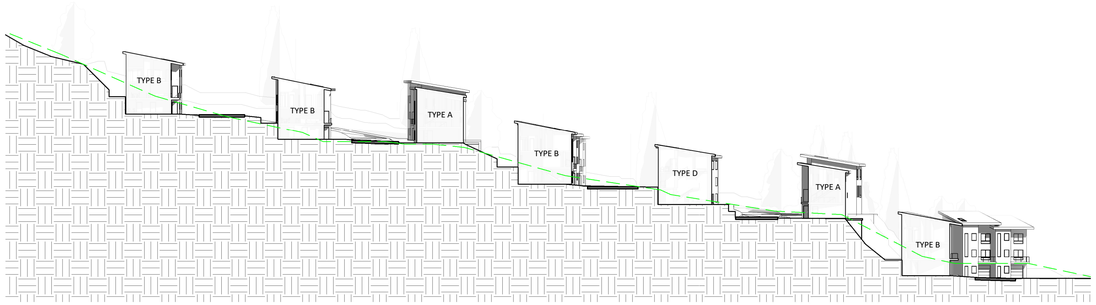
6 TYPICAL TERRACE SECTION
1 : 500



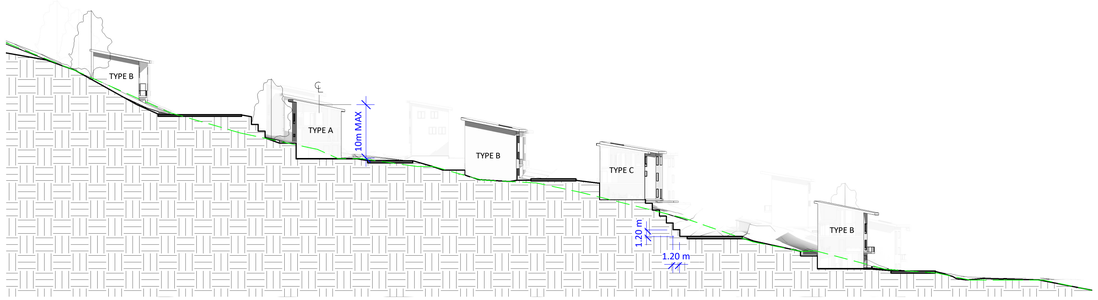
2 TYPICAL CLUSTER ELEVATION
1 : 500



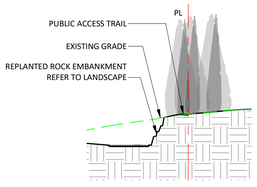
7 LAND TERRACING
1 : 500



3 Site Section 1a
1 : 500



4 Site Section 1b
1 : 500



5 TYPICAL ROCK EMBANKMENT SECTION
1 : 500

Christine Lintott Architects Inc.
Suite 1 - 864 Queens Avenue, Victoria, BC V8T 1M5
Telephone: 250.384.1969
www.lintottarchitect.ca

Issue	Date
ISSUED FOR	MONTH DD, YEAR
REZONING	JUNE 6, 2021

Revision

No.	Description	Date

Consultant

REGISTERED ARCHITECT CHRISTINE WEE LINTOTT PROVINCE OF BRITISH COLUMBIA

Drummond Townhouses

803 Drummond Way

SITE PLAN & PROJECT DATA

Date	2021-06-04 11:08:40 AM
Drawn by	WGM/JG
Checked by	Checker

A0.01

Scale: As indicated

RYZUK GEOTECHNICAL
Engineering & Materials Testing

6-40 Cadillac Ave, Victoria, BC, V8Z 1T2 Tel: 250-475-3131 E-mail: mail@ryzuk.com www.ryzuk.com

June 1, 2021
File No: 8883-1

Colwood Peak Homes Ltd.
#150 – 11120 Bridgeport Road
Richmond, BC
V6X 1T2

Attn: Hayley Zhang, Ph.D., Design Manager
By Email (c/o McElhanney): Dave Smith (dsmith@mcelhanney.com)
Dale Douglas (ddouglas@mcelhanney.com)

Re: Proposed Residential Development
Lot 9 Zapata Place/Drummond Way – Colwood, BC

As requested, we attended the referenced site on December 28, 2020, to visually assess the existing geotechnical conditions as such related to the proposed construction of a multi-family residential development. Significant portions of the property are steeper than 30% grade and therefore are designated as Development Permit Area (Natural Hazard DPA), within the City of Colwood Official Community Plan (OCP Bylaw 171). Accordingly, professional review of the proposed development is required to meet the intent of the Bylaw. Our associated observations, comments and recommendations for preliminary feasibility are contained herein. Our work has been undertaken in accordance with, and is subject to, the attached Terms of Engagement.

PROPOSED DEVELOPMENT

The site is a roughly rectangular, approximately 2 Ha lot extending south of Drummond Way towards the north side of Zapata Place. The site is bordered by single family residences to the south, undeveloped lots to the east and west, and Drummond Way to the north. Currently the site is undeveloped with vegetation and bedrock outcrops throughout. The site is forested with mature medium to large coniferous and deciduous trees. The topography of the site is sloping down towards the north with vertical relief of approximately 65 m. The site is characterized by moderate to steep slopes with benches and bluffs.

We have reviewed the provided conceptual plans by Christine Lintott Architects Inc. (attached drawing number drawing ASK-004, May 31, 2021) that indicates the locations of proposed buildings and infrastructure. We understand the proposed development will include construction of approximately 43 three storey townhouse units and the associated roadway, driveways, and

parking areas. The southern portion of the lot will be dedicated park. We anticipate the development will utilize traditional strip and pad footings and wood framed construction.

SURFACE AND SUBSURFACE CONDITIONS

The site topography slopes down towards the north with approximately 65 m of vertical relief. The slopes within the designated park area exhibit natural very steeply sloping bluffs and benches with an overall slope of approximately 40 degrees. In the area north of the park, the slopes decrease to approximately 20 degrees overall.

The site is generally considered to be bedrock controlled. Surface conditions were observed to comprise a veneer of topsoil and moss over talus, and bedrock outcrops were observed throughout most of the site. Mineral soils, where present, are likely to consist of dense sand and gravel, or glacial till. The bedrock was observed to be a massive to variably jointed basaltic formation inferred to be a part of the Metchosin Volcanics Complex.

Within the park area, local bedrock slopes were observed inclined near vertical with heights up to 5 m. Boulders approximately 0.3 m diameter were observed within approximately 10 m of the vertical rock exposures. Based on the topography downslope of the rock exposures, as well as distance to the proposed development areas, we do not consider there to be potential for rockfall runout to affect the proposed residences.

In general, we anticipate groundwater conditions will fluctuate seasonally and that the long term groundwater table is at depth and will not affect the proposed development. Seasonal seepage from shallow granular soils atop bedrock may be anticipated.

GEOTECHNICAL ASSESSMENT AND RECOMMENDATIONS

On the basis of our investigation, we do not anticipate any unique geotechnical issues relating to development as proposed at this site.

Excavation Considerations

Based on our review of the conceptual plans, we anticipate that the lowest floors will be partial walk-out basements and that excavation into the slope will be required, at a maximum of 3.0 m depth. Temporary rock cuts may be cut vertically. Blasting should be planned to minimize back break of the cutslopes (cushion blasting or pre-shear, etc.). Adverse joints/fractures may be present upon exposure and stabilization work consisting of rock bolts and/or shotcrete may be required to maintain temporary worker safety. To minimize the risk of destabilization, sloping cuts to 0.25H:1.0V could be carried out instead of vertical. All cutslopes should be thoroughly scaled under geotechnical supervision to remove loose materials prior to worker access. If local soils are encountered, the cutslope geometry would be determined based on the observed materials and conditions. According to WorkSafeBC guidelines, excavations deeper than 1.2 m

must be inspected and approved by a qualified geotechnical professional, unless sloped in accordance with the guidelines.

We recommend that any proposed permanent soil slopes be shaped at 2 Horizontal : 1 Vertical (2H:1V) or flatter, and benching and retaining walls may be required to accommodate grade differentials where there is insufficient space for slopes. Permanent rock cuts may be sloped at 1H:4V or flatter, and should be assessed by a geotechnical professional at the time of excavation. Local stabilization work and scaling should be anticipated.

Seismic Considerations

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

Based on our observations on site, we expect the V_s^{30} to vary depending on the subgrade material. For structural elements bearing directly on bedrock or on less than 3 m of engineered fill or stiff soil atop such, a Seismic Site Class of 'B' can be used. For foundations bearing atop greater than 3 m of sand and gravel or till, a Seismic Site Class of 'C' should be used. Based on the 2015 National Building Code Seismic Hazard Calculation, for a 2% probability of exceedance in 50 years, the Peak Ground Acceleration (PGA) and Spectral Acceleration Values for seismic site classes 'B' and 'C' are provided in Table 1.

Table 1: Summary of PGA and Spectral Acceleration Values (NBC 2015)

Period (sec)	0.2	0.5	1.0	2.0	5.0	10.0	PGA (g)	PGV (m/s)
Response (g) Site Class 'B'	1.02	0.77	0.44	0.26	0.08	0.03	0.74	0.54
Response (g) Site Class 'C'	1.32	1.18	0.70	0.42	0.13	0.04	0.59	0.85

Foundations

All building foundations should be extended to bear atop native undisturbed mineral soils, intact/fractured in-place bedrock, or approved engineered fill placed atop such. All subgrade should be inspected and approved a qualified geotechnical professional prior to placement of foundations or engineered fill. Foundation elements bearing on native soil, bedrock, or approved engineered fill placed atop such, can be dimensioned assuming bearing resistances of 150 kPa/225 kPa SLS/ULS for foundations on undisturbed native soil or engineered fills, while 2000 kPa/3000 kPa on bedrock is considered appropriate.

Where bedrock is sloping more steeply than 6H:1V, such will either need to be flattened and benched for footing support, or the footings will need to be doweled to bedrock.

We recommend minimum footing widths of 400 and 600 mm for strip and pad footings, respectively. For frost protection, the base of all footings should extend to a depth of at least 450 mm below adjacent finished grades.

Foundation Wall Backfill

Foundation walls should be backfilled with clean, well graded granular material, compacted in maximum 300 mm lifts to at least 95% of Standard Proctor Maximum Density. Where the grade elevation differs significantly between the two sides of a perimeter wall, and the wall is free to rotate in order to develop the active earth pressure state (rotation of 0.1% of the wall height, non rigid wall), the wall should be designed to resist a lateral earth pressure (due to granular backfill) similar in magnitude and distribution to that of a fluid having a unit weight of 6.3 kN/m^3. Where the wall cannot rotate (rigid wall), it should be designed to resist an at rest lateral earth pressure loading, similar in magnitude and distribution to that of a fluid having a unit weight of 8.6 kN/m^3. Equipment larger than a skidsteer should not be allowed within 1.5 m of the foundation walls during backfilling.

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

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

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

where:

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

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

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

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

Engineered Fill

Engineered fill, if required, should be place upon approved subgrade and should consist of approved select, well graded granular fill material. The fill should be placed and compacted in suitably thin lifts under the supervision of a geotechnical professional to a minimum of 95% of Standard Proctor Maximum Dry Density (SPMDD), or judged equivalent. The recommended lift thickness is dependent on both the type of material and the method of compaction (i.e. 300 mm thick lifts for 19 mm minus crushed rock fill compacted with a vibratory diesel plate compactor). Placement methodology should be confirmed by a geotechnical professional before commencing

Engineered fill should be placed to extend horizontally beyond the edge of the foundation by 1.0 m plus a distance equal to the depth of fill placed, unless suitable splay is present within approved native soils. In perimeter areas, it is inadvisable to have the fill splay extend beyond property lines, the footings may be required to be lowered or can utilize geosynthetic reinforced soil.

Foundation Drainage

Conventional perimeter foundation drainage consisting of perforated drain pipe surrounded by free draining granular material containing low fines, tied into the recommended free draining backfill material is recommended. To prevent the migration of fine-grained soil particles into the drainage system, a layer of medium weight, non-woven geotextile should be placed between the clean drain rock around the perforated pipe and the granular backfill material. The geotextile should encompass the entire drain rock/drain pipe system.

Retaining Wall Considerations

Retaining walls associated with the grading of the site will need to be designed by a qualified professional, if their height exceeds 1.2 m. Any walls shorter than 1.2 m are considered landscaping walls and do not need professional considerations. The subgrade should be assessed by a geotechnical professional prior to wall construction. If the wall is being construction on sloping rock, then additional considerations may be added for dowelling into the rock under the base of the wall.

Pavement Considerations

In areas of light traffic, 75 mm of asphalt over 250 mm of 19 mm minus crushed rock should be sufficient. For heavier traffic areas, we suggest 75 mm of asphalt over a minimum of 150 mm of 19 mm minus crushed rock above a further 150 mm of 75 mm minus crushed rock. Alternatively, 300 mm of 19 mm minus could be used provided it is low in fines and free draining.

Optimum water content of the replacement fill soils described above is critical to achieve good compaction. We suggest performing spot check in-situ density tests to ensure soils are compacting to 100 % of SPMDD below paved areas.

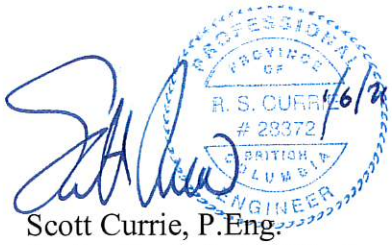
CLOSURE

In summary, we consider that the proposed development is feasible from a geotechnical perspective. Care will be required during excavation and blasting to limit disturbance to the surrounding residential areas in accordance with best practices for urban operations. Based on the above, and provided our recommendations are followed, we do not consider the site prone to slope instability and/or erosion hazard as noted within the City of Colwood's Official Community Plan (OCP). Therefore, we support a permit exemption regarding the site designation of Natural Hazard Development Permit Area to allow for the construction of the proposed residential development.

Based on the above, we consider the land may be safely used for the use intended, that being for development of a multi-unit townhouse residential development, in accordance with Section 56 of the Community Charter.

We hope the preceding is suitable for your purposes at present. If you have any questions with respect to the above, please contact us.

Yours very truly,
Ryzuk Geotechnical



McKenzie Douglas, EIT
Junior Engineer

Scott Currie, P.Eng.
Senior Geotechnical Engineer

Attachments – Terms of Engagement
– Christine Lintott Architects Inc., drawing ASK-004, May 31, 2021

RYZUK GEOTECHNICAL
ENGINEERING & MATERIALS TESTING

TERMS OF ENGAGEMENT

1. GENERAL

1.1. Ryzuk Geotechnical (the Consultant) shall render the Services, as specified in the agreed Scope of Services, to the Client for this Project in accordance with the following terms of engagement. The Services, and any other associated documents, records or data, shall be carried out and/or prepared in accordance with generally accepted engineering practices in the location where the Services were performed. No other warranty, expressed or implied, is made. The Consultant may, at its discretion and at any stage, engage sub-consultants to perform all or any part of the Services.

2. COMPENSATION

2.1. All charges will be payable in Canadian Dollars. Invoices will be due and payable by the Client on receipt of the invoice without hold back. Interest on overdue accounts is 24% per annum.

3. REPRESENTATIVES

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

4. TERMINATION

4.1. Either party may terminate this engagement without cause upon thirty (30) days' notice in writing. On termination by either party under this paragraph, the Client shall forthwith pay to the Consultant its Charges for the Services performed, including all expenses and other charges incurred by the Consultant for this Project.

4.2. If either party breaches this engagement, the non-defaulting party may terminate this engagement after giving seven (7) days' notice to remedy the breach. On termination by the Consultant under this paragraph, the Client shall forthwith pay to the Consultant its Charges for the Services performed to the date of termination, including all fees and charges for this Project.

5. ENVIRONMENTAL

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

6. PROFESSIONAL RESPONSIBILITY

6.1. In performing the Services, the Consultant will provide and exercise the standard of care, skill and diligence required by customarily accepted professional practices and procedures normally provided in the performance of the Services contemplated in this engagement at the time when and the location in which the Services were performed.

7. INSURANCE

7.1 Ryzuk Geotechnical is covered by Professional Indemnity Insurance as follows:

- 7.1.1 $ 3,000,000 each and every claim
- 7.1.2 $ 5,000,000 aggregate
- 7.1.3 $ 5,000,000 commercial/general liability coverage

7.2 Notwithstanding the provision of insurance coverage by the Client, the Engineer hereby agrees to indemnify and save harmless the Client, its successor(s), assign(s) and authorizes representative(s) and each of them from and against

losses, claims, damages, actions, and causes of action, (collectively referred to as "Claims") that the Client may sustain, incur, suffer or be put to at any time either before or after the expiration or termination of this Agreement, that arise out of errors, omissions or negligent acts of the Consultant or their Subconsultant(s), servant(s), agent(s) or employee(s) under this Agreement, excepting always that this indemnity does not apply to the extent, if any, to which the Claims are caused by errors, omissions or the negligent acts of the Client, its other consultant(s), assign(s) and authorized representative(s) or any other persons.

8. LIMITATION OF LIABILITY

8.1. The Consultant shall not be responsible for:
- 8.1.1. the failure of a contractor, retained by the Client, to perform the work required for the Project in accordance with the applicable contract documents;
- 8.1.2. the design of or defects in equipment supplied or provided by the Client for incorporation into the Project;
- 8.1.3. any cross-contamination resulting from subsurface investigations;
- 8.1.4. any Project decisions made by the Client if the decisions were made without the advice of the Consultant or contrary to or inconsistent with the Consultant's advice;
- 8.1.5. any consequential loss, injury or damages suffered by the Client, including but not limited to loss of use, earnings and business interruption;
- 8.1.6. the unauthorized distribution of any confidential document or report prepared by or on behalf of the consultant for the exclusive use of the Client
- 8.1.7. Subsurface structures and utilities

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

8.3. The total amount of all claims the Client may have against the Consultant or any present or former partner, executive officer, director, stockholder or employee thereof under this engagement, including but not limited to claims for negligence, negligent misrepresentation and breach of contract, shall be strictly limited to the amount of any professional liability insurance the Consultant may have available for such claims. Where the Consultant is a corporation or partnership, the Client and Consultants of the Client will limit any claim they may have to the corporation or partnership, without liability on the part of any officer, director, member, employee, or agent of such corporation or partnership.

8.4. No claim may be brought against the Consultant in contract or tort more than two (2) years after the date of discovery of such defect.

9. DOCUMENTS AND REPORTING

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

9.2. The documents have been prepared specifically for the Project, and are applicable only in the case where there has been no physical alteration to, or deviation from any of the information provided to the Consultant by the Client or agents of the Client. The Client may, in light of such alterations or deviations, request that the Consultant review and revise these documents.

9.3. The identification and classification as to the extent, properties or type of soils or other materials at the Project site has been based upon investigation and interpretation consistent with the accepted standard of care in the engineering consulting practice in the location where the Services were performed. Due to the nature of geotechnical engineering, there is an inherent risk that some conditions will not be detected at the Project site, and that actual subsurface conditions may vary considerably from investigation points. The Client must be aware of, and accept this risk, as must any other party making use of any documents prepared by the Consultant regarding the Project.

9.4. Any conclusions and recommendations provided within any document prepared by the Consultant for the Client has been based on the investigative information undertaken by the Consultant, and any additional information provided to the Consultant by the Client or agents of the Client. The Consultant accepts no responsibility for any associated deficiency or inaccuracy as the result of a miss-statement or receipt of fraudulent information.

10. JOBSITE SAFETY AND CONTROL

10.1. The Client acknowledges that control of the jobsite lies solely with the Client, his agents or contractors. The presence of the Consultant's personnel on the site does not relieve the Client, his agents or contractors from their responsibilities for site safety. Accordingly, the Client must endeavor to inform the Consultant of all hazardous or otherwise dangerous conditions at the Project site of which the Client is aware.

10.2. The client must acknowledge that during the course of a geotechnical investigation, it is possible that a previously unknown hazard may be discovered. In this event, the Client recognizes that such a hazard may result in the necessity to undertake procedures which ensure the safety and protection of personnel and/or the environment. The Client shall be responsible for payment of any additional expenses incurred as a result of such discoveries, and recognizes that under certain circumstances, discovery of hazardous conditions or elements requires that regulatory agencies must be informed. The Client shall not bring about any action or dispute against the Consultant as a result of such notification.

11. FIELD SERVICES

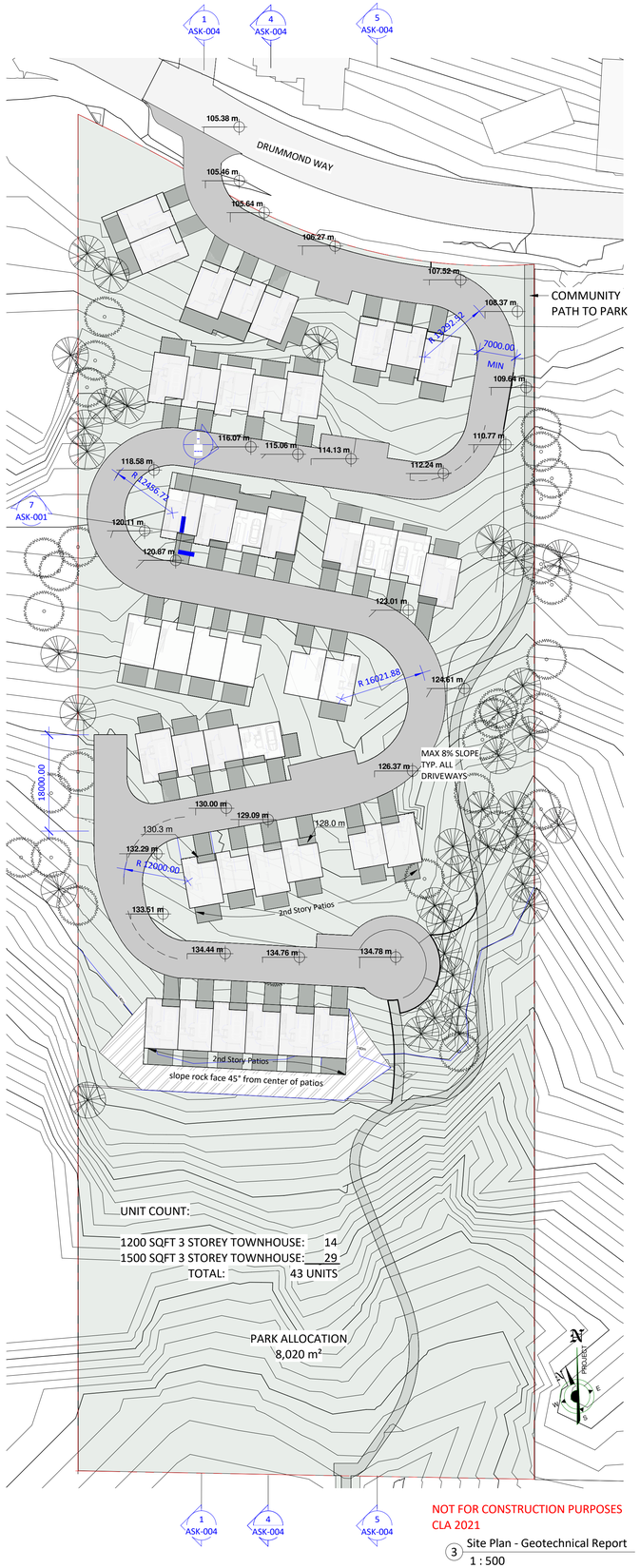
11.1. Where applicable, field services recommended for the Project are the minimum necessary, in the sole discretion of the Consultant, to observe whether the work or a contractor retained by the Client is being carried out in general conformity with the intent of the Services. Any reduction from the level of services recommended will result in the Consultant providing qualified certifications for the work.

12. DISPUTE RESOLUTION

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

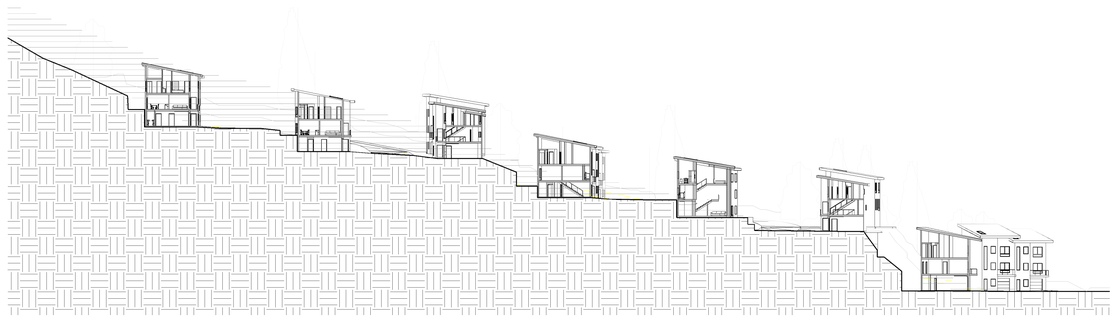
13. CONFIDENTIALITY

During the period of this Agreement, the Consultant shall not use or disclose any Confidential Information to any third parties. The Consultant will only use Confidential Information for the sole purpose of carrying out the service(s) agreed upon. Access to the Client's Confidential Information will be restricted to employees who need the information to perform work duties. The Consultant may share photos of the project without disclosing any information not already made public unless the Client refuses consent of photos shared on social media. Unless already made public, the Consultant will not share owner or site address information on social media or with outside parties.



NOT FOR CONSTRUCTION PURPOSES
CLA 2021

3 Site Plan - Geotechnical Report
1 : 500



1 Section 1.0_GEOTECHNICAL
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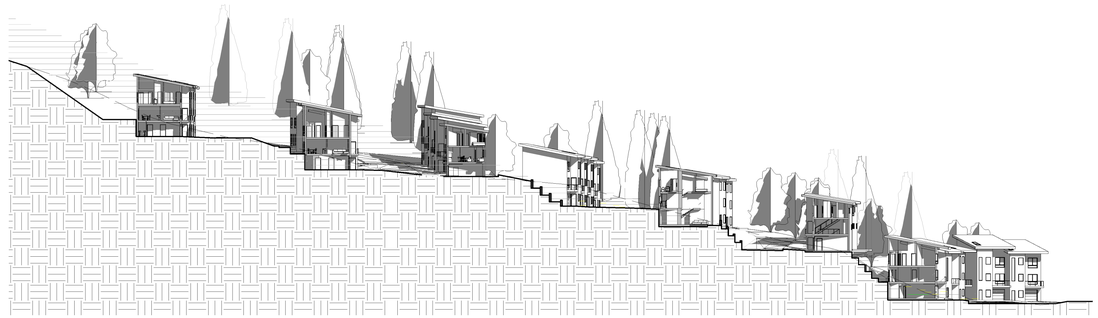

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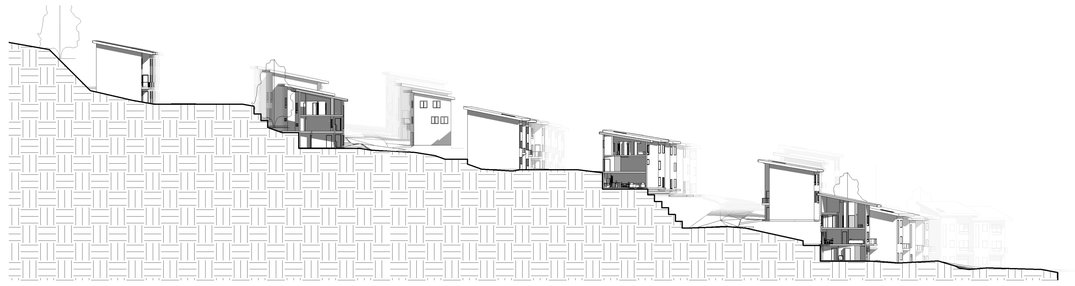

5 Section 1.3_GEOTECHNICAL
1 : 500

Christine Lintott Architects Inc.

Suite 1 - 864 Queens Avenue, Victoria, BC V8T 1M5
Telephone: 250.384.1969
www.lintottarchitect.ca

Issue	Date
ISSUED FOR	MONTH DD, YEAR
Review	21-04-29

Revision

No.	Description	Date

Consultant

Drummond Townhouses

803 Drummond Way

Site Plan & Site Sections

Date	2021-05-31 12:33:25 PM
Drawn by	Author
Checked by	Checker

ASK-004

Scale 1 : 500

May 2021

Prepared for
Colwood Peak Homes Ltd.
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Environmental Assessment (EA) for the Drummond Way Land Use Approvals Project, Colwood, BC

Prepared by

McElhanney

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Executive Summary

McElhanney Ltd. (McElhanney) was commissioned by Colwood Peak Homes Ltd. (the Client or CPHL) to prepare an Environmental Assessment (EA) for the proposed residential development referred to as the Drummond Way Land Use Approval Project located on Drummond Way in Colwood, BC. This report provides a summary of McElhanney's findings and recommendations regarding Environmentally Valuable Resources (EVRs) in and around the Site (also referred to as the study area).

This EA was completed with information obtained from desktop studies and data collected from four site visits completed on May 23, 2018, June 13, 2018, November 9, 2020, and November 12, 2020. This EA was conducted to identify the presence of EVRs that may be potentially impacted during the project. The objective of this report was to provide environmental information and recommend mitigative strategies for the proposed project activities as well as identify the preferred area for an environmental reserve which comprises 40% of the development.

The Site was evaluated for potential terrestrial and aquatic habitat and habitat suitability for plants, animals, amphibians, and fish. Wildlife use was noted through visual evidence on Site including habitat use.

Several EVRs were identified during this assessment. Suitable habitat for a variety of wildlife including large and small mammals, birds, and reptiles was identified. The following summarizes key EVRs in the study area:

- Native vegetation and terrestrial ecosystems were identified including the following provincially red listed vegetation communities:
    - Douglas-fir - Arbutus (*Pseudotsuga menziesii / Arbutus menziesii*)
    - Garry oak / Arbutus (rock outcrops) (*Quercuse garryana / Arbutus menziesii*)
    - Douglas-fir / dull Oregon-grape (*Pseudotsuga menziesii / Mahonia nervosa*)
- The ecosystems and habitats observed in the study area were considered likely to contain rare vascular plants, and were confirmed to contain fern leaved desert parsley (*Lomatium dissectum dissectum*) and slimleaf onion (*Allium amplectens*);
- The study area contained high quality habitat features for birds, including passerines, and raptors such as hawks, owls, and eagles.

Without the implementation of appropriate Best Management Practices (BMPs), potential impacts may occur during construction of the project which include but are not limited to the following:

- Loss of a portion of the at-risk ecosystems identified on the Site.
- Habitat removal and noise disturbance associated with vegetation clearing, blasting, excavating and recontouring of land during construction works.
- Degradation of nearby sensitive habitat and areas to be retained as an Environmental Reserve related to the potential introduction of invasive species with construction disturbance.

The development will be conducted with site adaptive planning principals. The environmental professional will work closely with the design and construction teams to protect the natural environment to be retained adjacent to the developable area. Following the finalization of design details, specific mitigation strategies

and environmental management should be planned prior to the commencement of construction activities and implemented as appropriate through the completion of a Construction Environmental Management Plan to be developed by the contractor retained to complete the project.

Compliance to the following legislation is recommended:

- The BC *Weed Control Act (BC 1996b)* with respect to noxious weeds on or adjacent to the Site,
- The *Wildlife Act (BC 1996a)* and the *Migratory Birds Convention Act (Canada 1994)* with respect to mitigating impacts on breeding birds, and

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List of Acronyms

BC	British Columbia
BGC	Biogeoclimatic Zone
BMPs	Best Management Practices
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CDC	Conservation Data Centre (BC)
CDF	Coastal Douglas Fir
CDFmm	Coastal Douglas Fir moist maritime (biogeoclimatic zone)
CRD	Capital Regional District
DFO	Fisheries and Oceans Canada
EA	Environmental Assessment
EIA	Environmental Impact Assessment
ENV	Ministry of Environment and Climate Change Strategy
ESC	Erosion and Sediment Control
EVR	Environmentally Valuable Resources
FLNRORD	Ministry of Forest, Lands, and Natural Resource Operations & Rural Development
GOERT	Garry Oak Ecosystems Recovery Team
GPS	Global Positioning System
masl	Meters Above Sea Level
MBCA	Migratory Bird Convention Act
MOE	Ministry of Environment (BC)
OCP	Official Community Plan
QEP	Qualified Environmental Professional

QP	Qualified Professionals
SARA	Species at Risk Act
SCCP	South Coast Conservation Program
RAPR	Riparian Areas Protection Regulation
WSA	Water Sustainability Act

1. Introduction

McElhanney Ltd. (McElhanney) was commissioned by Colwood Peak Homes Ltd. (the Client or CPHL) to prepare an Environmental Assessment (EA) for the Drummond Way Land Use Approval Project (the Project). The land use approvals are for a proposed residential development located along Drummond Way in Colwood, BC (*Figures 1 & 2*) herein referred to as "the Site". This report provides a summary of McElhanney's findings related to Environmentally Valuable Resources (EVRs) identified in and around the Site and provides recommendations on how to reduce impacts to EVRs where feasible.

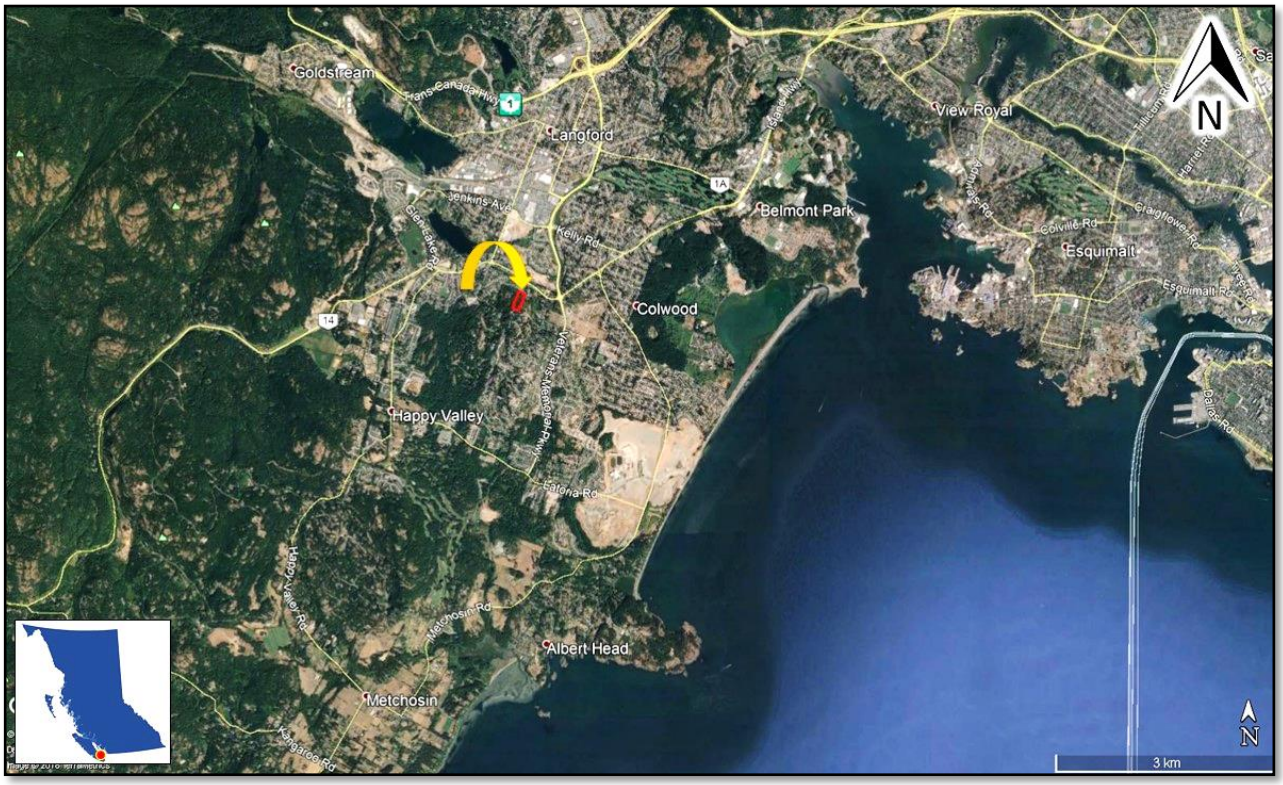


Figure 1. The general location of the Site (yellow arrow) located in Colwood, BC (Image courtesy of Google Earth, 2016).

Figure 2. The proposed development Site along Drummond Way (red outline) and the study area (white dashed line) approximately 100 m on either side of alignment (image courtesy of the Google Earth).

1.1 BACKGROUND INFORMATION

Environmental services were needed to assist the client's design team with planning a residential development with the inclusion of 40% of the parcel to be dedicated to the City of Colwood (the City) as park. The results of this assessment will recommend a general location for the portion of natural environment to be retained.

In 2011, an Environmental Impact Assessment (EIA) was completed by others at the Site for a previously proposed development. This 2011 report identified that the Site was located in the City's Official Community Plan's (OCP) Development Permit Area (DPA) for Sensitive Ecosystems and Hazardous Conditions. The EIA identified a provincially listed vascular plant species (slim-leaf onion [*Allium amplectens*]), a blue-listed bird species (the olive-sided flycatcher [*Contopus cooperi*]) and two red-listed plant communities (Douglas fir [*Pseudotsuga menziesii*]/arbutus [*Arbutus menziesii*] and Douglas fir/Oregon-grape [*Mahonia nervosa*]) on the Site. The report made recommendations to reduce the environmental impact and conserve portions of the environmentally sensitive areas on the Site.

While updating this EA, McElhanney reviewed the most current version of the OCP adopted in 2018. The Site is located in the following Environmental Development Permit Areas (EDPAs):

- Hillside (Colwood 2018)
- Natural Hazards - Steeply Sloped Areas (>30%) (Colwood 2018)
- Sensitive Ecosystem Protection (as defined in Section 19.1 of the OCP [Colwood 2018])

The City's key objectives for EDPAs is to promote site adaptive planning to protect ecological features, protect biological diversity, wildlife and wildlife habitats, habitat features and ecosystem functions. For the Hillside EDPA, the conservation of unique natural features such as rocky outcrops and matures trees and vegetation are a key priority. This EDPA outlines the priority to minimize blasting and re-contouring of hillsides (Colwood 2018). The Steeply Sloped Areas are a Natural Hazard EDPA and erosion, or unstable hazardous areas are a consideration for development. As per the OCP, the development of land with slopes greater than 30% must be avoided unless it can be demonstrated that the proposed development will not create geotechnical, ecological or visual impacts, can be sensitively integrated with terrain, and presents no hazards to people or property. A setback of a minimum of 10 m from the top or base of any steep slope is required except as otherwise recommended by a geotechnical professional.

The Sensitive Ecosystems EDPA encourages the protection of rare and endangered species and their habitats, and rare ecosystems. Protection of biodiversity and ecosystems that are resilient is also a key objective under this EDPA (Colwood 2018). The City supports cluster development and alternative design strategies that can afford a greater environmental protection while still achieving community planning objectives.

This EA will facilitate site planning with consideration of the environmental sensitivities identified on the Site. This EA will be used to inform the design team and facilitate site adaptive planning. Adaptive planning will support appropriate siting for the park area and infrastructure to reduce impacts to EVRs before they occur. Municipal, provincial, and federal legislation that may be applicable to the proposed development of the Site will be identified.

1.1.1 Previous Investigations

ENKON Environmental Ltd. (ENKON) completed an EIA in June of 2011 for the Site for Selah Developments Inc. This EIA was completed for a formerly proposed residential development which would have consisted of 20 single family homes. This proposed development was abandoned and the residential built form for the Site has changed under this current proposal.

Since the original EIA, the City has amended the OCP, and various provincial regulations have been also amended. The Site has remained undeveloped since 2011 and much of the background information is still relevant to the Site. McElhanney completed another investigation in 2018 which reviewed the most current site conditions and database information. Observations and conclusions from the ENKON report are referenced throughout this EA where applicable.

1.2 SCOPE OF WORK

McElhanney's initially completed an EA for the Site in 2018, following that the development went on hold temporarily. The project recommenced in late 2020 and a new conceptual scheme was developed. Additional site visits were conducted to review a drainage feature during the rainy season as well as to assess the current condition of the Site. The EA has been revised to reflect the current conditions, regulations, and the new conceptual development plan. The scope of work included the following:

- Conduct desktop and a field investigation within and around the Site to assess and inventory:
  - Terrestrial vegetation resources,
  - Aquatic resources (watercourses and drainage),
  - Wildlife and wildlife habitat features including wildlife trees, and
  - Presence/habitat of endangered, threatened, or vulnerable species at risk provincially or federally.
- Conduct a field reconnaissance to review the conditions on Site and assess the potential impacts of the project on the EVRs identified in the study area.
- A summary report is to be provided:
  - Outlining the findings of the investigation,
  - Map known and potential EVRs on a site plan, identifying areas where follow-up information may be required (i.e. the requirement for site inspections to be repeated during different seasons),
  - Identifying potential environmental impacts in relation to current development plans,
  - Outlining recommendations to mitigate the environmental impacts before, during and after development, and
  - Identifying any relevant permitting processes that may be required for the successful completion of the project.

1.3 REGULATORY AND POLICY SETTING

1.3.1 Municipal Legislation

The study area is in the City of Colwood within the Capital Regional District (CRD). Bylaw No. 1700 is the City of Colwood – Official Community Plan (OCP) (Colwood 2018). The Site lies within the Hillside & Natural Hazards (steeply sloped areas >30%) EDPA and the Sensitive Ecosystem EDPA. Previous versions of the OCP had mapped sensitive woodlands on this Site including Garry Oak and associated ecosystems. Rocky outcroppings are also found throughout the Site which are defined under the OCP as a sensitive ecosystem. Grading or alteration of rocky outcrops must be avoided as per the OCP.

1.3.2 Provincial Legislation

Wildlife Act

The provincial *Wildlife Act* (BC 1996a), Section 34, protects birds and their nests during the bird breeding season as well as the nests, nest trees and eggs of certain species all year. The provincial *Wildlife Act* Designation and Exemption Regulation (BC 2014), which indicates exemptions from permitting required under the *Wildlife Act* for nuisance wildlife. Blue heron (*Ardea herodias*) and raptors, particularly Bald Eagles (*Haliaeetus leucocephalus*) and Osprey (*Pandion haliaetus*), require large nest trees near coastal water bodies (BC 2003). Suitable habitat for such nests is available at the Site and in the surrounding area. Project works will need to ensure that appropriate buffers are kept around any raptor's nests identified to ensure compliance with the *Wildlife Act*.

1.3.3 Federal Legislation

Species at Risk Act (SARA)

Federal lands are subject to the protection of species listed under Schedule 1 of SARA as extirpated, endangered, or threatened (Canada 2002). It is an offence to kill, harm, harass, capture, or take an individual, and that species has legal protection related to the species' residence and critical habitat as specified in SARA.

Migratory Birds Convention Act

The *Migratory Birds Convention Act (MBCA)* (Canada 1994) prohibits the disturbance, destruction, or possession of migratory birds, their nests, or eggs. Also, migratory bird habitat is protected under the *MBCA* which prohibits the deposit of oil, oily waters, or other substances harmful to migratory birds in any areas that they frequent.

2. Methodology

Data was collected through a desktop review of Federal, Provincial, and regional databases to identify any known environmentally sensitive elements in the area. A literature review of previous reporting was conducted, and relevant background information obtained. Several site visits were conducted to assess the site during various seasons. The first was done on May 23, 2018 during the spring flowering season to study vegetation and wildlife. A follow up site visit was completed on June 13, 2018 on the southern portion of the Site only to review the rocky outcrops and sensitive terrestrial ecosystems at the southern boundary of the Site. A third site visit was completed on November 9, 2020 to show the design team the previously identified EVRs on the site to support adaptive planning. A fourth site visit was completed on November 12, 2020 to confirm that the defined drainage channel located on the developable portion of the site was manmade. The information described herein was supplemented through a detailed desktop assessment.

A hand -held Garmin GPS was used to assist in mapping the locations of sensitive features observed on site.

2.1 VEGETATION RESOURCES

Vegetation resources were assessed through a Site visit and a review of provincial and federal web-based databases including the following:

- Biogeoclimatic Ecosystem Classification Subzone/Variant Map for the South Island Resource Forest District (FLRNO 2016),
- A Field Guide to Site Identification and Interpretation for the Vancouver Forest Region (Green and Klinka 1994),
- CRD Regional map (interactive webmap used with permission from the CRD) (CRD 2018),
- BC Conservation Data Centre (CDC 2018) database of provincially listed plant species including information from the federal *Species at Risk Act* (Canada 2002) and the Committee on the Status of Endangered Wildlife in Canada [COSEWIC],
- BC Species and Ecosystems Explorer (CDC 2018),
- E-Flora BC: Electronic Atlas of the Plants of British Columbia (E-Flora BC 2018),
- Non-native invasive plant species (as listed in the *Weed Control Act* (BC 1996a),
- Provincially-listed ecological communities at risk (as defined in the BC Species and Ecosystem Explorer) (CDC 2018), and
- Presence of wildlife trees supporting Bald Eagles or Osprey nests (WiTS 2018).

Queries were conducted within the BC CDC Species and Ecosystems Explorer (2018) and iMapBC 2.0 (iMapBC 2018) databases for known at risk ecological communities, vascular plant and non-vascular plant species associated with the Coastal Douglas Fir (CDF) biogeoclimatic zone (BGC).

2.1.1 Listed Species / Ecosystem Designations

The CDC compiles and maintains information on wildlife and plant populations in BC. As part of this system, the CDC assigns a provincial rank or listing that ascribes to each species a ‘red’, ‘blue’ or ‘yellow’ designation based on its population status within BC (CDC 2018). The rankings, described below, highlight the wildlife and plant species as well as natural plant communities that are at risk:

- Red – any indigenous species, subspecies or ecological community that is extirpated, endangered, or threatened in BC.
- Blue – any indigenous species, subspecies or ecological community considered to be vulnerable or of special concern in BC. Blue listed elements are at risk, but are not extirpated, endangered, or threatened.
- Yellow – any indigenous species, subspecies or ecological communities that are apparently secure and not at risk.

These designations were used in this report to indicate the status of species and ecosystems observed relative to the provincial and federal listings of species at risk.

2.2 TERRESTRIAL WILDLIFE RESOURCES

The web-based databases considered in the assessment of wildlife use of the area and wildlife habitat include the following:

- CDC database of provincially listed wildlife species (CDC 2018), as well as species listed under the federal *Species at Risk Act* (Canada 2002) and COSEWIC.
- BC Habitat Wizard (BC 2018a).
- BC Species and Ecosystems Explorer (CDC 2018).
- E-Fauna BC: Electronic Atlas of the Wildlife of British Columbia (E-Fauna BC 2018).

The study area was reviewed for incidental observations relating to evidence of wildlife including nests, scat, tracks, and burrows during the site visits. Wildlife habitat conditions were supplemented with information obtained in a literature review for species typical in the CDF BGC zone. This information, in combination with the photograph log of the Site was reviewed to define an overview of potential habitat suitability, wildlife movement, and/or level of disturbance.

2.2.1 Species at Risk

The BC Species and Ecosystems Explorer database was accessed to determine vertebrate and invertebrate at risk species in the South Island Forest District. Habitat preferences were noted for each listed species within the South Island Forest District (E-Fauna BC 2018, iMapBC 2018).

COSEWIC was established under Section 14 of the federal *Species at Risk Act* (*SARA)* (Canada 2002). COSEWIC is a committee that assesses and designates which wild species of animal, plant, or other organisms are at risk of loss from the wild in Canada. Below is a listing of the federal status categories used by COSEWIC and *SARA* to rank or list a species:

- Endangered – a species facing imminent extirpation or extinction.
- Threatened – a species likely to become endangered if limiting factors are not reversed.
- Special Concern – a species that is particularly sensitive to human activities or natural events but is not endangered or threatened.
- Data Deficient – a species for which there is insufficient scientific information to support status designation.
- Not at Risk – a species that has been evaluated and found not to be at risk.
- Extirpated – a species that no longer exists in the wild in Canada but occurring elsewhere in the world.

Federally listed species and their critical habitats are protected under *SARA.* The above designations used in this report indicate the status of wildlife species potentially present as per the provincial and federal listings of species at risk.

3. Environmental Setting

3.1 CLIMATE AND RAINFALL

Climatic conditions at the Site were inferred based on data provided by Environment Canada (Canada 2018), Canadian Climate Normals 1981-2010. Recorded climate conditions for the Colwood Hatley Drive station for precipitation and the Victoria Highland station for temperatures were considered representative of the Site based on their proximity to that station.

Mean daily temperatures by month recorded between 1981 and 2010 ranged between 3.0 degrees Celsius (°C) in December to 17.4 °C in July. Annual precipitation was 1026.5 mm with monthly average lows of 19.2 mm in July and highs of 205.0 mm in November.

3.2 SOIL REPORTS

Soil maps published by the Province of BC (BC 1985) and the corresponding soil survey report (*MOE Technical Report 17: Soil of Southern Vancouver Island Report No. 44 and map sheet 1)* were reviewed to determine soil types at the Site. Soil identified at the Site was classified as Snuggery Soil Association. General characteristics of this soil type and soil descriptions for the Site are presented in *Table 1*. The soil classification map is provided in *Appendix A*. This information was crossed referenced with the BC Soil Information Finder Tool (SIFT) which confirmed the information in the below table.

Table 1. Summary of Soil Types Identified at the Site

Soil Name	Parent Material	Texture	Comment
Ragbark	Colluvium	Gravelly sandy loam	• Stony soils on steep slopes • Rapidly drained • Orthic Dystric Brunisol – shallow lithic (O.DYB-shli)
Rock Outcrop	Bedrock	-	• Bedrock within 10 cm of the surface
Somenos	Moraine	Gravelly sandy loam	• Moderately to strongly cemented pans • Well drained • Duric Dystic Brunisol (DU.DYB)

3.3 TOPOGRAPHY

The Site is located on Triangular Hill and the southern extent on the Site is near the summit of the hill. The lot is sloped steeply from south to north. The southern extent of the Site is 170 meters above sea level (masl) and the northern extent along Drummond Way is 106 masl. There are several areas that have sheer and cliff like surfaces where the rock outcrops are located. An ephemeral drainage channel is located in an incised

channel that begins near the southeast corner of the Site. A topographic map was obtained from the CRD webmap viewer (CRD 2018) (*Appendix B*).

4. Results

4.1 VEGETATION RESOURCES

The Site is located within the Coastal Douglas Fir (CDFmm) Moist Maritime Biogeoclimatic subzone (*Figure 3*) (Green and Klinka 1994). Typical vegetation in the CDFmm subzone are forests dominated by Douglas fir (*Pseudotsuga menziesii)*, as well as Grand fir (*Abies grandis*) and Western redcedar (*Thuja plicata*). The understory is typically dominated by salal (*Gaultheria shallon*), dull Oregon-grape (*Mahonia nervosa*), ocean-spray (*Holodiscus discolor*), and Oregon beaked moss (*Eurhynchium oreganum*). Vegetation species typical of the CDFmm were present on the Site. Within the Site there were distinct vegetation zones described in more detail below.

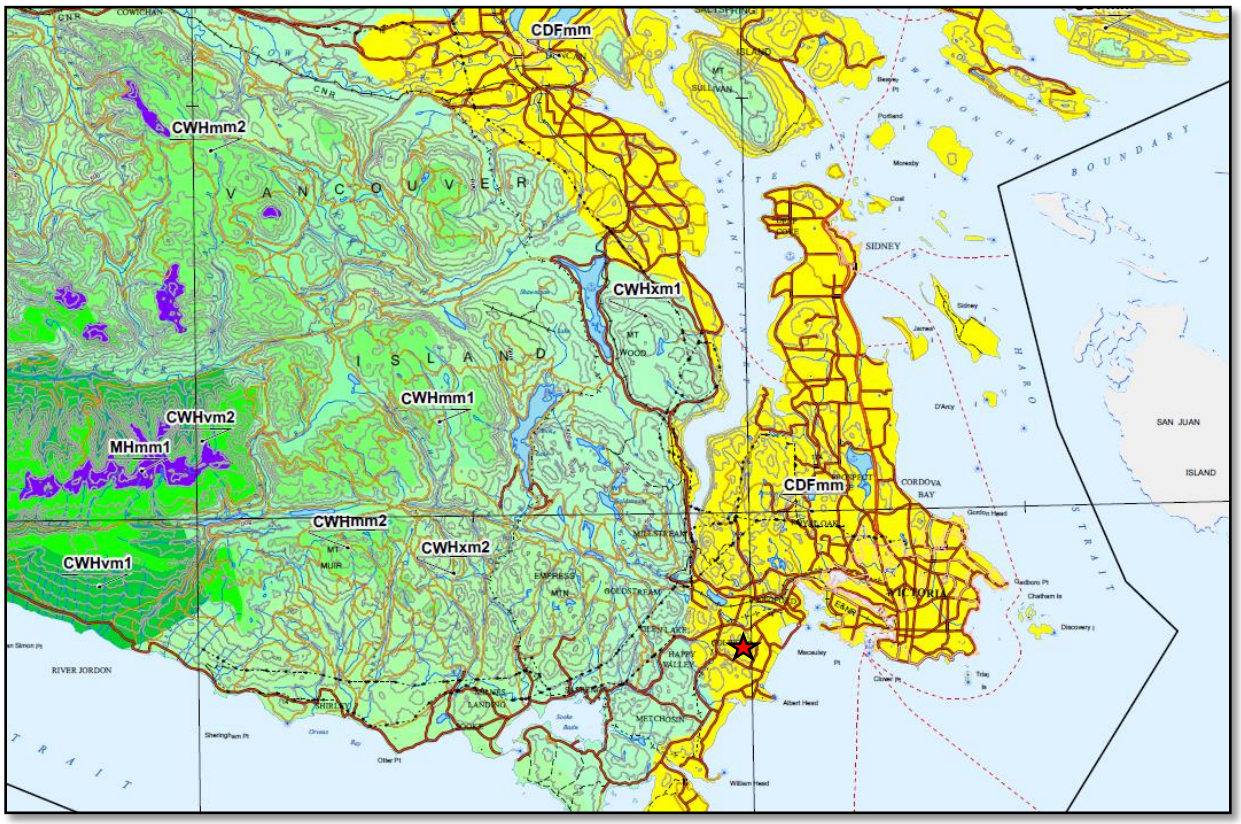


Figure 3. Excerpt from map of biogeoclimatic zones on southern Vancouver Island, red star indicates Site location (BC 2016).

The Site has a mosaic of vegetation communities that can be found within the CDFmm zone and includes:

- The Provincially red-listed Douglas-fir - Arbutus (*Pseudotsuga menziesii / Arbutus menziesii*) in the drier upslope woodlands
- The Provincially red-listed Garry oak / Arbutus (rock outcrops) (*Quercus garryana / Arbutus menziesii*)
- The Provincially red-listed Douglas-fir / dull Oregon-grape (*Pseudotsuga menziesii / Mahonia nervosa*) in the mid-slope mesic secondary growth woodlands

Several qualitative vegetation surveys were conducted throughout the Site to verify the species composition at the various vegetation communities that were previously identified in the ENKON report (*Figure 4*). The coastal variety of Douglas-fir was the most common species in forested areas on the Site. Some areas of the Site were disturbed and there was evidence of historic logging, which will be discussed further in Section 4.5.

Some modifications were made to the initial vegetation community mapping in the ENKON report (*Appendix C*) as shown below in *Figure 5*. Changes to vegetation mapping primarily occurred on the lower slope position of the Site. The rationale for the changes is based on new disturbance as well as the likelihood that vegetation survey point locations may have differed from those of the previous assessment.

Table 2 indicates vegetation species that were observed during the May 2018 site visit as well as reported in ENKONs 2011 data. The Site has a high diversity of native vegetation with over 80 species identified. The species identified at each vegetation survey point are summarized in *Appendix D.*

Table 2. Notable Plant Species Observed during the Site Visit in May 2018.

Common Name	Scientific Name	Type of Plant	McElhanney 2018	ENKON 2011
Alaska oniongrass	*Melica subulata*	Graminoid		X
American vetch	*Vicia americana*	Herbaceous	X	
Arbutus	*Arbutus menziesii*	Evergreen tree	X	X
Baldhip rose	*Rosa gymnocarpa*	Shrub	X	X
Bigleaf maple	*Acer macrophyllum*	Deciduous tree	X	X
Big-leaved sandwort	*Moehringia macrophylla*	Herbaceous		X
Bitter cherry	*Prunus emarginata*	Deciduous tree		X
Blue wildrye	*Elymus glaucus*	Graminoid	X	X
Bracken fern	*Pteridium aquilinum*	Fern	X	X
Broad-leaved shooting-star	*Dodecatheon hendersonii*	Herbaceous	X	X
Broad-leaved starflower	*Trientalis latifolia*	Herbaceous	X	
Broad-leaved stonecrop	*Broad-leaved stonecrop*	Herbaceous	X	X
**Bull thistle	*Cirsium vulgare*	Herbaceous		X
**Canadian thistle	*Cirsium arvense*	Herbaceous	X	
California brome	*Bromus carinatus*	Graminoid		X
Cascara	*Rhamnus purshiana*	Deciduous tree		X
Chickweed monkeyflower	*Mimulus alsinoides*	Herbaceous	X	X
Chocolate lily	*Fritillaria lanceolata*	Herbaceous	X	
Cladonia	*Cladonia spp*	Lichen		X

Common Name	Scientific Name	Type of Plant	McElhanney 2018	ENKON 2011
Cleavers (Scratch bedstraw)	*Galium aparine*	Herbaceous	X	X
Common camas	*Camassia quamash*	Herbaceous	X	X
Common forget-me-not	*Myosotis discolor*	Herbaceous		X
Common horsetail	*Equisetum arvense*	Herbaceous	X	
Common rush	*Juncus effusus*	Rush	X	
Common yarrow	*Achillea millefolium*	Herbaceous	X	
Creeping buttercup	*Ranunculus repens*	Herbaceous	X	X
**Dandelion	*Taraxacum officanale*	Herbaceous	X	
**Daphne	*Daphne laureola*	Shrub	X	X
Douglas fir	*Pseudotsuga menziesii*	Conifer tree	X	X
**Dovefoot geranium	*Geranium molle*	Herbaceous	X	X
Dull Oregon grape	*Mahonia nervosa*	Shrub	X	X
Electrified cat's tail moss	*Rhytidiadelphus triquetrus*	Moss	X	X
English holly	*Ilex aquifolium*	Shrub	X	
***Fern leaved desert parsley**	*Lomatium dissectum dissectum*	Herbaceous	X	
Fragile fern	*Cystopteris fragilis*	Fern		X
Garry oak	*Quercus garryana*	Deciduous tree	X	X
Grand fir	*Abies grandis*	Conifer tree	X	
Herb Robert	*Geranium robertianum*	Herbaceous		X
Himalayan blackberry	*Rubus armeniacus*	Shrub	X	X
Juniper haircap moss	*Polytrichum juniperinum*	Moss		X
Lanky Moss	*Rhytidiadelphus loreus*	Moss	X	
Little buttercup	*Ranunculus uncinatus*	Herbaceous		X
Little western bittercress	*Cardamine oligosperma*	Herbaceous		X
Long stolon sedge	*Carex inops spp inops*	Sedge		X
Meadow death camas	*Zigadenus venenosus*	Herbaceous	X	
Menzies larkspur	*Delphinium menziesii*	Herbaceous	X	X
Miner's lettuce	*Claytonia perfoliata*	Herbaceous	X	X
**Field bindweed	*Convolvulus arvensis*	Herbaceous		X
Mountain Sweet-cicely	*Osmorhiza bertoroi*	Herbaceous		X
Oceanspray	*Holodiscus discolor*	Shrub	X	X
**Oxeye Daisy	*Leucanthemum vulgare*	Herbaceous	X	
Pacific dogwood	*Cornus nuttallii*	Shrub		X
Pacific sanicle	*Sanicula crassicaulis*	Herbaceous	X	X
Pathfinder	*Adenocaulon bicolor*	Herbaceous	X	X
Pearly everlasting	*Anaphalis margaritacea*	Herbaceous		X
Purple peavine	*Lathyrus nevadensis*	Herbaceous	X	
Rattlesnake plantain	*Goodyera oblongifolia*	Herbaceous		X
Red alder	*Alnus rubra*	Deciduous tree	X	
Red columbine	*Aquilegia formosa*	Herbaceous	X	
Red huckleberry	*Vaccinium parvifolium*	Shrub		X
Red osier dogwood	*Cornus sericea*	Shrub		X
**Red sorrel	*Rumex acetosella*	Herbaceous	X	
**Reed canary grass	*Phalaris arundinacea*	Graminoid	X	

Common Name	Scientific Name	Type of Plant	McElhanney 2018	ENKON 2011
Salal	*Gaultheria shallon*	Shrub	X	X
Salmonberry	*Rubus spectabilis*	Shrub		X
Saskatoon	*Amelanchier alnifolia*	Shrub		X
**Scotch broom	*Cytisus scoparius*	Shrub	X	X
Sea blush	*Plectritis congesta*	Herbaceous	X	X
Siberian miner's lettuce	*Claytonia sibirica*	Herbaceous		X
Sitka willow	*Salix sitchensis*	Shrub		X
***Slimleaf onion**	*Allium amplectens*	Herbaceous		X
Small-leaved montia	*Montia parvifolia*	Herbaceous	X	X
Small-flowered nemophila	*Nemophila parviflora*	Herbaceous		X
Smooth alumroot	*Heuchera glabra*	Herbaceous		X
Snowberry	*Symphoricarpos spp*	Shrub	X	
Step Moss	*Hylocomium splendens*	Moss	X	X
Sword fern	*Polystichum munitum*	Fern	X	X
**Tall buttercup	*Ranunculus acris*	Herbaceous	X	
Tall Oregon grape	*Vaccinium parvifolium*	Shrub		X
Thimbleberry	*Rubus parviflorus*	Shrub	X	X
Three-leaved foamflower	*Tiarella trifoliata*	Herbaceous	X	
Trailing blackberry	*Rubus ursinus*	Shrub	X	X
Western trillium	*Trillium ovatum*	Herbaceous	X	
Vanilla leaf	*Achlys triphylla*	Herbaceous	X	X
Western coralroot	*Corallorhiza maculata*	Herbaceous	X	X
Western redcedar	*Thuja plicata*	Conifer tree	X	X
Western trumpet honeysuckle	*Lonicera ciliosa*	Shrub	X	X
Western buttercup	*Ranunculus occidentalis*	Herbaceous		X
Western starflower	*Trientalis latifolia*	Herbaceous		X
White fawn lily	*Erythonium oregonum*	Herbaceous	X	X
Wild Strawberry	*Fragaria vesca*	Herbaceous	X	X
Yellow monkey flower	*Mimulus guttatus*	Herbaceous	X	X
Yerba beuna	*Clinopodium douglasii*	Herbaceous		X

***Species at risk** (species status was verified using EFauna 2018)
**Invasive species

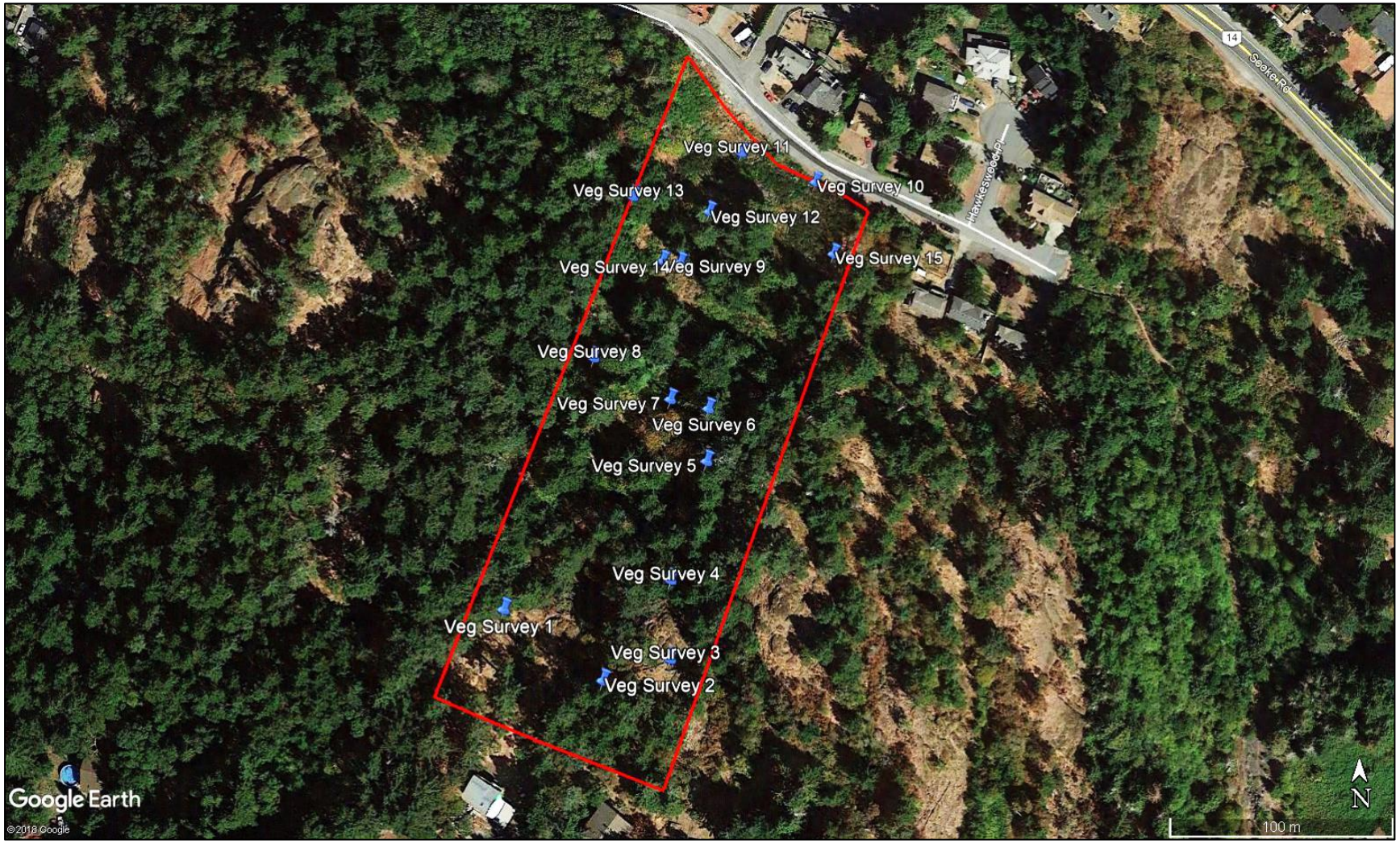


Figure 4. Vegetation survey points to verify vegetation communities (image courtesy of the Google Earth).

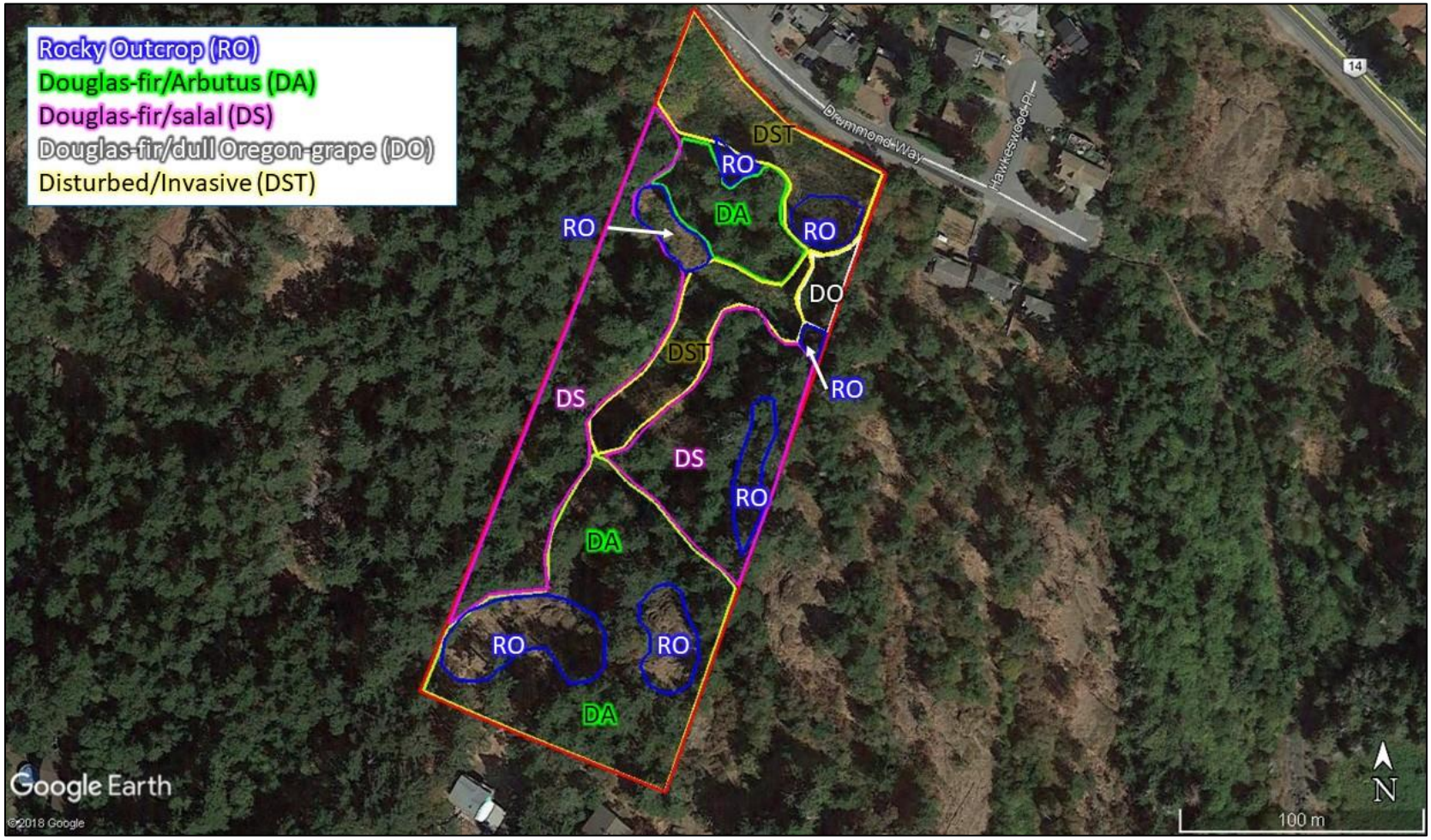


Figure 5. Vegetation communities identified on-site (image courtesy of the Google Earth).

4.1.1 Garry Oak Rock Outcrops

Garry oak areas are some of Canada's most endangered ecosystems. Less than 5% of these ecosystems remain in a near-natural condition (GOERT 2018). Associated ecosystems are highly varied and include rock outcrops and coastal bluffs, maritime meadows and treeless grasslands, along with seasonal wetlands and small pools which disappear during droughts (GOERT 2018). Several in-tact Garry oak rock outcrops are present on the Site with the most prominent ones near the southern boundary at the top of the slope (*Photographs 1* & *2*). There are more than 100 species at risk that are associated with Garry oak areas (GEORT and Parks Canada 2007). Garry oak ecosystems range from shady woodlands to open meadows with scattered trees. Garry oak trees may be found in mixed stands with other trees, mainly arbutus and Douglas-fir, as seen on the Site. On the rock outcrops spring wildflowers, grasses, and mosses flourish.

Photograph 1. Red listed Garry Oak meadow on a rocky outcrop on the southwest corner of the Site.

Photograph 2. Spring wildflowers including common camas and seablush in a Garry Oak Ecosystem on a rock outcrop at the southwest corner of the Site.

4.1.2 Douglas fir / Arbutus Vegetation Community

Classified as the CDFmm/02 site series, this is the driest of the forested communities in the CDFmm subzone (SCCP 2010). It is found primarily on hillsides and rocky knolls. This is a provincially red-listed ecosystem, and rare as less than 0.5% of the entire CDF zone remains as mature or old forest state in BC (SCCP 2010).

Photograph 3. Red listed Douglas-fir / Arbutus vegetation community on the southern portion of the Site.

The tree canopy was dominated by Douglas-fir and Arbutus. Typically, the canopy cover ranges from 40 to 90% (SCCP 2010). Garry oak is present due to the openness created by the rock outcrops. The shrub layer ranges in cover from 5-85%; and well developed, oceanspray and dull Oregon-grape are dominant (SCCP 2010). Other shrub-layer species include salal, baldhip rose, and trailing blackberry. Herb cover varies widely (5-95% cover), but on average the cover is generally low (SCCP 2010). The herb layer includes several grasses which typical include western fescue, Alaska oniongrass, blue wildrye, and California brome. Pacific sanicle was common along with sword fern, miner's lettuce, and broad-leaved starflower. The moss layer is variable within the plant community (1-40% cover) and is most prevalent on outcrop bedrock areas where trees and shrubs are unable to establish (SCCP 2010).

4.1.3 Douglas fir / Salal Vegetation Community

This zonal site association for the CDF was more common on the landscape than the other vegetation communities observed on the Site. There is a moderately dry soil moisture regime and a very poor to medium soil nutrient regime. Nuszdorfer et al. (1991) describe typical characteristics of the vegetation community as summarized below. Mature stands have a canopy cover that is continuous except for openings caused by rock outcrops or shallow soil. The tree layer is dominated by Douglas-fir, usually with a component of grand fir and western redcedar. The shrub layer in mature stands is well developed, containing mainly salal and dull Oregon-grape with lesser amounts of red huckleberry and baldhip rose. The herb layer, though less well

Photograph 4. Douglas-fir / Salal vegetation community on the western portion of the Site.

developed than the shrub layer, is still prominent and dominated by sword fern, trailing blackberry, and frequently snowberry. Oregon beaked moss is the predominant moss of the well-developed moss layer. *Photographs 5 & 6* show some of the herbaceous plants encountered during the May 2018 Site visit in the Douglas fir / salal vegetation community.

Photograph 5. Western coralroot in the Douglas-fir / salal vegetation community

Photograph 6. Trillium and dull-Oregon grape in the Douglas-fir / salal vegetation community

4.1.4 Douglas fir / Dull Oregon-Grape Vegetation Community

This plant community is also provincially red-listed (SCCP 2010b), classified as the CDFmm/01 site series. At the Site, the tree layer was dominated by Douglas-fir and the shrub layer is largely composed of dull Oregon-grape, salal, and oceanspray. The sparse herb layer usually includes some broadleaved starflower, sword fern, and bracken fern. Normally there is a well-developed moss layer including Oregon beaked-moss. On the Site, this vegetation community was on the lower slope position and was identified in the 2011 ENKON report. Since that time, most of the vegetation in this community has been removed, leaving only a small fragment left on the northeastern border. This area is directly adjacent to highly disturbed areas, causing invasive species to be more prominent than in other woodland areas on the Site.

This plant community was once widespread in the drier, warmer portions of the Pacific Coastal formation of western North America (SCCP 2010b). Its decline is due to extensive past timber harvesting, as well as its proximity to high density human populations. These lands are highly valued for rural and urban development.

4.1.5 Rare Vascular Plants

McElhanney identified fern leaved desert parsley (*Table 2*), a provincially red-listed species, on the southern portion of the Site primarily located on the rock outcrops and the Douglas-fir /Arbutus woodland. During ENKON's 2011 site visit, slimleaf onion (provincially blue-listed) was noted on the southwestern rock outcrop.

Provincial database search results indicated that there were two relevant occurrences of rare vascular plants within a 5 km search radius of the study area (*Table 3*). Search result maps for all plant and animal species at risk (including historically extirpated species) are included in *Appendix G*. Several rare vascular plant species have been extirpated from the area, but two rare vascular plants might be found within the study area in addition to the species identified at the Site. A full list of rare vascular plants that are expected to be found within the CDF zone in the South Island Forest District, based on relevant Site habitat conditions, are provided in *Appendix F* (CDC 2018).

Table 3. Provincially listed vascular plant species located within 5 km of the study area.*

Scientific Name	English Name	BC List	Last Observation Date	Habitat**
Plagiobothrys tenellus	Slender Popcornflower	Red	2008	Rock outcrop
Viola howellii	Howell's Violet	Red	1957	Woodland Needleleaf

**CDC search results for CDF in the CRD for vascular plants within 5 km of study area*

*** Habitat information from Eflora BC (Klinkenberg 2018)*

4.1.6 Sensitive Terrestrial Ecosystems

Provincial database search results indicated that there was potential for the occurrence of sensitive terrestrial ecosystems in the study area. The full list of potential ecosystems is provided in *Appendix F.* In general, the ecosystems in the study area were intact with native species dominating the landscape, increasing the likelihood of the presence of provincially listed terrestrial ecosystems. Qualitative vegetation surveys were completed as part of this assessment, so specific quantitative vegetation cover and species dominance data was not collected. However, of the potential 15 relevant sensitive ecosystems identified in the database search results, three ecosystems were present on the Site *(Table 4)*.

Table 4. Ecological Communities Search Results – Terrestrial Ecosystems (CDF in the CRD)*

Scientific Name	English Name	BC List	Ecosystem Group
Pseudotsuga menziesii / Arbutus menziesii	Douglas-fir - Arbutus	Red	Terrestrial Realm - Forest: Coniferous - dry
Pseudotsuga menziesii / Mahonia nervosa	Douglas-fir / dull Oregon-grape	Red	Terrestrial Realm - Forest: Coniferous - mesic
Quercuse garryana / Arbutus menziesii	Garry oak / Arbutus (rock outcrops)	Red	Terrestrial Realm - Forest: Broadleaf - dry

**(CDC 2018a.) BC Species and Ecosystem Explorer*

4.2 WILDLIFE & WILDLIFE HABITAT

There are several large undeveloped forested areas in and around the City of Colwood, many of which are connected by narrow green spaces that act as wildlife corridors. This allows for large mammals to occasionally access the City. Although rare, large carnivores such as black bears (*Ursus americanus*), and cougars (*Puma concolor*) have been known to wander through the area. Incidental wildlife observations noted during the site visit are marked on *Figure 6*.

Figure 6. Wildlife observations noted during the May 2018 site visit (image courtesy of the Google Earth).

Mammals

Black-tailed deer (*Odocoileus hemionus)* frequents the Site, several individuals were observed during the Site visit as well as evidence of their scat, trails and areas where they bed down (typically in the rocky outcrop Garry Oak meadows). Evidence of the black-tailed deer locations for bedding down and wildlife trails are shown *Photograph 7* & *8* and *Figure 6*. The deer encounters were on the northern and central portion of the Site and are not mapped.

Small mammal use in the study area was also noted, including a rabbit in the southern end of the Site in a Garry Oak meadow on a rocky outcrop. The rabbit was likely the Eastern cottontail rabbit (*Sylvilage floridanus*) which is an introduced species to Vancouver Island. The Site provides suitable wildlife habitat for hunting and foraging for a variety of small mammals such as raccoons, red squirrels, mice, voles and bats typical of CDF forests (MELP 1999).

Photograph 7. Piece of fur from a deer or rabbit.

Photograph 8. Black tailed deer trail

Birds

Bird activity was observed throughout the Site. Field observations included identification of bird calls, observations of bird feathers, pecking and foraging activity on trees, and observations of flying and foraging within the study area. The study area contained high quality habitat features for birds (including passerines, and raptors).

Numerous passerines including migratory birds were observed during the field review such as the spotted towhee (*Pipilo maculatus*), American robin (*Turdus migratorius*), red-breasted nuthatch (*Sitta canadensis*), American bushtit (*Psaltriparus minimus*), chipping sparrow (*Spizella passerina*), black-capped chickadees (*Poecile rufescen*), several Anna's hummingbird (*Calypte anna*), rufous hummingbird (*Selasphorus rufus*), and song sparrows (*Melospiza melodia*). Additional bird observations included a red-tailed hawk (*Buteo jamaicensis*), a hawk tentatively identified as a Cooper's hawk (*Accipiter cooperii*), a turkey vulture (*Cathartes aura),* American crow (*Corvus brachyrhynchos*), and downy woodpeckers (*Picoides pubescens*). California quails (*Callipepla californica*), an introduced species, were observed on the June 13, 2018 site visit.

Additional species anticipated to use the Site include the Pileated Woodpecker (*Hylatomus pileatus*), Yellow-bellied Sapsucker (*Sphyrapicus varius*), Hairy Woodpecker (*Leuconotopicus villosus*), Steller's Jay (*Cyanocitta stelleri*), Raven (*Corvus corax*), Chestnut-backed Chickadee (*Poecile rufescens*), Brown Creeper (*Certhia americana*), Winter Wren (*Troglodytes hiemalis*), and Varied Thrush (*Ixoreus naevius*), all of which eat conifer seeds or wood-boring insects (CRD 2017). Owls, swallows, and chickadees also nest in cavities made by woodpeckers, while Bald Eagles rely on Douglas-fir trees to support their enormous nests.

A detailed bird and nesting survey was not completed during the site visit, but some incidental observations were noted and marked on *Figure 6*. The closest documented Bald Eagle nests are approximately 1.7 km to the east located on the Royal Roads University/Department of National Defence Land in the forested area near Esquimalt Lagoon (see *Appendix E*) (WITS 2018).

Wildlife Trees

Several wildlife trees were observed during the site visit, but many areas of the Site were not accessible for assessment. Locations of wildlife trees observed are marked on *Figure 6.* Mature trees that were greater than 80 cm in breast height diameter were also located and mapped. There was a wildlife tree located on the northern/central portion of the Site that would provide suitable perch habitat for birds of prey (*Photograph 9*). Numerous mature conifers were used by woodpeckers for foraging. Cavities created (*Photograph 10*) may be suitable for nesting passerines.

Photograph 9. Suitable perch tree for raptors.

Photograph 10. Wildlife tree used for woodpecker foraging.

Amphibians & Reptiles

A manmade ephemeral drainage channel was identified during the Site visit. This drainage was assessed as not providing suitable habitat for amphibians that are typical of CDFmm zone. The rocky outcrops throughout the Site appeared to provide high quality habitat for reptiles including snakes and lizards. A northern alligator lizard (*Elgaria coerulea principis*) was observed on a rocky outcrop on the southeast portion of the Site as marked on *Figure 6*.

4.3 DRAINAGES

An ephemeral drainage channel was identified running through in the center of the Site in 2018. The channel was approximately 1 m in width, incised, and dry during the summer (*Photograph 11*). Sections of the channel

appeared to be natural while others were distinctly manmade. The report issued at that time recommended follow up reviews of the watercourse during the rainy season with appropriately qualified professionals to determine if the watercourse was natural or manmade. The following section discusses initial data collected in 2018 and follow up data in 2020 used to determine that the watercourse is manmade.

Photograph 11. Manmade ephemeral drainage identified during the May 2018 Site visit

At the summit of the hill on Zapata Place, there was a culvert directing stormwater flows (marked as a yellow star on *Figure 7* and shown in *Photograph 12*) on to the Site. A manmade drainage ditch was observed down gradient of the hanging corrugated steel culvert (*Photograph 13*). This drainage feature followed a natural depression and became less distinct within about 80 m of the culvert. No distinct drainage channel was observed at the northern boundary of the Site, but it was inferred that overland flow during precipitation follows the ravine like contours between the rock outcrops and would eventually flow into the drainage channel encountered in the center of the Site. The source and outlet of the drainage were not determined during the 2018 site visit but were inferred to result from the collection of water off the outcrops from overland flow.

Photograph 12. Steel corrugated culvert adjacent to Zapata Place to the north of the Site.

Photograph 13. Drainage ditch located to the north of the Site.

The ENKON report from 2011 indicated that there was a drainage channel that appeared to have been created by an excavator to drain hillslope runoff located adjacent to the T-shaped disturbed area in the center of the Site. The drainage channel was dry during their investigation. The location was not identified on a figure in their report and the description was inconsistent with where McElhanney encountered a drainage channel, thus, there was uncertainty if this was the same drainage feature seen by McElhanney. Furthermore, previously impacted areas had started to naturalize since the 2011 assessment.

Figure 7. Location of a manmade drainage channel including a culvert (yellow star) and a disconnected stormwater ditch south of the Site (orange dashed line).

On November 12, 2020, a site visit was conducted to specifically review the drainage channel to verify that it was manmade. The Site was accessed from the top of the slope on the north end from Zapata Place. The entire length of the drainage feature was assessed, and no inlet or outlet was identified (as with the 2018 assessment). Overland flow and seepage collected in this drainage channel dissipated near the toe of the slope where shallow bedrock was encountered.

Flows were minimal and the wetted width of the channel was approximately 20 cm. Many areas showed an incised channel that was the size, depth, and width of an excavator bucket. There was also evidence of test pitting throughout the site, in some locations connected to the drainage channel. *Photograph 14* shows evidence of former excavation that has naturalized over time and *Photograph 15* shows the width of flows observed in November 2020. The drainage channels appear to have been constructed to drain the hillside during periods of historical logging. The area has regrown, and many portions of the Site appear in a healthy natural condition. Some areas of vegetation were more degraded then others, and it is inferred that more recent impacts have occurred on the site following logging.

At the toe of the slope on the northwest corner of the Site, there were some rushes that are consistent with poorly drained soils. Moisture in this area is a result of hillslope runoff and the area was not consistent with a wetland character.

Photograph 14. Drainage ditch with distinct evidence of former excavation that has begun to naturalize.

Photograph 15. Flowing water in the drainage ditch observed in November 2020.

Stormwater features or treatments, while sometimes conveying water, are not considered natural streams under the *Water Sustainability Act* (WSA). However, there is some provision of the WSA if the stormwater feature provides water directly connected to fish-bearing habitat. Features of the drainage channel as identified in 2018 are summarized in *Table 5*. McElhanney completed an analysis of site topography, in combination with aerial photograph interpretation and the Site observations to determine the inferred location of the drainage channel (*Figure 7*). A slope analysis was completed for the Site and the area in which the drainage was identified had portions where the slopes were greater than 30%. Slopes greater than 20% tend to be a natural barrier to fish passage (BC 1998). The lack of connectivity to other watercourses suggests

that this drainage does not provide fish habitat. Thus, it was determined that the WSA and the Riparian Area Protection Regulation (RAPR) is not applicable to this Site.

Table 5. Summary of the drainage within the study area

Channel width	Reach gradient	Morphology	Fish Access Potential	Barrier
<1m	>20%	Dry during assessment	No	Steep slopes

4.4 SPECIES AT RISK

Regional listings of provincially designated threatened or endangered vertebrates, invertebrates, vascular plants, and ecosystems that were expected to be found within the CDF zone in the South Island Forest District, based on relevant Site habitat conditions, are provided in *Appendix F* (CDC 2018a).

4.4.1 Wildlife

Database queries for the presence of wildlife species at risk known to have habitat within the CDF zone were conducted within the CDC Species Explorer databases (CDC 2018). The data obtained also indicated *SARA* listed species that may have been locally observed. Provincially listed wildlife species that may potentially utilize the study area, based on the presence of preferred habitat characteristics, are presented in *Appendix F*. A review of species-specific habitat requirements and provincially mapped observations (E-Fauna 2018, iMapBC 2018) informed our site visit to confirm potential species on site. Provincially listed terrestrial wildlife species that are known to utilize the study area are listed in *Table 6*.

No wildlife species at risk were observed during McElhanney's site visits.

Table 6. Provincially listed wildlife species potentially occurring on Site based on Site habitat conditions (CDC 2018)

Scientific Name	English Name	BC List	SARA	Habitat Information*	Likelihood or Presence
Contia tenuis	Sharp-tailed Snake	Red	1-Endangered (Jun 2003)	Occurs in low-elevation woodland habitats dominated by Douglas-fir, arbutus and/or Garry oak. All records are from the Coastal Douglas-Fir Biogeoclimatic Zone. Often found in small openings on rocky outcrops and on warm hillsides.	Likely
Contopus cooperi	Olive-sided Flycatcher	Blue	1-T (Feb 2010)	Conifer Forest - Mesic (average); Mixed Forest (deciduous/coniferous mix)	Observed in 2011
Corynorhinus townsendii	Townsend's Big-eared Bat	Blue		Associated with a variety of habitats from coastal forests to arid grasslands. Conifer Forest - Mesic (average); Conifer Forest - Dry; Mixed Forest (deciduous/coniferous mix)	Moderate

Scientific Name	English Name	BC List	SARA	Habitat Information*	Likelihood or Presence
Glaucidium gnoma swarthi	Northern Pygmy-owl, swarthi subspecies	Blue		Various woodland habitats. Nest in holes in trees and can use cavities generated by woodpeckers. Meadow; Conifer Forest - Mesic (average); Conifer Forest - Dry; Mixed Forest (deciduous/coniferous mix);	Moderate
Myotis keenii	Keen's Myotis	Blue	3 (Mar 2005)	Associated with coastal forest habitats. Cliff; Rock/Sparsely Vegetated Rock; Conifer Forest - Mesic (average)	Moderate
Myotis lucifugus	Little Brown Myotis	Yellow	1-E (Dec 2014)	Wide range of habitats Meadow; Conifer Forest - Mesic (average); Conifer Forest - Dry; Mixed Forest (deciduous/coniferous mix); Garry Oak Woodland	Moderate
Mustela erminea anguinae	Ermine, anguinae subspecies	Blue		Meadow; Conifer Forest - Mesic (average); Conifer Forest - Dry; Mixed Forest (deciduous/coniferous mix);	Moderate
Megascops kennicottii kennicottii	Western Screech-Owl, kennicottii subspecies	Blue	1-T	Prefers open woodlands, especially deciduous trees. Conifer Forest - Mesic (average); Conifer Forest - Dry; Mixed Forest (deciduous/coniferous mix)	Moderate

**habitat information from E-Fauna BC (2018) and The Cornel Lab of Ornithology (2018)*

4.5 DISTURBANCE HISTORY

The study area has a history of disturbance. There is a large "T" shaped disturbance in the middle of the Site that looks as though the area was at one time stripped of vegetation (*Photograph 16*). Soil disturbance, consistent to an excavator, was observed. This area has begun to revegetate with an early seral forest and a higher predominance of invasive species than found at many of the other areas on the Site. It is uncertain how recently this disturbance occurred, but it was documented in the 2011 ENKON report and was visible on the 2010 aerial photographs available through Google Earth.

A second large disturbance area was located along the northern boundary of the Site near Drummond Way (*Photograph 17*). Google Earth aerial photographs show that the vegetation was cleared in 2012, which occurred after the previous environmental assessment. This area was the major area of change between the previous and current environmental assessments. The area has revegetated as a dense patch of Scotch broom with various other invasive species.

These two disturbed areas have allowed for invasive species to establish throughout the Site and are relatively recent (i.e. within the last 20 years). It is also inferred that logging has occurred and that much of the Site is now in secondary growth. The impacts from logging are much older, given the size of trees on the site, but the historical timing is unknown. In general, vegetation communities further up slope nearer to the southern boundary are less impacted by invasive species and retain intact native species ecosystems. The rocky outcrops would not have had species suitable for timber sales and comprise many native species.

Photograph 16. T- shaped disturbed area in the center of the Site, dominated by Scotch broom.

Photograph 17. Disturbed area on the north of the Site along Drummond Way, dominated by Scotch broom,

5. Environmentally Valuable Resources

The Site included both a complex mosaic of natural ecosystems and human-influenced habitat. Several EVRs were identified during this assessment. Critical habitat for rare plants was observed and a variety of wildlife species including large and small mammals, birds, and reptiles. The following summarizes key EVRs in the study area:

- Native vegetation and terrestrial ecosystems were identified which included the following provincially red listed vegetation communities:
    - Douglas-fir - Arbutus (*Pseudotsuga menziesii / Arbutus menziesii*)
    - Garry oak / Arbutus (rock outcrops) (*Quercus garryana / Arbutus menziesii*)
    - Douglas-fir / dull Oregon-grape (*Pseudotsuga menziesii / Mahonia nervosa*)
- Observed ecosystems were confirmed to contain species at risk such at the fern leaved desert parsley and slimleaf onion;
- The study area contained high quality habitat features for birds, including passerines, and raptors such as hawks, owls, and eagles.

Figure 8 shows the environmentally sensitive ecosystems on the Site that will potentially be impacted by the project.

Figure 8. Sensitive ecosystem on-site including Garry oak rocky outcrops (blue outline), Douglas-fir/Arbutus (green outline), and Douglas-fir/dull Oregon grape (white outline).

6. Potential Environmental Impacts

The development plans were at the conceptual stage for the proposed residential development when this EA was conducted. The details of these plans have now been finalized with information derived from the EA. The following determinations have been made for the assessment of impacts for this project:

- Approximately 40% of the Site will be left as a natural area. The current conceptual scheme proposes to leave the southern portion as well as an area along the eastern boundary of the Site undeveloped. This is in part related to the presence of sensitive ecosystems, in combination with challenges related to developing this portion of the hillside;
- Vegetation clearing is required for the construction of the project. Retained vegetation will be fenced or clearly flagged so that the impacts to natural areas will be kept to the minimum necessary.
- Vegetation clearing should be planned outside of the critical bird breeding window, which reduces risks to birds and their nests.

If the design plan changes, rendering these determinations invalid, the impact assessment may need to be revisited. General environmental impacts of development are described below.

6.1 SOILS

This project will alter the landscape and the natural environment. Soil and landforms interact with living organisms by providing habitat. The quality of the soil is closely related to the vegetation that grows within an ecosystem. The health of the soil is related to its ability to meet the range of ecosystem functions as appropriate to its environment. The impacts listed below have the potential to reduce the health/quality of the soil, thus reducing the overall habitat quality of the project area. Best Management Practices (BMPs) will be required to mitigate the potential risks to soils within the study area.

Blasting and cut and fill practices will be employed during the construction phase of the project. Fill are expected to be sourced from blasted rock from the Site as well as clean imported fill. Overburden materials (including topsoil) may be reused or repurposed within the project footprint as appropriate.

Site preparation and construction activities may result in impacts to soils in the study area but can be reduced using mitigation measures discussed in Section 7:

- A reduction in soil quality due to the erosion and compaction of soils or contamination from the accidental spill of deleterious substances such as fuel, oil, or spills from equipment,
- Blasting, excavation, levelling, and in-filling activities have the potential to disturb soils and create erodible soil surfaces,
- Grade changes and alteration of local drainage patterns and potential erosion of soil surfaces; and
- Generation of sediment/dust laden runoff.

6.2 VEGETATION RESOURCES

Clearing of woodlands habitat is needed for the Project which will result in the loss of some portions of at-risk ecosystems. Surface disturbance in sensitive areas during construction may result in further loss of native biodiversity of the retained natural areas due to a potential introduction or increased presence of non-native invasive species. Noxious weed species present on or adjacent to the study area are potential seed sources that may facilitate invasion of these weed species to newly disturbed areas of the development.

The following potential impacts to vegetation resources may occur:

- Removal of individual trees including wildlife trees,
- Disturbed ecosystems adjacent to or within the project footprint from construction activities,
- Reduction of wildlife habitat through the removal of vegetation in the study area,
- Accidental damage to the root zone causing loss of trees to be retained because of site alteration or construction activities,
- Noxious weeds controlled under the *Weed Control Act* (BC 1996b) are found throughout the study area and will need mitigation measures in place for controlling spread. Invasive weeds tend to establish quickly, spread rapidly, and overtake native species habitat, preventing the natural regeneration of natural ecosystems. As a result, they are a threat to natural ecosystem establishment or restoration.

- Loss of native biodiversity due to increased presence of non-native invasive species after construction disturbance.

6.3 WILDLIFE AND WILDLIFE HABITAT

There are moderate direct and indirect impacts to wildlife or wildlife habitat expected because of this development project. Habitat loss and fragmentation may result including the removal of potential nesting or foraging areas that are provided by trees and shrubs within the project footprint.

Migratory breeding birds and their active nests are protected under the federal *Migratory Birds Convention Act (MBCA)*. As vegetation provides nesting and foraging habitat for birds and other animals, there is the potential to contravene Section 34 of the *Wildlife Act* and the *MBCA* with vegetation clearing activities. During their breeding season, birds are especially sensitive to noise disturbances and may desert their nests and young. Construction timing windows for birds are the most suitable periods for performing works that would otherwise impact sensitive life stages. While the nesting period for bird species varies by species, the general bird breeding period begins mid-March and may extend until late August (Canada 2016). Appropriate BMPs for reducing impacts to wildlife and their habitat as well as the risk of negative human and carnivore interactions are required for this project. Further discussion of mitigation strategies is outlined in Section 7.

The following impacts to wildlife resources will occur:

- Permanent loss of wildlife habitat through the creation of new hard surfaces covering soil surfaces, the removal of vegetation and wildlife trees, and grading, blasting, and infilling of habitat.
- Disturbance of bird species protected under *Wildlife Act* 34 (BC 1996b) and the *MBCA* (Canada 1994) and breeding and foraging activities of species at risk.

7. Mitigation & Avoidance Strategies

To minimize impacts to the identified EVRs, the use of environmental best management practices (BMPs) will be required. The siting of the environmental reserve / natural area on Site, which may be dedicated as parkland to the City, will be important in reducing impacts to the EVRs on the Site. The preferred area to retain for conservation is the southern and northeastern portions of the Site, shown in purple outline on *Figure* 9 and making up 40% of the Site. This area would result in the least amount of impacts on environmentally sensitive features observed on the site. The exact shape and size of the conserved area will be determined to suit the needs of the development. It is likely to follow natural contours on the landscape.

Figure 9. Preferred conservation area to reduce impacts to at-risk ecosystems (outlined in purple)

Steps should be taken to minimize impacts to the rocky outcrops on the southern portion of the Site preferably through the establishment of a conserved natural area. The soils on the rock outcrops are very shallow and are easily impacted by human foot traffic. Conservation of these intact Garry oak ecosystems would be facilitated by limiting human access to these sensitive areas. If the development considers establishing walking trails in the conserved area, access to rocky outcrops may be restricted by fencing or through the creation of a public pathway/trail with fencing that prevents access to extremely sensitive areas but allows for viewing of the natural habitat. Partnership with GOERT may be beneficial to best protect these sensitive ecosystems during development.

Construction of the project will require the implementation of provincial guidelines for BMPs to ensure compliance with federal and provincial environmental protection legislation. *Table 7* outlines potential impacts and recommended mitigation strategies.

Table 7. Proposed activity, potential impacts, mitigation measures to be applied and residual impact

Aspect of Project to be Mitigated	Activities Proposed to Cause Impact	Mitigation Measure	Residual Impact
Vegetation	Removal of on-Site vegetation (up to 60%)	• Project design should retain vegetation where feasible, to provide stabilized slopes, important bird foraging habitat, and maintenance of wildlife corridors	• Removal of vegetation within the project footprint will result in impacts that are local in geographic extent and may have high impacts to at-risk ecosystems.

Aspect of Project to be Mitigated	Activities Proposed to Cause Impact	Mitigation Measure	Residual Impact
		• Retention of the wildlife trees that have been identified or may be encountered during the construction or the project, where feasible.	
	Damage to root zones by construction activities	• Erect a fence at the outer limit of the critical root zone of trees to be retained, which is defined as the distance around the tree at a radius 10 times the diameter of the tree (at breast height) or outside the dripline of the tree, where feasible. • Avoid damage to the root system, trunk, or branches of any retained tree. • Do not place any material or equipment within the critical root zone of the tree. • Do not attach any signs, notices, or posters to retained trees.	• Impact local in geographic extent • Not substantial
	Increase in invasive species to newly disturbed areas	• Re-establishing native vegetation along new or disturbed edges of natural features by seeding or transplanting locally appropriate native species. • Control of designated noxious species when encountered.	• Moderate due to sensitivity of intact at-risk ecosystems
Wildlife Encounters	Wildlife encounters and conflicts may occur during project works. Wildlife conflicts may consist of relatively minor nuisances or more serious health, safety, or conservation concerns.	• Work areas must be kept completely free of uncontained wildlife attractants such as food, waste materials, cleaning products, fuel etc. • All food and wildlife attractants should be secure when not in use • The contractor is responsible to ensure any material that may be blown or washed away is retrieved. • Garbage shall not be burned, buried, or disposed of on site. All garbage generated during the project will be contained and removed regularly for appropriate off-site disposal, including recycling where applicable. • Fuels, lubricants etc. are known wildlife attractants. Care will be taken fueling generators, chain saws etc.	• Not substantial
Loss of Bird Habitat	Land based clearing for construction	• Where possible, construction should be completed during the least risk timing windows for birds,	• Low to moderate impact due to the extent of habitat loss.

Aspect of Project to be Mitigated	Activities Proposed to Cause Impact	Mitigation Measure	Residual Impact
		which are periods during the year where construction impacts are minimized. • Pre-construction raptor assessments are recommended to verify that no protected nests are located in the project footprint. • If work occurs during the bird breeding season a QEP must complete nesting surveys prior to construction. • Preparation of a bird management plan should be prepared by a QEP for nests that are encountered during nest surveys.	• Impacts to individual birds are not substantial if BMPs are implemented.
Drainages	Excavation and recontouring causing modifications to natural drainage patterns	• Retain natural drainage patterns wherever possible. • Develop a stormwater management plan for areas where natural drainage will be modified.	• Not substantial
Noise and Disturbance	Potential molestation of an active nest by construction noise is a contravention of the Wildlife Act. During breeding season birds are very sensitive to noise disturbances and may desert their nests and young.	• Retention of the wildlife trees are recommended, where feasible. • Establish and maintain an appropriate buffer zone as necessary that is free of human disturbance (BC 2013).	• Not substantial

If the recommended avoidance strategies are implemented, impacts of the potential project on environmental features are expected to be moderate and can be mitigated with appropriate siting of an environmental park and application of BMPs during construction.

An abundance of bird species, including migratory birds, were noted during the Site visit. As such, vegetation clearing activities should be timed during the least risk timing windows for nesting birds to reduce risk of disturbance of breeding activities.

8. Conclusions

This EA was completed with information obtained from desktop studies and data collected from Site visits completed on May 23, 2018, June 13, 2018, November 9, 2020 and November 12, 2020. This EA was conducted for the Drummond Way Land Use Approval Project to identify the presence of EVRs that may be potentially impacted by the proposed residential development located in Colwood, BC. The objective of this

report was to provide environmental information and recommend mitigative strategies to guide plans and design for upcoming potential construction activities.

The Site was evaluated for potential terrestrial and aquatic habitat and habitat value for plants, mammals, birds, and reptiles. The Site has areas of human disturbance and consists of a mosaic of rare native ecosystems that are connected to a larger undeveloped area which provides movement and access of wildlife to the habitat located on the Site.

Several EVRs were identified during this assessment. Suitable habitat for a variety of wildlife including large and small mammals, birds, and reptiles was identified. The following summarizes key EVRs in the study area:

- Native vegetation and terrestrial ecosystems were identified which included the following provincially red listed vegetation communities:
    - Douglas-fir - Arbutus (*Pseudotsuga menziesii / Arbutus menziesii*)
    - Garry oak / Arbutus (rock outcrops) (*Quercuse garryana / Arbutus menziesii*)
    - Douglas-fir / dull Oregon-grape (*Pseudotsuga menziesii / Mahonia nervosa*)
- Critical habitat was confirmed for the fern leaved desert parsley (*Lomatium dissectum dissectum*) and slimleaf onion (*Allium amplectens*) on Site;
- The study area contains high quality habitat features for birds, including passerines, and raptors such as hawks, owls, and eagles.

Observations from the site visits, supplemented with web-based reviews of provincial and regional databases (desktop study) indicated the presence of plants and wildlife species at risk in the region around the Site. Habitat features on the Site are favourable for many of the at-risk species identified in the desktop studies.

Without the implementation of appropriate BMPs, potential impacts may occur during construction of the project which include but are not limited to the following:

- Loss of a portion of the rare at-risk ecosystems identified on the Site,
- Habitat removal and noise disturbance associated with vegetation clearing, blasting, excavating and recontouring of land during construction works, and
- Degradation of nearby sensitive habitat and areas to be retained as an environmental reserve related to the introduction of invasive species related to construction disturbance.

Following the finalization of plans and design details, specific mitigation strategies and environmental management strategies should be developed prior to the commencement of construction activities and implemented as appropriate through a Construction Environmental Management Plan to be developed by the contractor retained to complete the project.

Compliance to the following legislation is recommended:

- The *Wildlife Act* and the *Migratory Birds Convention Act* with respect to mitigating impacts on breeding birds, and
- The BC *Weed Control Act* with respect to noxious weeds on or adjacent to the Site.

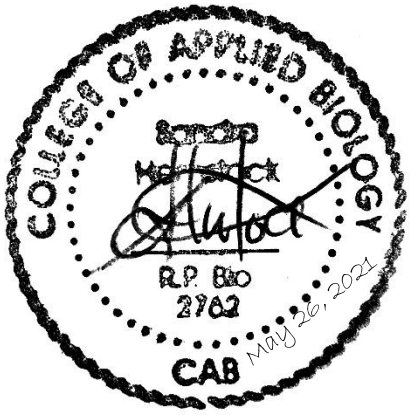
9. Professional Statement

The information presented in this report is for use by Colwood Peak Homes Ltd. and their representatives as part of the Drummond Way Land Use Approval Project. This assessment and its recommendations are based on limited data collected from multiple field reviews, and a review of readily available web data bases. This review was based on an assessment of potential development impacts as per the design plan. Conclusions and recommendations presented here may change with additional information. We trust the information provided is sufficient to meet your needs at this time.

Should there be any questions regarding the information within, please do not hesitate to contact the undersigned.

Yours truly,

MCELHANNEY LTD.



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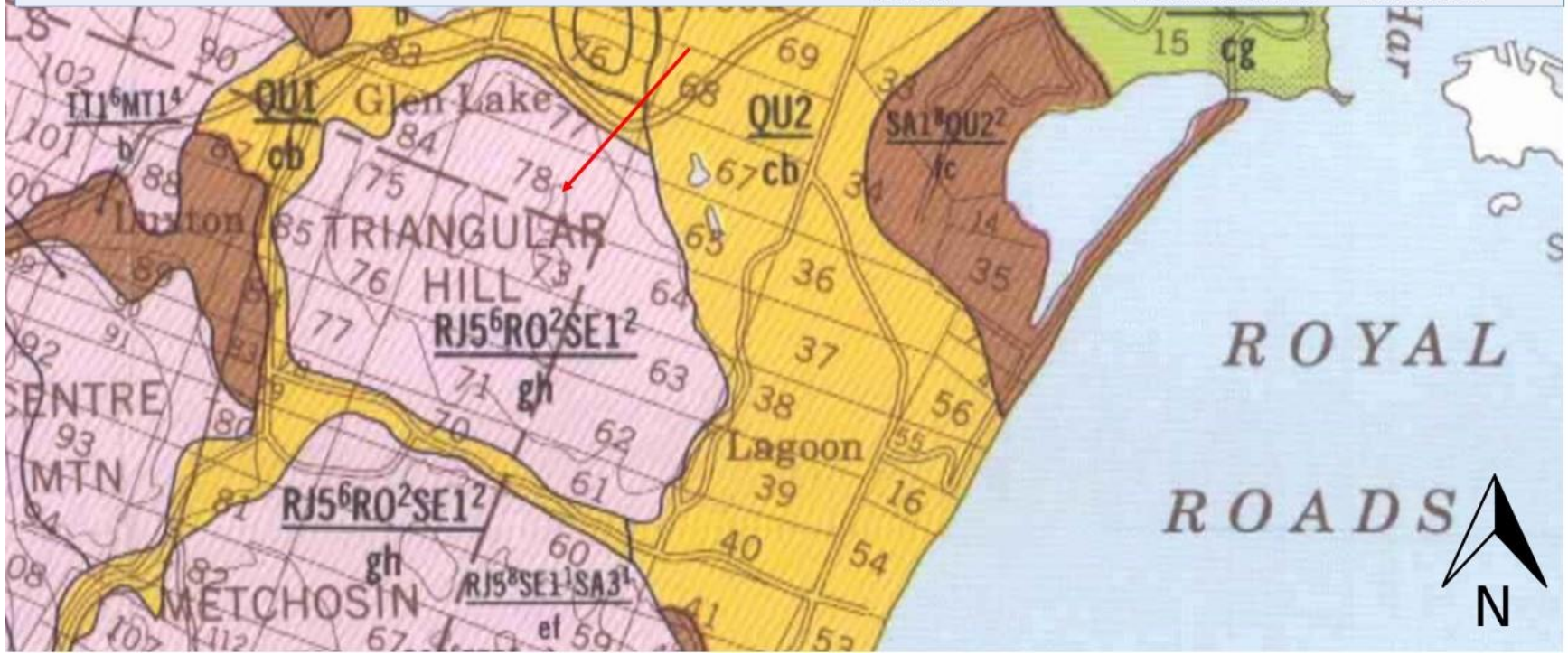
Appendix A

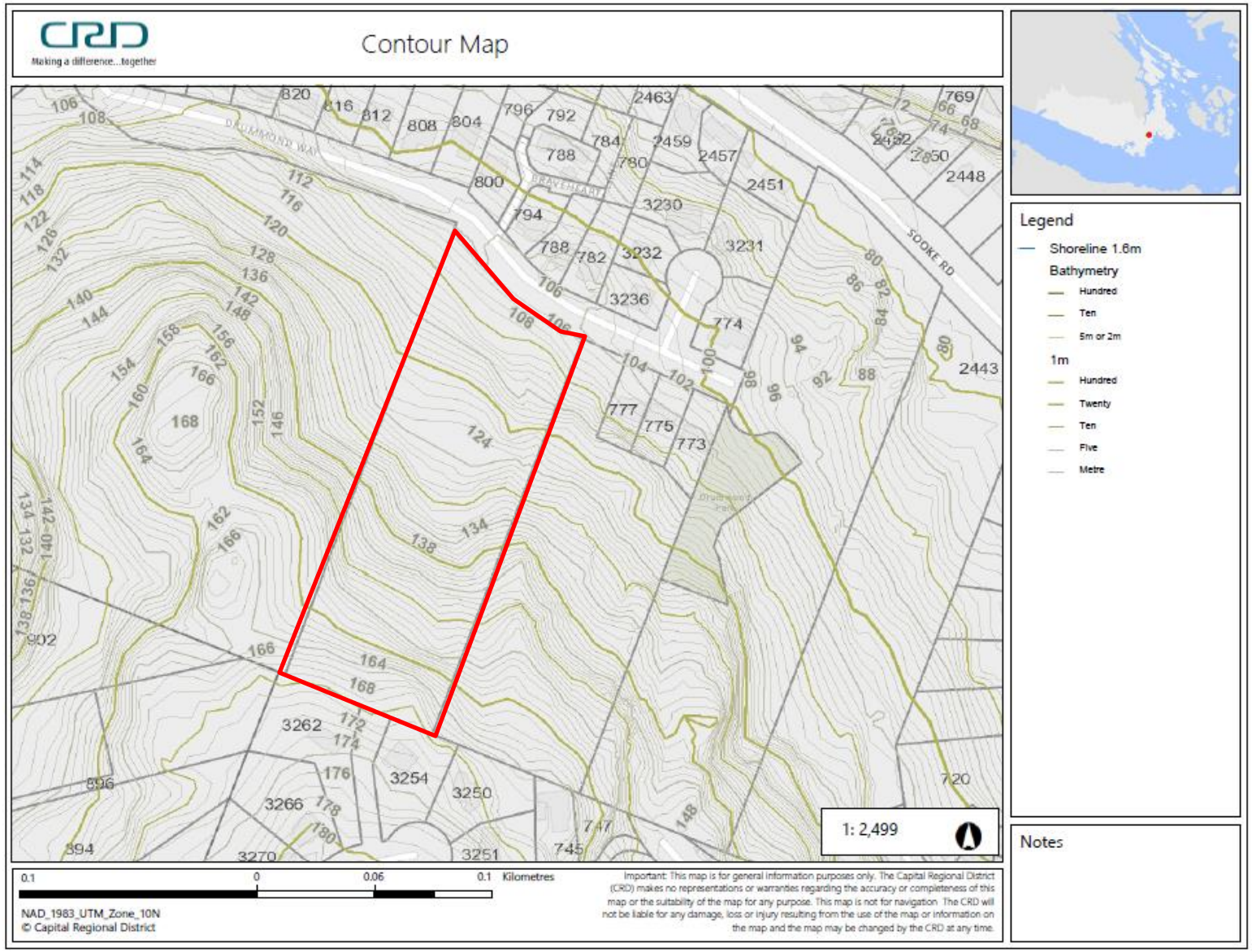
Soil Classification Map

Symbol	Name	Parent Material	Most Common Texture	Most Common Drainage	Most Common Soil	Vegetation Zonation	Comment
RJ	Ragbark	Colluvium	Gravelly sandy loam	Rapidly drained	Orthic Dystric Brunisol – shallow lithic (O.DYB-shli)	Coastal grand fir – western red cedar zone	Stony soils on steep slopes
RO	Rock Outcrop	Bedrock	-	-		-	Bedrock within 10 cm of the surface
SE	Somenos	Moraine	Gravelly sandy loam	Well drained	Duric Dystic Brunisol (DU.DYB)	Coastal grand fir – western red cedar zone	Moderately to strongly cemented pans



Appendix B

Topographic Map


CRD
Making a difference...together
Contour Map
DRUMMOND WAY
BRAVEHEART
SOOKE RD
Legend
Shoreline 1.6m
Bathymetry
Hundred
Ten
5m or 2m
1m
Hundred
Twenty
Ten
Five
Metre
1: 2,499
Notes
0.1 0 0.06 0.1 Kilometres
NAD_1983_UTM_Zone_10N
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Appendix C

Previous Environmental Report

REPORT

Drummond Way Environmental Impact Assessment

Prepared for:
City of Colwood
Planning and Zoning Department
3300 Wishart Road
Victoria, B.C. V9C 1R1
Attention: **Alan Haldenby, Director of Planning**

Prepared By:

ENKON Environmental Ltd.
Suite 310-730 View Street
Victoria, B.C. V8W 3Y7
Telephone 1 (800) 374-5291
enkon@enkon.com

Project No.: 1236-009

June 2011

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INTRODUCTION

1.1 Project Description

Selah Developments Inc. is proposing to build residential subdivision on a 2.01 ha parcel on Drummond Way in the City of Colwood (Figure 1). The site is proposed to consist of 20 single family homes (Figure 2), and access to the site will be from Drummond Way to the north and Zapata Place to the south. According to the City of Colwood's Official Community Plan's Development Permit Areas Map the entire subject site is located within a development permit area for Sensitive Ecosystems and Hazardous Conditions. As part of the rezoning process, the proponent requested that ENKON Environmental Ltd. (ENKON) complete an environmental assessment of the site and provide recommendations on minimizing environmental impacts associated with the proposed subdivision development.

Drummond Way Project Location

Map Drawn: June 9, 2011
Drawn By: ENKON Environmental Ltd.
Figure 1

N

0 250 500 1,000 1,500
Meters

ENKON
Environmental
Phone: 1 800 374 5927
Email: enkon@enkon.com

Drummond Way - Site Layout

Legend

- Proposed Road/Footpath
- Green Space
- Site Boundary
- Lot Boundaries

Map Drawn: July 7, 2011
Figure 2
Drawn By: ENKON Environmental Ltd.

N

0 10 20 40 60 80 Meters

ENKON Environmental
Phone: 1 800 374 5927
Email: enkon@enkon.com

ENVIRONMENTAL SETTING

2.1 Terrestrial Resources

2.1.1 Vegetation

2.1.1.1 Methods

Office Study

Prior to the field program an office study was completed to review available secondary information. The following were examined:

- 1:20,000 colour orthophotos
- TRIM mapping (1:20,000 scale)
- NTS mapping (1:50,000 scale)
- SEI mapping (1:20,000 scale).

In addition, the following websites were visited to collect data on sensitive systems, record trees and rare species occurrence:

- Capital Regional District's Natural Areas Atlas

  http://crdatlas.ca
- Ministry of Environments BC Species Explorer

  http://www.env.gov.bc.ca/cdc
- Sensitive Ecosystem Inventory

  http://www.env.gov.bc.ca/sei

Field Survey

The focus of the field survey was to determine the potential presence of rare and endangered vascular plants and plant communities and to confirm the location of environmentally sensitive areas. Following a review of available mapping and aerial photographs a field survey was conducted on June 6, 2011, at which time 13 vegetation plots were surveyed and plant communities and environmental features were mapped. Information recorded during this survey included:

- Dominant tree species (primary and secondary canopy);
- Dominant tall and low shrub species;
- Dominant herbs;
- Structural stage and
- Aspect and gradient.

2.1.1.2 Results

General

The Project Area is located in the Eastern Vancouver Island Ecoregion within the Nanaimo Lowland Ecosection. This Project Area lies within the Coastal Douglas-fir Moist Maritime (CDFmm) Biogeoclimatic Subzone. Douglas-fir as well as grand fir and western redcedar dominate forests on zonal sites within the CDFmm. Salal, Oregon-grape, oceanspray and Oregon-beaked moss dominate the understorey. Less prominent species include baldhip rose, snowberry, western trumpet honeysuckle, vanilla leaf and electrified cattail moss. The presence of Garry oak, arbutus and numerous members of the lily family characterize these drier sites. A species list for vegetation typically occurring within the CDFmm is presented below in Table 1. Table 2 shows the plant species encountered during the 2011 field survey.

The subject lot is composed of a dry mixed woodland/rock outcrop mosaic, as well as second growth conifer-dominated forest and areas of disturbance. Woodland sites are found around the entire site but are predominantly in the northern two thirds of the property. Rock outcrop communities are frequently dominated by grasses and mosses, with prolific wildflower communities of high diversity. Often, native shrub cover at these sites is sparse. The southern third of the property is dominated by substantial rock outcrops with smaller occurrences along the northeastern property line. There is a large "T" shaped disturbance located in the middle of the property and it looks as if this area was cleared and stripped with an excavator. Age classes of forest types range from pole sapling (structural stage 4) to maturing forest (structural stage 5/6). The dry mixed woodland area consisting of Douglas-fir and arbutus is predominantly located in the southern half of the property; the Douglas-fir-salal plant association occurs in the northern portion of the property and along the eastern border. A small stand of Garry oaks is present along the eastern border of the property.

Table 1: Vegetation Typically Occurring within the Coastal Douglas-fir Moist Maritime Subzone (CDFmm)

Common Name	Latin Name
arbutus	*Arbutus menziesii*
bigleaf maple	*Acer macrophyllum*
Douglas-fir	*Pseudotsuga menziesii ssp. menziesii*
Garry oak	*Quercus garryana*
grand fir	*Abies grandis*
shore/lodgepole pine	*Pinus contorta*
western redcedar	*Thuja plicata*
baldhip rose	*Rosa gymnocarpa*
dull Oregon-grape	*Mahonia nervosa*
falsebox	*Paxistima myrsinites*
hairy honeysuckle	*Lonicera hispidula*
Indian plum	*Oemleria cerasiformis*
Labrador tea	*Ledum groenlandicum*
oceanspray	*Holodiscus discolor*
red elderberry	*Sambucus racemosa*
salal	*Gaultheria shallon*
salmonberry	*Rubus spectabilis*
snowberry	*Symphoricarpos spp.*
western trumpet honeysuckle	*Lonicera ciliosa*
Alaska oniongrass	*Melica subulata*
big-leaved sandwort	*Moehringia macrophylla*
bracken fern	*Pteridium aquilinum*
broad-leaved shootingstar	*Dodecatheon hendersonii*
false lily-of-the-valley	*Maianthemum dilatatum*
lady fern	*Athyrium filix-femina*
nodding trisetem	*Trisetum cernum*
Pacific sanicle	*Sanicula crassicaulis*
purple peavine	*Lathyrus nevadensis*
skunk cabbage	*Lysichiton americanum*
sword fern	*Polystichum munitum*
three-leaved foamflower	*Tiarella trifoliata*
vanilla leaf	*Achlys triphylla*
coastal leafy moss	*Plagiomnium insigne*
electrified cat's tail moss	*Rhytidiadelphus triquetrus*
juniper haircap moss	*Polytrichum juniperinum*
lanky moss	*Rhytidiadelphus loreus*
Oregon-beaked moss	*Kinbergia oregana*
palm tree moss	*Leucolepis menziesii*
red-stemmed feathermoss	*Pleurozium schreberi*
reindeer lichen	*Cladina spp.*
sphagnum moss	*Sphagnum spp.*
step moss	*Hylocomium splendens*

Table 2: Vegetation Occurring on Drummond Way Lot (June 2011)

Common Name	Latin Name
Alaska oniongrass	*Melica subulata*
arbutus	*Arbutus menziesii*
baldhip rose	*Rosa gymnocarpa*
big-leaf maple	*Acer macrophyllum*
big-leaved sandwort	*Moehringia macrophylla*
bitter cherry	*Prunus emarginata*
blue wildrye	*Elymus glaucus*
bracken fern	*Pteridium aquilinum*
broad-leaved shooting star	*Dodecathion hendersoni*
broad-leaved stonecrop	*Sedum spathulifolium*
bull thistle	*Cirsium vulgare*
cascara	*Rhamnus purshiana*
chickweed monkeyflower	*Mimulus alsinoides*
cladonia	*Cladonia sp.*
cleavers	*Galium aparine*
common camas	*Camassia quamash*
common forget-me-not	*Myosotis discolor*
creeping buttercup	*Ranunculus repens*
Dicranum sp.	*Dicranum sp.*
Douglas-fir	*Pseudotsuga menziesii*
dovefoot geranium	*Geranium molle*
dull Oregon-grape	*Mahonia nervosa*
electrified cattail moss	*Rhytidiadelphus triquetrus*
fragile fern	*Cystopteris fragilis*
Garry oak	*Quercus garryana*
hairy cat's-ear	*Hypochaeris radicata*
herb robert	*Geranium robertianum*
Himalayan blackberry	*Rubus discolor*
juniper haircap moss	*Polytrichum juniperinum*
little buttercup	*Ranunculus abortivus*
little western bittercress	*Cardamine oligosperma*
long stolon sedge	*Carex inops ssp. inops*
Menzies' larkspur	*Delphinium menziesii*
miner's-lettuce	*Claytonia perfoliata*
morning glory	*Ipomoea mauritiana*
mountain sweet-cicely	*Osmorhiza bertoroi*
oceanspray	*Holodiscus discolor*
Pacific dogwood	*Cornus nuttallii*
Pacific sanicle	*Sanicula crassicaulis*
pathfinder	*Adenocaulon bicolor*
pearly everlasting	*Anaphalis margaritacea*
Piperia sp.	*Piperia sp.*
rattlesnake plantain	*Goodyera oblongifolia*
red huckleberry	*Vaccinium parvifolium*
red osier dogwood	*Cornus sericea*

roadside rock moss	*Rhacomitrium canescens*
salal	*Gaultheria shallon*
salmonberry	*Rubus spectabilis*
Saskatoon	*Amelanchier alnifolia*
Scotch broom	*Cytisus scoparius*
Scouler's harebell	*Campanula scouleri*
Scouler's willow	*Salix scouleriana*
seablush	*Plectritis congesta*
Siberian miner's lettuce	*Claytonia sibirica*
Sitka willow	*Salix sitchensis*
slimleaf onion	*Allium amplectens*
small-flowered nemophila	*Nemophila parviflora*
small-leaved montia	*Montia parvifolia*
smooth alumroot	*Heuchera glabra*
spurge laurel	*Daphne laureola*
step moss	*Hylocomium splendens*
sweet vernal grass	*Anthoxanthum odoratum*
sword fern	*Polystichum munitum*
tall Oregon-grape	*Vaccinium parvifolium*
thimbleberry	*Rubus parviflorus*
trailing blackberry	*Rubus ursinus*
vanilla leaf	*Achlys triphylla*
western buttercup	*Ranunculus occidentalis*
western coralroot	*Corallorhiza striata*
western redcedar	*Thuja plicata*
western starflower	*Trientalis latifolia*
western trumpet honeysuckle	*Lonicera ciliosa*
white fawn lily	*Erythronium oregonum*
wild strawberry	*Fragaria virginiana*
yarrow	*Achillea millefolium*
yellow monkeyflower	*Mimulus guttatus*
yerba buena	*Satureja douglasii*

Vegetation Communities

Rock Outcrops (RO)

Rock outcrops are sensitive ecosystems in the CDFmm biogeoclimatic zone because of their extremely shallow soil layer. Vegetation on these sites is generally stunted and is often limited to shrub-like growth patterns. Vegetation on these sites must endure a very dry soil moisture regime and shallow erodable soils. Typical vegetation found on the rock outcrops on this site include baldhip rose, small-flowered alumroot, small-leaved montia, rock moss, Wallace's selaginella, broad-leaved shooting star, common camas, death camas, sea blush, sweet vernal grass, small-flowered blue-eyed Mary and broad-leaved stonecrop. This ecosystem is dominated by mosses growing over bedrock outcrops and often occurs in large open areas in association with other open type ecosystems such as Garry oak or Douglas-fir - Arbutus. There are two large rock outcrops

along the southern end of the property, two smaller outcrops along the eastern property line and three small outcrops northwestern end of the property. This community type covers approximately 2029 m^2 ha or 10.09% of the site.

Photograph 1 – View of northern face of northern most rock outcrop.

Photograph 2 - View of rock outcrop in disturbed area (note Scotch broom).

Photograph 3 – Eastern view of southwestern rock outcrop.

Photograph 4 - View of wildflower field on southwestern rock outcrop.

Photograph 5 – View across Douglas-fir/arbutus polygon towards southeastern rock outcrop.

Photograph 6 - View rock outcrop along eastern property line.

Douglas-fir/Arbutus (DA)

The Douglas-fir/Arbutus site series has a very dry soil moisture regime and a very poor to medium soil nutrient regime. The tree canopy is often interrupted because of the rock outcrops and pockets of shallow soil. A characteristic floristic feature of this site association is the presence of Douglas-fir regeneration in the understorey of the tree canopy. Mature stands are dominated by Douglas-fir and arbutus. Garry oak is often present as a minor tree species. The shrub layer contains oceanspray, dull Oregon-grape, and baldhip rose. Tall Oregon-grape and Saskatoon are also present in minor amounts. The herb layer consists of Columbia brome, purple peavine, Alaska oniongrass, western trumpet honeysuckle, broad-leaved starflower, white fawn lily, Pacific sanicle and often western fescue and cleavers. Oregon-beaked, electrified cat's-tail and step are the dominant moss species. The DA plant community is present as maturing forest. This community type covers approximately 7270 m^2 or 36.17% of the site.

Photograph 7 – View of Douglas-fir/arbutus plant community.

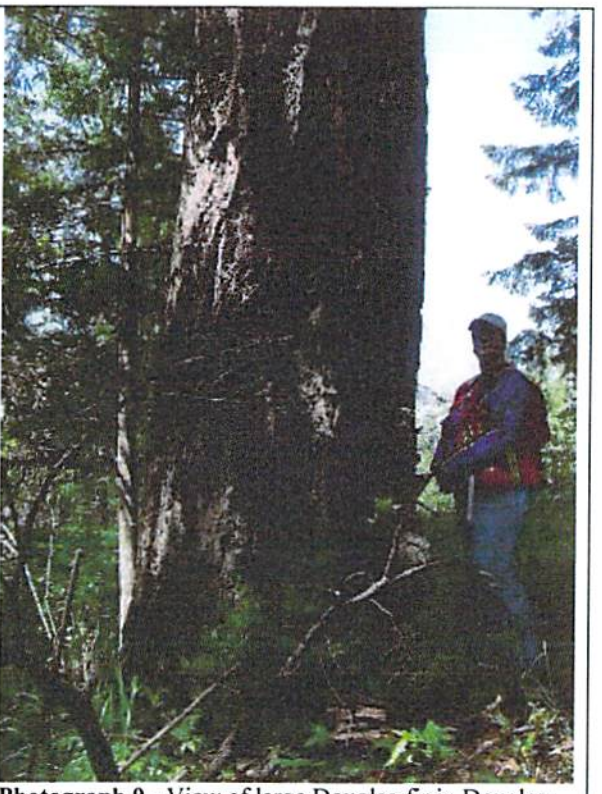
Douglas-fir – salal (DS)

The Douglas-fir–salal site series has a moderately dry soil moisture regime and a very poor to medium soil nutrient regime. This site association occurs on gentle to moderate slopes in the middle slope position. Mature stands have a canopy cover that is continuous except for openings caused by rock outcrops and shallow soils. The tree layer is dominated Douglas-fir, often with a component of grand fir and western redcedar. The shrub layer in mature stands is well developed, containing mainly salal and dull Oregon-grape with lesser amounts of red huckleberry and baldhip rose. The herb layer is dominated by sword fern, trailing blackberry and snowberry. Oregon beaked, step and electrified cat's-tail are the dominant moss species. This community type is present on site as maturing forest and covers approximately 7308 m^2 or 36.36% of the site.

Douglas-fir/dull Oregon-grape (DG)

The Douglas-fir – Grand fir – Oregon grape site series has a mesic soil moisture regime and a rich to very rich soil nutrient regime mesic soils. It typically occurs on gentle slopes in a middle- to upper-slope position. The tree layer consists primarily of Douglas-fir, western redcedar and grand fir, but may also contain bigleaf maple and western flowering dogwood. The shrub layer consists mostly of salal and dull Oregon-grape, with lesser amounts of oceanspray and baldhip rose. The herb layer is predominated by sword fern and vanilla leaf. The moss layer typically consists of Oregon beaked moss, step moss, palm tree moss and electrified cat's-tail moss. This polygon is located along the northern property boundary, immediately to the south of the moist forest. This ecosystem covers approximately 1512 m^2 or 7.52% of the site.

Photograph 8 – View of western coralroot in Douglas-fir/salal plant community.



Photograph 9 - View of large Douglas-fir in Douglas-fir/salal plant community.

Photograph 10 – View of Douglas-fir/dull Oregon-grape plant community.

Photograph 11 - View of Douglas-fir/dull Oregon-grape plant community.

Western redcedar – Indian plum (RP)

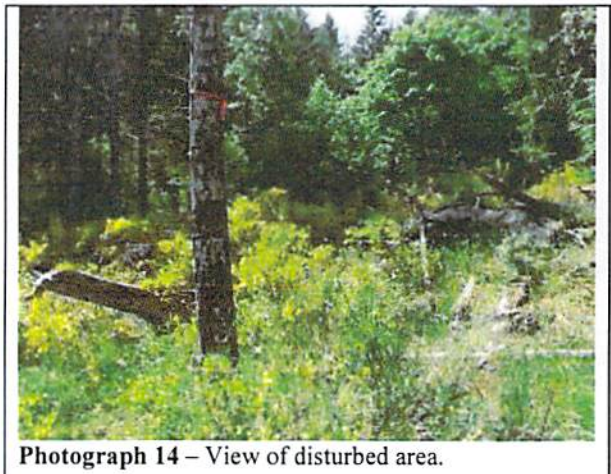
There is a small area of immature moist woodland located at the northern end of the property. This area is seasonally wet due to hillslope runoff. Plant species within this area consist of red alder, bigleaf maple, Scouler's willow, thimbleberry, salmonberry, Himalayan blackberry, oceanspray, red osier dogwood, and juvenile western redcedar. This ecosystem covers approximately 747 m^2 or 3.72% of the site.

Photograph 12 – View of Riparian plant community.

Photograph 13 - View Riparian plant community.

Disturbed (DI)

The disturbed portion of this property occurs in a "T" shape in the center of the property. It appears at one time this was an excavator track however it is currently heavily overgrown with invasive species such as Scotch broom and Himalayan blackberry with lesser amounts of salal, tall Oregon-grape, baldhip rose, Pacific sanicle, oceanspray and Garry oak seedlings. This disturbed area covers approximately 1274 m^2 or 6.34% of the site.



Photograph 14 – View of disturbed area.

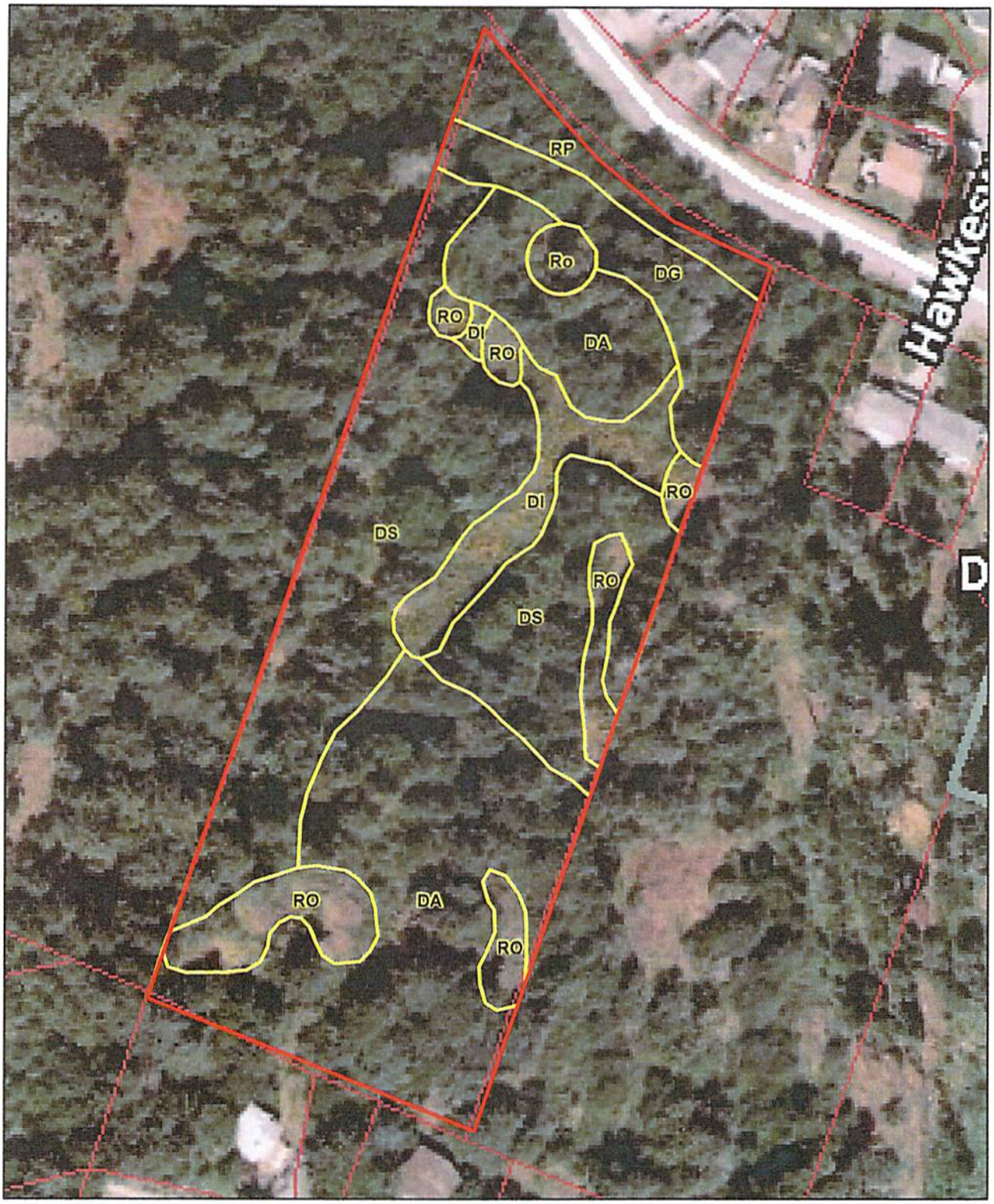
Photograph 15 - View of disturbed area (note ditch).

In summary, the site consisted of the following:

- 2029 m^2 of rocky outcrop vegetation (RO)
- 7270 m^2 of Douglas-fir/Arbutus vegetation (DA)
- 7308 m^2 of Douglas-fir/salal (DS)
- 1512 m^2 of Douglas-fir/dull Oregon-grape (DG)
- 747 m^2 of Western redcedar – Indian plum (RP)
- 1274 m^2 of disturbed (DI)

These vegetation communities and the location of the vegetation survey plots are presented in Figure 3.

Drummond Way - Vegetation Communities



Legend

Site Boundary

Vegetation Communities

Map Drawn: June 14, 2011
Figure 3
Drawn By: ENKON Environmental Ltd.

N

0 15 30 60 Meters

ENKON Environmental

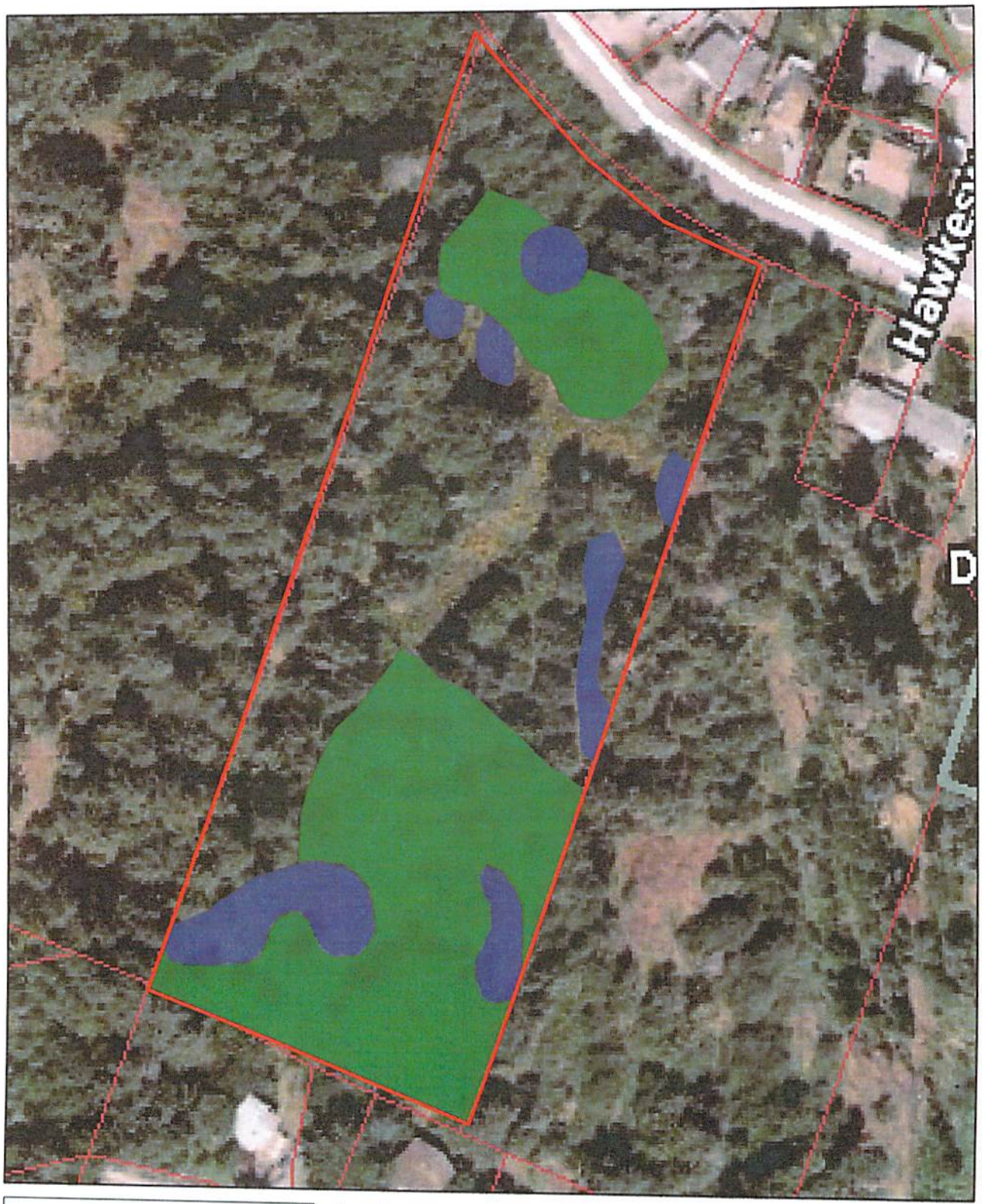
Sensitive Ecosystems

According to the Sensitive Ecosystem Inventory maps from the Ministry of Environment (MoE) there are no sensitive ecosystem polygons mapped for this property.nnBased on the 2011 field survey it was determined that the following sensitive ecosystems are present on the property:

- Terrestrial herbaceous (rock outcrops) (HT:ro) – 2029 m^2
- Woodland (WD) – 7270 m^2

Terrestrial herbaceous ecosystems are defined as natural grasslands or byrophyte-dominated vegetation, including rock outcrop/grassland and rock outcrop/moss types, having greater than 20% cover. Woodlands can consist of Garry oak woodlands, Douglas-fir/Arbutus woodlands or trembling aspen stands. All sensitive ecosystems found on the site are shown on Figure 4.

Drummond Way - SEI



Legend

Site Boundary

Sensitive Ecosystem

Terrestrial Herbaceous

Woodland

Map Drawn: July 7, 2011
Figure 4
Drawn By: ENKON Environmental Ltd.

0 15 30 60 Meters

N

ENKON Environmental

Rare and Endangered Vascular Plants and Plant Communities

Rare vascular plants occurring within the South Island Forest District listed by the Conservation Data Center (CDC) are shown in Appendix I. As of July 6, 2011, 112 plant species were present on the CDC list, including 58 red-listed species and 54 blue-listed species.

Rare and endangered vascular plant species are listed by the Conservation Data Center (CDC), which categorizes them as either red- or blue-listed. Red-listed species include species that are extirpated in British Columbia, in danger of becoming extirpated, or are threatened. Blue-listed species are species that are sensitive or vulnerable to human activity or habitat encroachment. The CDC now makes available from its website a search engine to determine whether there are any element occurrence polygons present on the property. These polygons indicate the expected area in which a rare plant may be found. There were no polygons found in the immediate vicinity of the property.

During the 2011 field visit slimleaf onion (*Allium amplectens*) was noted on the southwestern rock outcrop which is blue-listed. In addition several rein orchids (*Piperia* species) specimens were observed on rock outcrops on the eastern property boundary. There are two listed species of rein orchid known to occur within the CDFmm that have some potential to occur on the site; white-lipped rein-orchid (*Piperia candida*, red-listed) and elegant rein-orchid (*Piperia elegans*, blue-listed). It is not possible to identify these plants until they flower. In order to determine if there are listed orchids on the site a follow-up visit is recommended before the end of July.

The CDC reports the occurrence of 37 rare and endangered plant communities in the CDFmm of which 30 are red-listed, six are blue-listed, and another yellow listed (Appendix I). The CRD's Natural Areas Atlas indicates that the entire site is composed of the red-listed Douglas-fir – Oregon-grape (DG) plant community.

A small portion of this plant community was observed along the northern boundary of the site to the immediate south of the RP plant community. As well, the red-listed Douglas-fir / arbutus (DA) site association was observed in the southern half of the site.

Significant Trees

The CDC does not have any records from the *B.C. Registry of Big Trees* of "record" occurring within the Project Area. A large diameter Douglas-fir (1.5 m DBH) was observed along the eastern boundary of the site.

2.1.2 Wildlife

2.1.2.1 Methods

Office Study

The following background information was reviewed prior to the field visits in order understand the site topography and identify potential biological resources that may occur on the property. This information was then used to plan approximate location of survey areas (transect and point count stations) and stratification of the study area based on habitat types.

- TRIM mapping (1:20,000 scale);
- Additional mapping for the study site and area (i.e. air photo, 1:15,000 scale and topographic mapping, 1:20,000 forest cover maps) and aerial photographs to identify potential habitat for target species; and
- Conservation Data Center Tracking Lists (for rare animals, vascular plants and plant communities).

Field Study

The field survey for this property was conducted on June 6, 2011 and included a wildlife tree assessment and incidental sightings. When feasible, all surveys were conducted according to the following provincial standard methodologies developed by the Resources Information Standards Committee (RISC). Because tree falling has not been scheduled an active nest survey and/or nocturnal raptor survey have not been conducted. If tree falling is to be scheduled within these breeding windows then additional surveys will be necessary.

Potential Occurrence of Vertebrates of Conservation Interest

The Conservation Data Centre (CDC) maintains tracking lists of rare vertebrate species for each Forest District in British Columbia. Species, subspecies, populations, or communities at high risk of extinction or extirpation are placed on the red-list, while those considered vulnerable are placed on the blue-list. Although the South Island Forest District tracking list shows many animal taxa "at risk" (i.e. red- or blue-listed), many of these are entirely dependent on the marine environment. Those vertebrate species for which potentially suitable habitats occur in the Project Area are summarized below in Table 3.

Table 3: Selected Red and Blue-listed Vertebrates of the South Island Forest District

English Name	Scientific Name	Provincial Status	Federal Status
Sharp-tailed snake	*Contia tenuis*	Red	Endangered (SARA schedule 1)
Band-tailed pigeon	*Columba fasciata*	Blue	Special Concern (COSEWIC)
Western screech-owl, kennicottii subspecies	*Otus kennicottii kennicottii*	Blue	Special Concern (COSEWIC)
Northern pygmy owl	*Glaucidium gnoma swarthi*	Blue	None
Olive-sided Flycatcher	*Contopus cooperi*	Blue	Threatened (COSEWIC)
Ermine, *anguinae* subspecies	*Mustela erminea anguinae*	Blue	Special Concern (COSEWIC)

Wildlife Tree Survey

The site was opportunistically searched for wildlife trees during other surveys conducted on the property. Wildlife trees consist of veteran trees and those that show signs of being or have the potential of being important to wildlife.

2.1.2.2 Results

Habitat Capability

The subject property is a complex mosaic of natural and human-influenced habitat. Soil moisture conditions range from moist to very dry, while forest cover ranges from open (RO) to relatively closed (DS/DG).

Mapped plant communities occurring on the site were organized into six generalized habitat groupings. A brief description of the habitat grouping and their associated wildlife values is provided below and ratings are summarized in Table 4 and 5 below.

Upland Habitats

Douglas-fir/Arbutus (DA), Douglas-fir – salal (DS) , Douglas-fir – Oregon-grape (DG)

These habitat grouping covers a large proportion of the site. The Douglas-fir/arbutus community is predominantly located along the southern property line with a smaller occurrence towards the northern end of the site. The tree layer is dominated with Douglas-fir and arbutus with an understory comprised mostly of dry upland species such as oceanspray and Oregon-grape. The Douglas-fir/salal community occurs on along the western side of the property as well as a smaller occurrence along the eastern property line. The tree layer is dominated by

Douglas-fir trees and is interspersed with bigleaf maple. Characteristic understorey species include salal, oceanspray, baldhip rose and upland willow species, which can form a moderately dense cover in semi-open canopy conditions. This grouping has average to above average ratings for habitat attributes such as forage production, hiding cover, snags, woody debris and surface complexity. It has moderate to high importance for deer, small-to-medium-sized furbearers, woodpeckers and forest songbirds.

Rock Outcrop (RO)

Two large rock outcrops occur in the southern portion of the property and are intermingled with the Douglas-fir/arbutus and Douglas-fir/salal forests. Plant growth on outcrops is typically dominated by mosses with a lesser cover of graminoids, forbs and drought tolerant shrubs. They typically have above-average value with respect to wildlife forage production and travel. They can be important sites for herbivores like deer and cottontails, and often attract use by basking reptiles and hunting raptors.

Disturbed (DI)

There is a "T" shaped disturbed area located in the centre of the site and is dominated by Scotch broom and Himalayan blackberry. Disturbed areas are generally low quality habitats, although they possess fairly high herbage values and high values for ground and shrub nesting songbirds that are able to breed successfully in such areas.

Lowland Habitats

Western redcedar – Indian plum (RP)

There is a small section of young moist forest located along Drummond Way at the northern property line. There is a small ditch that runs along the front of the property to address runoff off Drummond Way. Moisture in this area is also the result of hillslope runoff from the property. The forest in this area is moderately disturbed with garbage and yard clippings that have been dumped. Due to the disturbed nature of this area as well as the location of the roadway along the northern edge of the polygon this area has a moderate habitat value. It is suitable for ground and shrub nesting songbirds and would provide migratory corridors for small mammals. It does not appear that the ditch holds a substantial amount of water to allow for successful amphibian reproduction.

Table 4: Habitat Values for Selected Vertebrate Species/Species Groups

Habitat Grouping	Relative Importance to Species / Species Group						Overall Wildlife Rating
	Deer	Furbearers[1]	Small Mammals[2]	Herptiles[3]	Woodpeckers	Songbirds	
Disturbed	Moderate	Low	Low to Moderate	Low to Moderate	Nil	Moderate to High	Low-Moderate
Douglas-fir/Arbutus (dry mixed woodland)	Moderate to High	Moderate	Low	Low	Moderate to High	High	Moderate
Douglas-fir - salal (mesic mixed woodland)	Moderate to High	Moderate	Moderate to Low	Low	Moderate to High	High	Moderate
Rock Outcrop	Moderate to High	Moderate	Moderate	Moderate to Low	Moderate-Low	Moderate	Moderate
Western redcedar – Indian plum	High	Moderate-High	High	Moderate to High	Moderate	High	Moderate

Notes:

[1] "Furbearers" is a generalized term, which includes raccoons, mustelids, Eastern cottontails and red squirrels.

[2] "Small Mammals" include shrews, mice and voles native to Vancouver Island.

[3] "Herptiles" is a term given to the combined grouping of amphibians with reptiles.

Table 5: Summary of Values in Habitat Types

Habitat Grouping	Forage Production			Snag Abundance	Coarse Woody Debris	Surface Complexity	Hiding Cover	Travel Corridor Potential
	Browse	Herbage	Berries					
Disturbed (sparsely vegetated)	Very Low	High	Moderate	Nil	Nil	Low	Very Low	Moderate
Douglas-fir/Arbutus (dry mixed woodland)	Moderate to High	Moderate to Low	Moderate to Low	Moderate	Moderate	Moderate	High	High
Douglas-fir – salal (mesic mixed woodland)	Moderate to High	Moderate to Low	Moderate to Low	Moderate to High	Moderate to High	Moderate	High	High
Rock Outcrop	Moderate to High	Low	Moderate	Low	Moderate	Moderate	Moderate	Moderate to High
Western redcedar - Indian plum	Low	Low	Low	Low	Low to Moderate	Low	Low	Moderate

Birds

No nests of species continuously protected under Section 34 of the B.C. *Wildlife Act* (e.g. bald eagle; great blue heron) were found on or near the property. Although bald eagles do occasionally hunt away from the marine shoreline, the majority nest within 250 m of tidal waters. Outside the breeding season, great blue herons often feed in wetlands and meadows (particularly in winter) but nest colonies are usually associated with close proximity to productive eelgrass beds (< 6 km flight distance). No nests were located during the visits to the site however territorial songs of many of the birds heard on the property indicated the presence of breeding birds.

Songbirds form the largest part of the bird assemblage on this property. Warblers and thrushes are common in the forest patches during the breeding season. Open and above canopy areas attract use by sparrows, swallows, and other aerial insectivores. Commonly mixed forest habitats provide the highest levels of structural diversity, and therefore are expected to possess the highest songbird densities. In order to comply with Section 34 of the Wildlife Act, which states that it is illegal to disturb or destroy the nest of any breeding bird, tree falling should only occur after the middle of August when the majority of birds have finished nesting and their young have successfully fledged. The window for falling trees occurs after the middle of August and before February when some of the larger owls can initiate breeding. If trees have to be removed outside of this window a biologist will be required to conduct a nesting survey. If any active nests are found a buffer zone, as recommended in the Best Management Practices for Land Development, should be followed.

Table 6 below summarizes bird species recorded during the 2011 field survey. A total of 20 songbird species were observed on the site.

Table 6: Bird Species Observed During the June 2011 Field Survey

English Name	Scientific Name
American robin	*Turdus migratorius*
Bewick's wren	*Thryomanes bewickii*
Bushtit	*Psaltriparus minimus*
California quail	*Callipepla californica*
Chestnut-backed chickadee	*Poecile rufescens*
Dark-eyed junco	*Junco hyemalis*
Golden-crowned Kinglet	*Regulus satrapa*
Hairy woodpecker	*Picoides pubescens*
Northern flicker	*Colaptes auratus*
Olive-sided flycatcher	*Contopus cooperi*
Orange-crowned warbler	*Vermivora celata*
Pacific wren	*Troglodytes pacificus*
Pacific-slope flycatcher	*Empodonax difficilis*
Red-breasted nuthatch	*Sitta canadensis*
Red-tailed hawk	*Buteo jamaicensis*

English Name	Scientific Name
Rufous hummingbird	*Selasphorus rufus*
Spotted towhee	*Pipilo maculatus*
Turkey vulture	*Cathartes aura*
Violet-green swallow	*Tachycineta thalassina*
Western tanager	*Piranga ludoviciana*
Species Total	**20 species**

Incidental Observations

Black-tailed deer (*Odocoileus hemonionus* ssp. *columbiana*) sign was observed on the property. Eastern cottontail (*Sylvilagus floridanus*) droppings were encountered throughout the site. Grey squirrel (*Sciurus carolinensis*) middens were noted on the side.

2.1.3 Accounts of Red and Blue-Listed Species

The only blue- or red-listed species observed on site during the survey the blue-listed olive-sided flycatcher. Olive-sided flycatchers are often found in clearings and early post-fire landscapes. They have a preference for coniferous forest edges and opening like meadows, rivers, bogs, swamps and ponds. They feed exclusively on insects that are caught in the air and have a preference for bees. Cup nests are constructed high in the tree, usually conifers but occasionally deciduous. Typically three eggs are in a clutch. The olive-sided flycatcher undertakes the longest migration of any of North America flycatchers arriving on their breeding grounds late in the spring.

As well, it is possible that the provincially blue-listed band-tailed pigeon, northern pygmy owl, western screech owl, and sharp-tailed snake may occur on the property.

The band-tailed pigeon (*Columba fasciata*) is found in the forests or coastal woodlands of Western British Colombia and the United States (Alsop, 2002; Baron and Acorn, 1997; Campbell *et al.* 1997). They perch, nest and feed in coniferous trees such as pines as well as maples and alders. The band-tailed pigeon will avoid populated areas and any human contact. It prefers forest environments. This secretive cousin of the common pigeon (i.e., rock dove) eats nuts, seeds, berries, blossoms and insects found in coastal woodland and forest habitat. When in season, it is also known to eat domestic crops such as cherries, berries, oats, barley and wheat. Breeding season begins in March and lasts through late spring. The female builds a flat, loose nest on the ground, in low brush, or in the fork of lower tree branches usually associated with stream habitat. Nesting materials are provided by the male and consist mainly of twigs and pine needles. One, egg sometimes, two eggs are laid per season with both male and female responsible for incubation.

The northern pygmy owl has not been listed by COSEWIC but is blue-listed as species of concern by the CDC in the Southern Vancouver Island Forest District. The northern pygmy owl is an uncommon resident across the province of British Columbia and most abundant across the northwest and southern part of the province. Resident populations are restricted to the southern portions of the province (Campbell et. al. 1990). This owl occupies the edges of open coniferous forests or mixed woodlands of riparian thickets, damp and dry meadows, vacant city lots, parks, cemeteries and residential areas. Primarily a cavity nester, historically, all nests discovered in British Columbia have been in old woodpecker holes of coniferous trees including Douglas-fir, western hemlock, and western larch.

The western screech owl has been designated by COSEWIC as a species of concern and is blue-listed in the Southern Vancouver Island Forest District. Campbell (1990) describes the western screech owl as an uncommon to fairly common resident on the south coast including Vancouver Island. The western screech owl occurs at low elevation forests throughout much of Vancouver Island. The forest type and proportion of deciduous trees vary depending on location but territories are often in riparian zones. Forested habitats are quite varied and can include urban and suburban areas. Aside from suitable nesting sites, the territory must include dense conifer roosting sites (Robertson et al. 2000). Southern Vancouver Island is one of the main regions of concern for this species. Urban development is leading to a decline in the amount of low elevation forested habitat available (Fraser et al. 1999, Robertson et al. 2000). Another concern is the rapid increase of barred owls in the last decade or two, a predator of the western screech owl. There were no cavities noted on the property that would be suitable in size but the area could be used as part of a foraging territory.

The property also holds some potential for the red-listed sharp-tailed snake. It prefers south facing slopes with woody debris and rocks creating structural complexity. This species has been designated as endangered by COSEWIC and red-listed by the CDC in the South Vancouver Island Forest District (May 2005). The Natural Areas Atlas shows that potential sharp-tailed snake habitat is located 500 m to the southwest of this property. The sharp-tailed snake is very illusive and rarely seen animal (Cook 1984). In British Columbia, several scattered records have been made from Vancouver Island and the Gulf Islands, in the Coastal Douglas-fir Biogeoclimatic Zone; one additional record made from McGillivray Lake, in the Engelmann Spruce-Subalpine Fir Biogeoclimatic Zone. Elsewhere, range extends from western Washington and Oregon south to central California.

Little is known about the sharp-tailed snake because of its secretive behaviour and because it is primarily nocturnal. Sharp-tailed snakes occur in a variety of habitats, however, they are most commonly found in moist environments with an abundance of surface debris, such as twigs, roots, and leaves. The limited

information available suggests that they prefer to live in small forest openings with a rocky substrate and southern exposure (Ovaska 2004). The sharp-tailed snake is found in areas with surface moisture and it becomes active during the cool fall and winter temperatures. Because of their preference for cooler temperatures and higher moisture levels, *C. tenuis* is active at different times and in different microhabitats than most snakes. This snake can be found mainly in wooded areas of varying ages or near intermittent streams (Leviton 1971; Morey 1989; Basey 1976, Ovaska 2004). The staple diet of the snake consists mainly of slugs (Nussbaum et al. 1983; Spalding 1993).

There is some habitat suitable for this species on this site however occurrences on the Island are very few. Green and Campbell (1992), describe the sharp-tailed snake as mostly known from North and South Pender Islands in the Gulf Islands, although two specimens were caught near Chase in the interior in 1964. One specimen collected in the 1800's has its locality noted as Vancouver Island and two more specimens have recently been found in Metchosin on Vancouver Island. It is not clear whether this distribution is due simply to the secretive nature of the snake and the resulting scarcity of recorded specimens or that the British Columbia populations are relicts of a wider range in the past. This species can co-exist with development as long as "snake friendly" gardening and landscaping is used. These involve leaving much of the rocky outcrops in their natural state and avoid using chemical slug bait.

2.2 Aquatic Resources

There are no known aquatic features located on this property. During the 2011 field survey there were small ditches noted in the disturbed area. It appears that these were dug with an excavator and were used to drain hillslope runoff. They still occasional convey flow and rafting leaves and twigs were noted. They are likely dry for much of the year and all were dry during this survey. They drain down the eastern side of the disturbed area and enter into the Drummond Way ditch. The ditch was followed into Drummond Park, to the east of the property, where signs of above ground flow diminished. Because this roadside ditch does not convey flows into a waterbody that contains fish the Riparian Areas Regulation does not apply and a further assessment is not required.

IMPACT ASSESSMENT

3.1 Vegetation

3.1.1 Potential Impacts

Potential impacts to vegetation include the following:

- Loss of rare or endangered plants or plant communities;
- Loss of wildlife habitat and
- Mass wasting or erosion due to removal of stabilizing root systems.

The total area encompassed by the development, including houses and roadways is approximately 1.75 ha, which is approximately 87.0 % of the total property. Based on the present plan all of the disturbed area will be re-developed. The remaining 0.26 ha (13.0% of total area) with become park. Upon consultation with ENKON the developer re-designed the site layout in order to protect the two large rock outcrops and Douglas-fir/arbutus plant community located at the southern end of the property.

3.1.1.1 Rare Plant Communities

Based on the proposed site layout plan the following rare plant communities will be impacted:

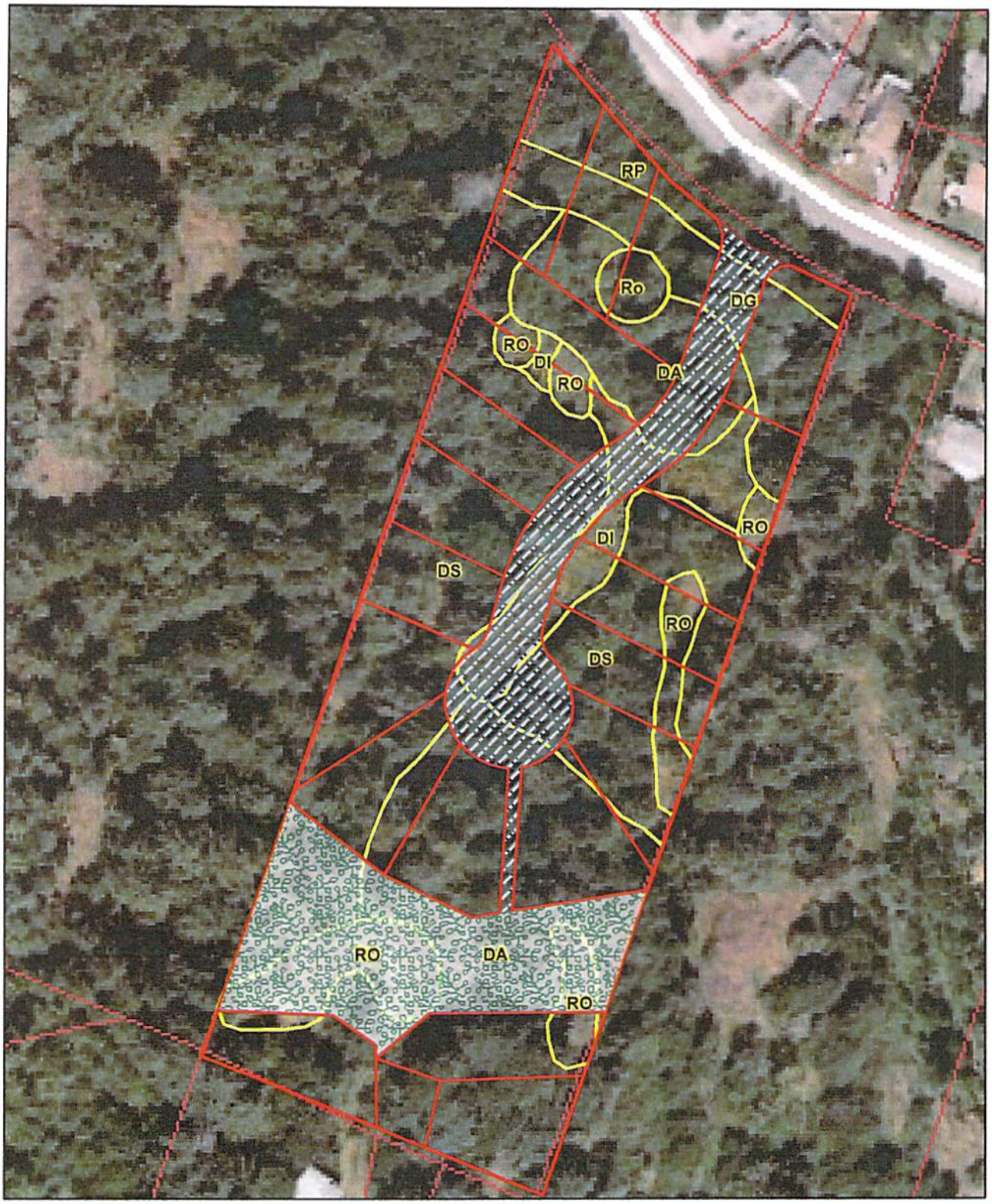
- Douglas-fir/arbutus (red-listed) - 0.61 ha (85%)
- Douglas-fir – Oregon-grape (red-listed) - 0.15 ha (100%)

3.1.1.2 Sensitive Ecosystems

Losses to sensitive ecosystems due to the proposed subdivision are:

- Rock outcrops 0.11 ha (56%)
- Woodland 0.61 ha (85%)

Drummond Way - Figure 5



Legend

- Lot Boundaries
- Green Space
- Proposed Road
- Site Boundary
- Vegetation Communities

Map Drawn: July 7, 2011
Figure 5
Drawn By: ENKON Environmental Ltd.

0 15 30 60 Meters

N

ENKON Environmental
Phone: 1 800 374 5927
Email: enkon@enkon.com

3.1.2 Mitigation Strategies

Based on the current site layout plan losses to sensitive ecosystems and rare plant communities occurring on the property are potentially significant. ENKON is proposing the addition of conservation covenants on portions on some of the lots where possible. The lots considered for these covenants are as follows:

- Lots 2 and 3 – southern part of lots where RO and DA plant communities are present
- Lot N – eastern part where RO plant community is located
- Lots J, K and L – eastern part where RO plant community is located
- Lots G, H and I – southern part of lots where DA plant community is located
- Lot 5 – eastern part of lot where RO plant community is located
- Lot 6 – eastern part of lot where DA plant community is located
- Lot 7 – western part of lot where DA and RO plant communities are located

There will be a significant reduction in the loss of sensitive ecosystems and rare plant communities as a result of this development if the above mentioned areas are protected. It is anticipated that there will be some physical constraints on what areas can be covenanted as the extent of the blasting on site has not yet been determined.

Mitigation methods, as outlined below, were developed as per the recommendations in Environmental Objectives, Best Management Practices and Requirements for Land Developments, Vancouver Island Region (MELP 2001).

To reduce the potential for vegetation impacts, the following mitigation practices are recommended:

- Erect fencing (which could include split-rail fencing along trails near sensitive ecosystems) to discourage access and prevent direct human and domestic pet impact around the sensitive ecosystem polygons where appropriate, such as those areas where maximum human access is expected. This is particularly important in rock outcrop areas as they are easily damaged by pedestrian traffic;
- Protect all trees that are to be retained from mechanical damage to the trunk and root system, for example by marking and/or fencing trees that are to be protected during the construction phase of the project;
- Restrict vehicle traffic to designated access routes and travel lanes to avoid soil compaction and vegetation disturbances;
- Dispose of woody debris in an environmentally sensitive manner;

- Avoid alterations to existing hydrological patterns to minimize impact on riparian vegetation and sensitive ecosystems;
- Remove the minimum amount of vegetation possible from environmentally sensitive areas or areas where rare or endangered plants or plant communities are identified by the environmental monitor;
- Establish "clear only" zones on steep or other environmentally sensitive areas, in which tree and shrub roots will be left intact in the ground to minimize impact due to erosion, to promote regeneration, or to retain aesthetic values;
- Minimize blasting in close proximity to sensitive areas (particularly the Douglas-fir – Arbutus plant communities) wherever possible and re-vegetate cleared areas with a native seed mix as soon as practical to minimize or prevent erosion;
- A plant salvage should be conducted on those areas which will be lost, especially in sensitive ecosystems such as woodlands and rock outcrops;
- Mark vegetation to be protected high visibility snow fencing to separate it from the construction area;
- Reduce grubbing as much as possible around the drip line of any tree to be retained and use high visibility snow fencing to identify the boundary beyond the drip lines of the trees to ensure that any soil removal will be restricted to the area away from the trees;
- Where partial clearing of a treed area is required, minimize and contain damage to adjacent vegetation within the 6 m allowance, and if any tree removal is necessary for access then the falling must done so that trees fall toward the cleared area, clearing in a manner that minimizes the potential for wind throw and enhances wildlife habitat;
- Establish conservation covenants on the remainder of the Sensitive Ecosystem polygons to be retained in the greenspace area; and,
- Follow the *Tree Protection Plan* and *Sensitive Ecosystem Management Plan.*

Where vegetation impacts are unavoidable enhancement in the form of broom removal and plantings of indigenous vegetation is recommended for the park and green space areas. These areas should be monitored to ensure planting success. Broom removal will be required on a regular basis to effectively eradicate this species.

3.2 Wildlife

3.2.1 Potential Impacts

The following sections discuss general potential construction and post-construction impacts and also address specific impacts that may affect the

wildlife species in the vicinity of the Drummond Way proposed residential development.

3.2.1.1 Construction Related Impacts

General Construction Impacts

Construction on the Drummond Way property will impact wildlife in two major ways during breeding season (March-August). The first impact is noise as heavy machinery and earth moving equipment generate high noise levels during the construction process. Secondly construction-generated dust from the releases of dust particles from earth-grading can alter the nesting and breeding of some birds.

Noise

Earthmovers and other heavy construction equipment will generate high noise levels. Noise levels may be particularly acute during the grading stages of construction and these noises may interfere with animal communication and detection of predators. If clearing and construction are performed during the bird breeding season, which is typically March through August, mating calls may be lost or obscured by the intervening noises, there is a potential for nest abandonment and loss of habitat for birds actively engaged in incubation and rearing. In addition, noise generated during site-preparation activities such as falling, chipping and blasting can disrupt breeding birds at some distance from the actual clearing area and cause other wildlife to avoid the area. Resulting short-term abandonment of nests can cause increased nest predation and also lower the temperature of nest contents to dangerously low levels causing natal mortality.

The project also has some potential to cause the disturbance of wildlife feeding, movement and/or dispersal patterns. Construction-related activities such as drilling, blasting, falling, and chipping will generate considerable noise, which may force wildlife to abandon habitats up to 200 m from the active construction zone. The size of the impact area would depend on factors such as the noise level, the duration of the activity, and its timing. In addition to noise disturbance, cavity-nesting species can be directly impacted during construction, by the removal of hazardous snags to create safe work zones.

Construction-generated Dust

Construction-generated dust may have noticeable repercussions for plants and nesting birds. Dust deposition on leaves can reduce photosynthesis through numerous means. It blocks stomata and increases transpiration, which may increase water loss during the night and make plants more susceptible to drought. Secondary effects of dust deposition will include lower resistance to disease, pests, and fungi of both plants (Farmer 1993) and young nest chicks.

Habitat Loss

The proposed greenspace retention area will consist of a combination of vegetation types including rock outcrops, dry mixed coniferious/deciduous woodland and mesic conifer forest. The retention of various habitat types will benefit an array of species of birds and the limited mammal assemblage.

Habitat Fragmentation and Wildlife Vehicle Collisions

Habitat fragmentation impacts are closely linked to impacts on wildlife movement patterns, and in extreme cases can lead to incidents of wildlife vehicle collisions. Habitat fragmentation relates primarily to smaller animals with limited dispersal ability.

The residential development proposed will further fragment the natural forests of the area with the removal of indigenous vegetation. This will be a benefit to habitat generalists like the brown-headed cowbird, house sparrow and European starling at the expense of species specialists like the Townsend's warbler and Cassin's vireo. Non-native animals, such as: pigeons, starlings and house sparrows may increase as native species decrease. Within the indigenous populations of wildlife, diversity may decline but total numbers should not.

It has long been known that relatively few species are able to meet all their habitat requirements for breeding, feeding and denning in one isolated area. As a result, most forms of wildlife are forced to move across the landscape on daily, monthly and/or seasonal basis. Though no detailed study of movement patterns has been conducted on the property, it is reasonable to assume that there is wildlife migration on the site. Animals with small home ranges such as frogs, salamanders, snakes and shrews are especially vulnerable to wildlife vehicle collisions, even at very low levels of traffic. The developer has created a road alignment at Zapata Place that will not intersect the green space thus helping to reduce wildlife roadway mortalities and will create a continuous migration corridor to the undeveloped adjacent properties.

3.2.1.2 Post-Construction Related Impacts

The following are impacts associated with the post-development phase of the proposed residential area, once the homes are built and occupied.

Predation by Domestic Animals and Urban Impacts

Household pets, primarily cats and dogs, pose a danger to birds and small animals. The impact of domestic cats on small mammal populations has been discussed in some detail in Zuleta and Galindo-Leal (1994). Cats are a significant predatory influence on birds and small mammals. Dogs may harass indigenous fauna, which then may avoid the area and seek out less developed areas in the neighbourhood.

Supplemental food for wildlife (i.e., bird feeders and people feeding wildlife), can alter species behaviour, keep populations above carrying capacity, favour opportunists (e.g., European starlings, house sparrows and raccoons), potentially introducing disease among some species (i.e. house finch conjunctivitis), and may directly increase chances of mortality. Birdfeeders used by granivorous

bird species can spread the bacterial disease salmonellosis through feces-contaminated seed and the fungal disease asperigillosis can be spread through mouldy seed at feeders. Hummingbird feeders containing a sugar-water solution can spread bacteria. Urbanization may indirectly contribute to birds at feeders becoming easy prey for cats and hawks. Finally, human garbage and pet food allow opportunists such as raccoons to be supported at population levels above what is found in the wild.

Competition for Nest Cavities

Developments such as this can increase competition for remaining nest cavities between native birds and more aggressive introduced species (e.g., starlings and house sparrows). In rural areas some cavity nesters such as Northern flickers, red breasted nuthatches and hairy woodpeckers appear to persist in the face of heavy competition for nest cavities with starlings and house sparrows. However, since cavities are often a limiting habitat feature in urban settings, there is still potential for impacts to native birds.

Increased exotic bird presence is a concern because they may decrease the amount of food available to indigenous birds. Common pigeons (i.e., rock dove), house sparrows, and European starlings are all exotics that thrive in an urban-natural space interface. Starlings are insectivores and may decrease both the food supply for native insectivores, as well as, affecting populations of pollinating insects.

Human Disturbance of Wildlife

Human activity in the area has likely resulted in a certain degree of wildlife habituation to human activity. However, the proposed increased human presence associated with a residential development may cause some species to reach a tolerance threshold and become more nocturnal or abandon the site altogether.

Roadside and yard waste from houses can also pose another risk to animals. With the development of housing and associated road network, the animal habitat will be exposed to a greater and wider array of human garbage. Items that pose particular threat include cigarette butts, gum, plastics and food wrappers, all of which can be mistaken for food and eaten. These items are not part of a healthy animal diet and plastics interfere with digestive processes. Raccoon, red squirrel and scavenging birds will suffer the most from human garbage if it is not managed appropriately.

3.2.2 Mitigation Strategies

3.2.2.1 Construction Related Impacts

In addition to the following mitigation techniques, the project proponent should have an environmental monitor on-site to oversee construction activities that have the potential to damage wildlife habitat. For example, during land clearing activities there is the potential to create sedimentation and soil erosion problems

if preventative measures such as silt fencing and sediment ponds are not put into place prior to land clearing activities. These preventative measures are especially important during rain events.

Noise

The following mitigation measures are recommended to alleviate for construction noise impacts:

- Schedule noisy construction activities in outside of the bird-breeding season (i.e. avoid such work over February through August).
- Use best management practices for blasting work (e.g. min. effective charge; shock matting, use of hydraulic vs. air drills, etc.).

Construction-generated Dust

To minimise impact from dust and impact to surface water it will be important to develop and implement a sediment and erosion control plan before construction and re-vegetate all areas with indigenous vegetation after construction.

To control unwanted dust, before grading or using heavy construction equipment, the ground should be sprayed with water. This reduces the amount of dust released into the air by 50 to 90%.

Habitat Loss

It is usually not possible to completely mitigate the impact of permanent habitat loss. Overall habitat impacts are considered high with the propose site layout and consideration should be given to the following mitigation measures:

- Treed linkage corridors should be maintained along the edges of the proposed development and between core-forested areas. This will ensure connectivity between nesting habitat and foraging habitat for birds. These linkages should try to incorporate representative even-aged second growth forest, with trees having deep crowns and cavities.
- Retain a selection of stand structural elements, such as large trees, snags, logs on the forest floor, and canopy gaps. This will be achieved by the retention of the DA and DS woodland types.
- Use existing clearings for equipment storage, material stockpiling and lay-down areas.
- During construction activities, hydroseeding and other planting efforts should utilize indigenous vegetation, preferably indigenous species already existing in the area and available from local sources.
- Salvage native herbaceous plants that would be removed by land clearing and re-plant them in areas where they would be beneficial.

3.2.2.2 Post-Construction Related Impacts

Predation by Domestic Animals and Urban Impacts

The following points would mitigate for impacts to wildlife from domestic pets and other urban impacts:

- Educate residence of the wildlife disturbance that untrained dogs can cause. Pets off leashes are free to disturb vegetation and harass wildlife. In so doing, they become potential predators of birds. They will also defecate in public area, which can be a public health risk. Thus to reduce and hopefully eliminate domestic animal feces in the area, pet owners should be required to carry stool bags for pets and disposed of the stool bag in an appropriate manner.
- Give preference to native species in landscape planting both in residential yards and landscaped common areas of the subdivision. Landscape using exotic species is of little value to wildlife and serves to reduce the biodiversity of the area. Additionally, landscaping with indigenous species provides buffer zone benefits.

Competition for Nest Cavities

Residents or a residential organisation should take the lead in the creation of artificial nest cavities by installing nest boxes for birds and artificial roosts for bat species. Nest boxes can be created to attract various wildlife species such as red-breasted nuthatch, woodpeckers, chestnut-backed chickadee, and owls. The artificial roosting/nesting sites can be constructed to attract particular species and prevent use by exotic species. These nest boxes or bat houses are inexpensive to make and, if the new residents are involved, could help build a sense of community and educate both adults and young children about the local wildlife. Nest or bat boxes should be located in the conservation areas located in the southern corner of the property.

Human Disturbance of Wildlife

Residents should be encouraged to responsibly dispose of yard waste (and vegetable-based kitchen waste). Organic waste should not be dumped in open areas, roadsides or adjacent forests. Residents should compost yard waste, preferably by using worm composting as it tends to be the fastest composting method and should therefore attract few scavengers relative to open composting.

BEST MANAGEMENT PRACTICES

4.1 Introduction

The following section describes the guiding principles, proposed mitigation measures and best management practices to reduce potential impacts to wildlife habitat from the proposed development. Although the mitigation measures outlined below are intended to reduce potential impacts to vegetation and wildlife habitat and populations, there inevitably will be residual adverse effects.

4.2 Tree Protection Plan

All trees that are to be retained will be protected from mechanical damage to the trunk and root system. This protection can be achieved through:

- Marking trees or snow fencing areas that are to be protected during the construction phase of the project;
- Install 'Tree Protection' signs;
- Take all measures necessary to prevent the activities such as storage of materials or equipment, stockpiling of soil or excavated materials, burning, excavation or trenching, or cutting of roots or branches within the tree protection areas;
- Restrict vehicle traffic to designated access routes and travel lanes to avoid soil compaction and vegetation disturbances; and,
- Avoid alterations to existing hydrological patterns to minimize impact on vegetation.

4.3 Sensitive Ecosystem Protection Plan

Protection of sensitive ecosystems can be achieved through:

- In close proximity to sensitive ecosystems limit clearing to the minimum area required for construction boundaries and surround areas that are to be protected during the construction phase of the project with snow fences;
- Install 'Sensitive Ecosystem Protection' signs;
- Remove the minimum amount of vegetation possible from environmentally sensitive areas or areas where rare or endangered plants or plant communities are identified by the environmental monitor;
- Take all measures necessary to prevent the activities such as storage of materials or equipment, stockpiling of soil or excavated materials, burning, excavation or trenching, or cutting of roots or branches within the sensitive ecosystem protection areas.

Due to the close proximity of the development to sensitive ecosystems, the following guidelines, as outlined in the SEI Conservation Manual (MELP, 2000), should be followed after the completion of construction where possible:

- Establish conservation covenants;
- Restrict recreational access;
- Control the introduction or spread of invasive species;
- Prevent wildlife disturbance (especially nesting or breeding areas);
- Locate developments away from sensitive core areas;
- Establish a buffer zone between the core sensitive areas and the development area; and,
- Maintain hydrologic regime.

4.4 Wildlife Management Plan

The following wildlife and general management guidelines are intended to act as a planning tool and a way to mitigate impacts from the subdivision development plan to the adjacent retained habitat.

4.4.1 General Mitigation Recommendations

For the site it is recommended that:

- Buffer zones be placed adjacent to adjacent forest interior habitat incorporating native vegetation. This buffer zone will act as an insulate from the pre- and post-construction noise and aid in controlling water runoff along with the stormwater management plan;
- If possible for night lighting, use low-pressure sodium lights and install them at a height and angle that will minimize light and glare impacts onto the adjacent forest habitat, as these lamps will be less attractiveness to night-flying insects and reduce light disturbances to nocturnal animals;
- Implement a sediment and erosion control plan prior to construction commencing;
- Do not allow residents to leave open garbage cans and pet food out, especially at night when opportunists are most active, as this would encourage opportunists such as raccoons and support populations above that found in the wild. This could be accomplished by running an article in a local or municipal newsletter;
- Post-construction, as part of the house sales process, inform residents of the negative effects of bird-seed feeders and hummingbird feeders. Request that residents maintain their bird feeders by keeping them clean

from feces, changing hummingbird feeder solution frequently, and not using mouldy seed to prevent the spread of disease.

- Give preference to native species in landscape planting both in residential yards and landscaped common areas of the subdivision. Landscape planting using exotic species is of little value to wildlife and serves to reduce the biodiversity of the area, especially with the significant polygons in the area. Given the proximity of the landscaped area, it is likely that the landscaping will encroach upon the indigenous vegetation and the sensitive ecosystem polygons identified. Additionally, landscaping with indigenous species provides the benefits of buffer zones;
- If the construction is to occur during the breeding bird season (February to August), before grading or using heavy construction equipment, the ground should be sprayed with water which will reduce the amount of dust released into the air by 50 to 90%;
- During construction activities, hydroseeding and other planting efforts should utilize indigenous vegetation, preferably indigenous species already existing in the area. Salvage any plants to be removed and replace them in areas where they would be of benefit. If possible, seed for planting should be obtained from local sources. Appropriate indigenous seed mixes should be used for hydroseeding. Conscientious hydroseeding will prevent the spread of, and introduction of, exotic species;
- Enforce zones of restricted use in trail areas post-construction. Close off any trails from the public that have been damaged during construction to allow time for regeneration and prohibit pets off leashes into the areas;
- Imposing restrictions on trail use also reduces or eliminates domestic animal feces in the area, which can also be enforced by requiring that stool bags are used for pets; and,
- Do not allow motor vehicles or motorized toys (e.g. model planes). in the forested areas surrounding the subdivision to reduce noise levels, as motor vehicles and motorized toys create loud noises that disturb territorial animals, especially during the breeding season (March to August).

4.4.2 Raptor and Breeding Bird Management Plan

4.4.2.1 Passerine and General Bird Management

General recommendations for the retention and development of passerine habitat, not specific to any species, should include the following where possible:

- Retain and enhance forest-edge habitat along road areas to provide escape or thermal cover for passerines, and also, when and where possible, accentuate these areas with indigenous berry bushes to provide more food;
- Encourage the placement of nest boxes in areas throughout the area post-construction to benefit cavity nesters (i.e. red-breasted nuthatch, Bewick's wren, woodpeckers, and the chestnut-backed chickadee), and along open, primary successive vegetated growth for cavity nesting birds (i.e. swallows, and Bewick's wrens);
- Where possible, retain natural corridors for wildlife movement and replant areas devoid of vegetation with indigenous shrubs and trees to allow contiguous corridor travel and create safety habitat for birds during the breeding season and during the migration seasons (spring and fall);
- Where possible, maintain habitat diversity, including vegetation age/successional structure, and refrain from monocultural stocking when re-vegetating;
- Discourage exotic/invasive species as a result of adjacent urban encroachment;
- Where possible, retain and enhance coarse woody debris and brush pilings on forest floors for core forest nesters (i.e. Pacific wrens);
- Avoid forest clearing during the nesting period to prevent bird-nest abandonment (March-August). Where possible, clearing should be done before or after this period;
- Avoid the use of pesticides in the area, post-construction, to control weeds.

4.4.2.2 Raptor Management

The site has the potential to provide moderate forage habitat for several raptor species (diurnal and nocturnal) and it contains nesting habitat for diurnal raptors like Cooper's hawk. A general raptor management approach for the site should include the following:

- The retention, where possible, of representative even-aged second growth forest, with trees aged approximately 40-80 years and having deep crowns with fewer trees per unit area. The forest canopy closure should be maintained at 60-70% with little or no ground cover;
- Where possible, the prohibition of site construction or maintenance around any identified, active raptor nests from March through to late July;
- The retention of any potential roost trees in the site along the edges of retained or created trails adjacent to the study site boundary. These should be maintained primarily in relatively large reserve patches or areas of intact forest adjacent to the site. For this purpose, areas around foraging zones (i.e. the adjacent riparian corridors of the study site), should have

corridor widths no less than 15 m and be composed of indigenous vegetation;

- Where possible, along the edges of the development, the retention of a selection of stand structural elements, such as large green trees, snags, logs on the forest floor, and canopy gaps. Older green trees should have structural characteristics such as cracks and holes in the bole where limbs have been shed. Snags that are retained should have cracks, bird holes and hollow interiors or should have the potential to develop these characteristics;
- Treed linkage corridors along the edges (north and south) of the proposed development and between core forested areas to the primary successional zones along the edges of the study site. This will ensure connectivity between roosting habitat and any riparian foraging habitat for all birds. These linkage requirements should be considered and accommodated within any forest ecosystem networks that are established through a landscape unit plan; and,
- During any land practice, the retention, where possible, of large snags and coarse woody debris along the development perimeter. This would benefit future habitat conditions for prey species of small mammals.

4.4.2.3 Stormwater Detention Pond

If a stormwater detention pond is proposed as part of the stormwater management plan it can provide useful habitat year-round. In order for it to function as a beneficial breeding/rearing pond for amphibians (i.e. red-legged frog), and for it to function as a useful wetland area for amphibians, it will need to receive plantings of aquatic emergent vegetation along shorelines. Here a minimal 5 to 10 m buffer of natural upland vegetation should be maintained. Pond construction should contain plantings/transplants of aquatic emergent vegetation such as small-flowered bulrush (Scirpus microcarpus), and various native sedges (*Carex* spp.) and rushes (*Juncus* spp.); this will provide areas for amphibians such as the Pacific tree frog to attach egg masses. As recommended by MoE, the proposed pond should have at least 50 % of its surface area in aquatic emergent plantings, incorporating plants such as the yellow water lily (*Nuphar polysepalem*) and Duckweed (*Lemna* spp.). It should also contain large organic debris and good riparian cover consisting of willows (*Salix* spp.) which would provide additional areas for wildlife. Additionally, installing nest boxes around the perimeter of the pond may attract indigenous urban cavity nesters such as swallows (i.e. tree and violet-green swallows) and wrens (i.e. Bewick's wren).

4.4.3 Small Mammal Management Plan

The most significant habitat for local small mammal populations occurs along the gullies between rock outcrops. Development encroachment, soil

compaction, chemical treatments and degradation of wooded areas along with coarse woody debris removal are the greatest issues associated with small mammal habitat loss.

The following mitigation measures should be implemented where possible to reduce potential impacts to small mammals and sustain this food source for raptors and large mammals:

- Minimize the range of the disturbance adjacent to the forested areas immediately beside the proposed development site;
- Post-development, allow the remaining protected habitat to provide insects, not only from the forest but from the remaining/retained watercourses. This means protecting the small microclimates can be sustained to favor foraging areas for small mammals;
- Retain, where possible, the coniferous and mixed forest areas (i.e. study site perimeter habitat) that have well-developed canopy cover and an abundance of coarse woody debris necessary for microclimate protection and cover;
- Retain, in the forested and riparian areas, loose bark trees and coarse woody debris;
- Maintain connective corridors between vegetation units and core forested areas surrounding the study site;
- During any construction, refrain from regrading slopes to divert drainage into retained coarse woody debris and riparian areas to prevent habitat flooding, and
- Where possible, retain areas of dense herbaceous and/or shrub layers, and forest litter.

4.5 Stormwater Management Plan

4.5.1 Objectives

The following are the primary objectives of a stormwater management plan:

- Infiltrate or convey runoff through the development to a secure outlet with minimal impacts to people and properties;
- Balance the needs of economic development and environmental sustainability.

4.5.2 Structural Management Practices

4.5.2.1 Lot Level and Conveyance Controls

Lot level and conveyance controls rely primarily on infiltration and filtering as a mechanism to remove contaminants. They allow for the pretreatment of water

and reduction of runoff volume and peak flows. Peak-flow source controls are used to reduce water quantity concerns and to reduce infrastructure cost. They include:

- Rooftop storage;
- Parking lot storage;
- Superpipe storage;
- Rear yard storage; and,
- Lot grading.

Infiltration-based source controls function to mitigate the urbanization impacts of both water balance and quality. Through reduction in surface runoff volume, these controls also contribute to flood and erosion control. Infiltration-based source controls include the following:

- Reduced grading to allow greater ponding of stormwater and natural infiltration;
- Directing roof leaders to rear-yard ponding areas, soakaway pits or cisterns;
- Sump-pumping foundation drains to rear-yard ponding areas;
- Infiltration trenches;
- Grassed swales;
- Pervious pipe systems;
- Filter strips;
- Redirecting roof leaders and foundation drains to distant surface ponding areas.

4.5.2.2 End-of-Pipe Controls

End-of-pipe stormwater management facilities receive stormwater from a conveyance system and discharge to the receiving waters. They are efficient at pollutant removal and flow control but do little to maintain pre-development hydrology or water balance. They include:

- Wet ponds;
- Artificial wetlands;
- Dry ponds;
- Extended detention areas;
- Infiltration basins; and,
- Sand filters.

4.5.3 Non-structural Stormwater Management Practices

Non-structural stormwater management practices include the following:

- Land use and comprehensive site planning;
- Landscaping and vegetative practices;
- Pesticide and fertilizer management;
- Litter and debris controls;
- Illicit discharge controls; and,
- Maintenance of stormwater management facilities.

4.6 Sediment and Pollution Control Plan

4.6.1 Construction Phase

A sediment control plan should be followed throughout and following the construction phase. The sediment control plan will consist of the following elements:

- To the extent possible, site clearing and grading will be scheduled for the dry weather period (summer), when the potential for surface runoff to erode exposed soils is lowest. As much as possible, the clearing and grading operations will be staged to avoid having large areas of disturbed soil present at any time, and particularly during the winter;
- Areas of exposed soil should be covered with straw and/or wood mulch or hydroseeded. Waste wood may be chipped on site and used as mulch.
- Sediment fencing should be established in cells to manage site run-off more effectively.
- If any soil or other erodable material is to be stockpiled for more than seven days, it will be covered with polyethylene sheeting that is anchored securely to prevent displacement by wind.
- Where necessary, sedimentation ponds and silt fencing will be used to retain sediments on the construction site. The design engineers will determine the appropriate sizes and locations of settling ponds;
- The sediment control structures will be installed as the first construction activity. All sediment control structures will be inspected regularly, and repaired/maintained as necessary;
- Ditches and/or berms will be installed as necessary to direct surface runoff away from disturbed areas. The ditches will be designed to prevent erosion due to high water velocities through the use of check dams (sandbags), filter fabric, rock rip-rap or polyethylene lining. Apart from these necessary diversions, the natural drainage patterns will be maintained;

- Sediment and erosion control materials will be stockpiled on site for use in any emergency situation that may arise. Stockpiled materials will include filter cloth, hay bales, rip-rap, grass seed, drain rock, culverts, matting polyethylene, used tires, etc; and,
- As soon as practical after construction, any remaining disturbed soils will be re-vegetated using an appropriate grass seed mixture. Seeding will be conducted before the end of the growing season to allow establishment of germination/roots.

4.6.2 Post-Construction Phase

Ground water infiltrator systems associated with residences and driveways will allow for the separation of sediments and pollutants from mixing with surface runoff. The infiltrator systems will be regularly inspected and, where necessary, cleaned.

The stormwater best management practices are targeted at collecting sediment and erosion and maintaining water quality. Road runoff can be directed to bio-swales where suspended solids can settle out. Bioswales should be vegetated with indigenous wetland plants.

Water quality control facilities should be designed to maintain water quality in all watercourses by collecting and diverting 'first flush' events of smaller storms (more frequent runoff events) from impervious areas.

4.7 Spill Prevention Plan

The spill prevention plan consists of the following elements:

- The construction staging area should be located at least 30 m away from any waterbody;
- Activities that carry a risk of materials' spills should take place within a bermed staging area. These activities include mixing concrete or other materials, any vehicle fuelling, and other maintenance of equipment that is done on site;
- Any areas where vehicle fuels or other potentially deleterious substances are stored should be equipped with impervious containment berms. If fuel tanks larger than 250 L are present within a berm, the bermed area should have a holding capacity equal to 125% of the capacity of the largest tank;
- Storage and maintenance facilities should have spill clean-up and disposal equipment. They also should have Medical Safety Data Sheets (MSDS) for any hazardous substances, a list of emergency contact names and telephone numbers, and a written list of emergency response and spill-reporting procedures;

- Mobile construction equipment should be fuelled, lubricated and serviced only at these approved locations;
- Field servicing of equipment, particularly near waterbodies should not be permitted. In addition, equipment and machinery should not be washed near watercourses;
- If a spill does occur, it should immediately be reported to the environmental monitor and to the Provincial Emergency Program (1-800-663-3456). Written notification should follow within two weeks of the verbal report;
- If a spill does occur, site personnel should immediately take steps to stop the discharge (if possible). As quickly as possible, they should contain the spill, clean up the affected area and dispose of waste materials at an approved disposal site;
- All hydraulic systems, fuel systems and lubricating systems should be in good repair;
- Equipment should be inspected before commencing work. Equipment with fuel or fluid leaks should not be permitted to work within or above any watercourse. Any equipment that develops a leak should immediately be removed from the watercourse and repaired;
- Before commencing work, all equipment should be steam-cleaned to remove oil, grease and other substances deleterious to aquatic life; and,
- Equipment should use only biodegradable hydraulic fluid.

The Spill Prevention Plan will be operationalized and put into effect by the Environmental Monitor, who will be responsible for ensuring that the contractor is familiar with the plan, and that all elements of the plan are appropriately put into effect (see Section 4.8).

4.8 Environmental Monitoring

The environmental monitor (monitor) will be responsible for ensuring compliance with these guidelines, the authorization from the City of Colwood and possibly provincial and government agencies. They will follow and enforce the approved sediment erosion control plans and other relevant legislation, and for putting the Spill Prevention Plan into effect. The monitoring guidelines will be in place prior to any works proceeding.

4.8.1 Meetings and Communication

The monitor will meet with the general contractor for the site to establish appropriate lines of communication. The monitor should also meet with the site contractor during any site inspection. The monitor will also meet with subcontractors, other field staff, environmental agency representatives, key

stakeholders and other engineering staff associated with the project where required.

4.8.2 Monitoring Prior to and During Site Clearing

The monitor will be responsible for the following activities prior to and during site clearing:

- Examining construction areas prior to commencement of work to identify sensitive areas where adverse effects may occur to ensure that they are adequately delineated;
- Ensuring that contractors are aware of environmentally sensitive areas in advance of construction activities and assisting in the development or modification of appropriate mitigative measures, if necessary;
- Marking environmentally sensitive areas and identify these areas to the construction foreman and/or crew;
- Reviewing vehicle access points to the site and the sediment control structures at these points prior to the start of clearing;
- Providing information and advice to project staff and contractors about construction matters related to environmental issues;
- Preparing site inspection field notes, and routinely taking photographs (and where necessary video) to record conditions;
- Acting as a liaison with the environmental agencies; and,
- Reviewing the sediment control structures proposed during construction.

4.8.3 Drainage and Sediment Control

The environmental monitor will review the proposed sedimentation control plan proposed for the site with the site contractor prior to construction activities. The monitor will be on site during construction of the sediment control system (SCS). It is understood that the General Contractor will be responsible for ensuring that the SCS is maintained and working adequately to control all discharges from the site. Their responsibilities will include inspection and maintenance of the SCS.

During construction, the responsibility of the monitor will be to:

- Examine the adequacy of the sedimentation and control works in reaching acceptable sediment levels as recommended by DFO/MoE guidelines (ie. total suspended solids and turbidity) discharged from the site;
- Make recommendations to the General Contractor on improving the SCS, if required;
- Instruct the construction foreman as to the site requirements and design specifications on sediment control structures and complete an inspection

of such structures on a routine basis, particularly during periods of inclement weather;

- Review placement of sand, gravel and materials (eg. hydroseed and mulch) specified to control erosion in exposed areas;
- Require that works be stopped in the event of malfunctions of the sediment control system or contravention of discharges limits;
- Ensure that runoff is diverted from cleared areas by use of swales or low berms and that runoff is routed to the appropriate sedimentation control structures. In environmentally sensitive or problem areas, the monitor will need to oversee the installation and maintenance of sediment control structures;
- Review stockpiling methods for excavated materials to ensure that they are placed in an appropriate locations and stored properly (eg. covered with tarps); and,
- Recommend mitigation measures and ensure expeditious implementation of these if activities are found to have the potential for environmental impact or poor water quality runoff.

4.8.4 Control of Deleterious Substances on the Development Site

The monitor will review housekeeping practices on site (e.g. daily cleanup, use of disposal bins) and ensure proper use, storage and disposal of deleterious substances and associated containers. This necessitates that the monitor be aware of all such substances used on site. Any spillage of fuels, lubricants or hydraulic oils events should be immediately reviewed by the monitor to determine if additional remedial measures are required and, if necessary, implemented expeditiously. The monitor will operationalize the Spill Prevention Plan and will ensure that an inventory of all hazardous materials is maintained.

4.8.5 Frequency of Site Inspections

Initially, the monitor will visit the site daily. Once all the environmental management measures are in place and these measures have demonstrated effective site control, the frequency of monitoring will be decreased to once per week. This frequency will increase during heavy rainfall events.

During the construction of the SCS and the work related to the bridge crossing, the environmental monitor will be onsite at all times during working hours.

4.8.6 Reporting

The monitor will need to provide environmental monitoring summary reports. The reports will be submitted to the following:

- City of Colwood;
- Ministry of Environment

The monitor will also complete an environmental completion report at the end of the construction phase, which will outline the major construction activities in relation to environmental issues, significant concerns encountered during the project and mitigation measures used to deal with those concerns.

CONCLUSIONS

Selah Developments Inc. is proposing to build a 20 unit residential subdivision on a 2.01 ha parcel on Drummond Way in the City of Colwood. According to the City of Colwood's Official Community Plan's Development Permit Areas Map the portions of the subject site are located within a development permit area for Sensitive Ecosystems and Hazardous Conditions. As part of the rezoning process, the proponent requested that ENKON Environmental Ltd. (ENKON) complete an environmental assessment of the site and provide recommendations on minimizing environmental impacts associated with the proposed subdivision development.

ENKON completed an environmental overview assessment of the property at on June 6, 2011. Slimleaf onion, a blue-listed plant species, was located on the southwestern rock outcrop and should be protected from development. The red-listed Douglas-fir /arbutus and Douglas-fir – Oregon-grape plant communities were observed to occur on the site, in the southern and northern parts of the property, respectively. Two sensitive ecosystems were observed on the property, terrestrial herbaceous (HT) and woodland (WD). The predominance of the sensitive ecosystems was present in the southern part of the property. The only rare or endangered wildlife species observed on the site was the blue-listed olive-sided flycatcher.

In order to more effectively maintain ecological integrity of retained natural areas and provide connection corridors for wildlife movement ENKON has recommended that the subdivision be designed so that the majority of the green space is preserved at the southern end of the property. Conservation covenants are recommended for the greenspace area as well as the back yards of several proposed lots, which will further reduce the loss of vegetation and will provide further connectivity across the site for wildlife movement. It is important to view this property in context of the development in the surrounding areas; it cannot be viewed in isolation and if the green space areas are to be functional they must maintain connectivity with surrounding areas which will create a habitat size suitable for some species that can survive in an urban/rural setting. Currently the lots to the immediate west and east are undeveloped. In the future, if these lots are developed, they should be designed with green space connectivity in mind. Reducing the green space areas into isolated pockets reduces the functionality of the retained areas and they start to act as population sinks where predators both native and non native start to negatively impact the local breeding fauna.

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Appendices

Appendix I: Conservation Data Centre Information
Appendix II: Tree Replacement Guidelines

Appendix I: Conservation Data Centre Information

Identify Results

Endangered Species and Ecosystems - Historical Non-sensitive Occurrences - Conservation Data Centre

BC_LIST:	Red
DATA_SENS:	N
EL_TYPE:	Vascular Plant
EL_TYPE_CD:	PLANT
ENG_NAME:	Lobb's Water-buttercup
ENG_NAME_F:	Lobb's water-buttercup
FEATURE_CODE:	FF84660210
FIRST_OBS:	1940-05-24
GLOB_RANK:	G4
HABITAT:	TERRESTRIAL
LAST_OBS:	1940-05-24
OCCR_AREA_SP_ID:	1821110
OCCR_DATA:	When and how this occurrence became extirpated are unknown. It was in black muck.
OCCR_ID:	5002
PROV_RANK:	SH
RANK:	X
RANK_COM:	Extirpated. Date unknown.
RANK_DESC:	Extirpated
REFERENCES:	Royal British Columbia Museum. 675 Belleville Street, Victoria, BC. V8V 1X4.
SCI_NAME:	Ranunculus lobbii
SCI_NAME_F:	*Ranunculus lobbii*
SHAPE_ID:	2306
SURV_SITE:	GLEN LAKE
TAX_CLASS:	dicots
VEG_ZONE:	Lowland
VERS_DATE:	Mar 20, 1996
#SHAPE#:	[Geometry]
AREA:	3124772.6755
LEN:	6274.77424650436

Coordinate Position

BC Albers: 1184021, 382657
Geographic: 48° 25' 50" N, 123° 31' 5" W
UTM 10N: 461679, 5364301


Sparks Rd
2306
Cecil Street
Drummond Way
GLEN
LAKE
Hazelwood Rd
Turnstone Dr
BRAEMAR
HEIGHTS
Canuck Cres
Fulton Rd
Wanless Rd
Sewell Rd
Bushill Rd
Sunsight Dr
Mary Anne Cres
St Tropez Pl
HAPPY VALLEY
TRIANGULAR

BC Conservation Data Centre: Occurrence Report (55776)

June 27, 2011

Pseudotsuga menziesii / Mahonia nervosa
Douglas-fir / dull Oregon-grape

Field definition document available at http://www.env.gov.bc.ca/atrisk/ims.htm

This is a summary report. For a complete record contact the CDC (cdcdata@gov.bc.ca).

Identifiers

Occurrence ID:	8647	**Status:**	
Shape ID:	55776	Global:	G2
Type:	Ecological Community	Provinicial:	S2
		BC List:	Red
Data Sensitive:	N		

Locators

Survey Site: METCHOSIN MOUNTAIN

Directions:

Survey Information

First Obs. Date:	2007	**Last Obs. Date:**	2007

Occurrence Data: This occurrence contains Douglas-fir dominated forests that are mostly in the young forest structural stage, with some areas being in the mature forest, pole/sapling and shrub structural stages.

Occurrence Rank and Occurrence Rank Factors

Rank: E Verified extant (viability not assessed) **Rank Date:**

Rank Comments:

Condition of Occurrence:

Size of Occurrence:

Landscape Context:

Description

General Description: This occurrence is located in the Mt. Metchosin and Braemar Peak area. The EO is surrounded by residential development, and other developments such as golf courses. The area is undulating with several rocky outcrops.

Habitat:

BGC: CDF mm

Documentation

References:

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Terrestrial Ecosystem Mapping [TEM] of the Coastal Douglas-fir Biogeoclimatic Zone. 2008. Prepared for B. Zinovich, Integrated Land Management Bureau, B.C. Minist. of Agric. and Lands, Nanaimo B.C. by Madrone Environmental Services, Duncan B.C. 1:20,000 spatial data.

Version

Version Date:	09-MAR-11

Mapping Information

Estimated Representation Accuracy:	Medium
Confidence Extent:	?

June 27, 2011


1740
Sooke Rd
Cecil Ridge Dr
Drummond Way
G L E N
L A K E
B R A E M A R
H E I G H T S
Hazelwood Rd
Turnstone Dr
55776
Keith Rd
Boshill Rd
Sunsleigh Dr
H A P P Y V A L L E Y
T R I A N G U L A R
9056
9196

Important

This map is for general information purposes only. The Capital Regional District (CRD) makes no representations or warranties regarding the accuracy or completeness of this map or the suitability of the map for any purpose. This map is not for navigation. The CRD will not be liable for any damage, loss or injury resulting from the use of the map or information on the map and the map may be changed by the CRD at any time.

Printed Mon, Jun 27, 2011

Sharp-tailed Snake

Regional Community Atlas

Capital Regional District
gis@crd.bc.ca
http://www.crd.bc.ca

CRD

Appendix II: Wildlife Tree Replacement Guidelines

Wildlife Tree Replacement Strategies

Artificial Snag Creation

Snags (dead or dying trees) are important habitat elements for a wide range of wildlife expected to occur in the area including woodpeckers, raptorial birds, small mammals and amphibians. A number of techniques exist for creating artificial snags (e.g. girdling, topping and fungal inoculation) with variable results. It is recommended that a number of deciduous trees be topped and limbed to reduce their susceptibility to windthrow events. Trees with diameters 15 cm to 30 cm (DBH) should be topped approximately 3 m from the ground, for use by weak excavators such as the red-breasted nuthatch and downy woodpecker. If possible, larger diameter trees (> 30 cm DBH) should be topped 5 m from the ground for larger excavators (e.g. hairy and pileated woodpeckers) and wildlife that nest well above the ground. A few limbs should be retained on these stems for perching birds. Consideration should also be given to boring stems in places to encourage nesting and scarring them to mimic natural crevices and encourage the spread of heart rot fungi. Tree pieces should be left on-site to increase coarse woody debris abundance.

Large Organic Debris Installation

Numerous species make use of large organic debris for hiding, denning, foraging and/or travel cover. Both terrestrial and pond-breeding salamanders rely on the moist conditions inside large recumbent logs to survive the dry season. Mammals such as skunks, shrews and mice employ woody debris as denning, foraging and travel cover. Bark-gleaning birds such as the northern flicker and pileated woodpecker forage extensively in downed wood. It is recommended that large diameter (50+ cm) conifer stem pieces of a manageable size (e.g. 1 – 2 m in length) be distributed at approximately 30 m intervals along the length of the riparian corridor. Douglas-fir is the preferred species for this enhancement activity, as it typically decays just below its thick bark layer, resulting in the creation of natural cavities. Any trees of suitable size that are cleared from the development area could be used.

Nest Box Installation

Installation of nest boxes could benefit several bird species known to occur in the area including members of the woodpecker and chickadee families, and possibly even purple martin. Smaller owls such as the western screech-owl would likely also benefit from the installation of nest boxes. To avoid competition, it is recommended that nest boxes have a minimum spacing of 15 m, with openings oriented in different directions. In general, smaller birds will be attracted to lower boxes near shrubbery, while larger birds appear to prefer higher, more open locations (Carrick, 1971). To minimize maintenance, nest boxes should be hung from branches using roof-mounted hooks, where possible.

Appendix D

Vegetation Survey Point Data

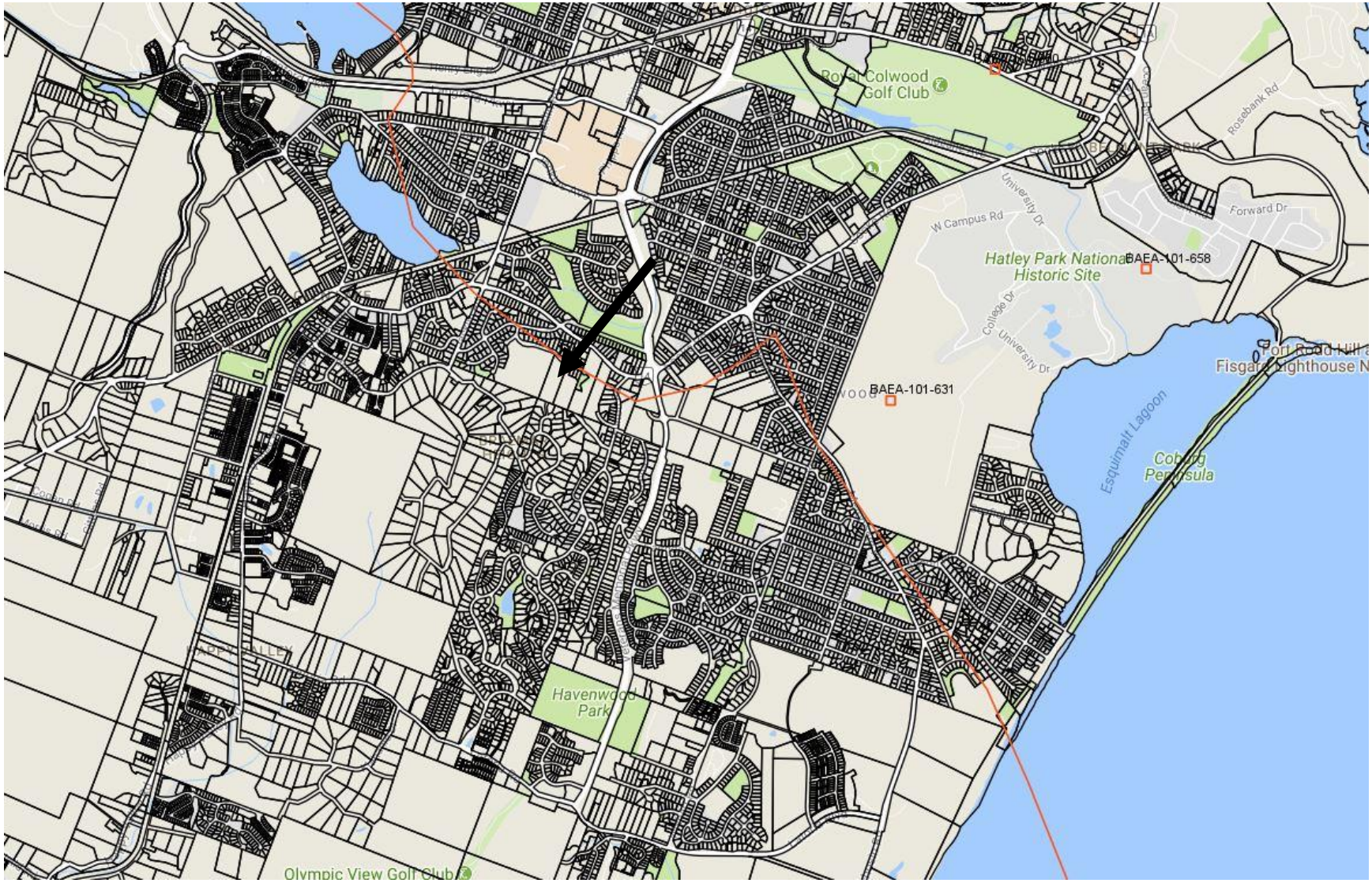
Common Name	Scientific Name	Type of Plant	Veg Survey 1	Veg Survey 2	Veg Survey 3	Veg Survey 4	Veg Survey 5	Veg Survey 6	Veg Survey 7	Veg Survey 8	Veg Survey 9	Veg Survey 10	Veg Survey 11	Veg Survey 12	Veg Survey 13	Veg Survey 14	Veg Survey 15
American vetch	*Vicia americana*	Herbaceous		X									X				
Arbutus	*Arbutus menziesii*	Evergreen tree	X	D	X	X										X	
Baldhip rose	*Rosa gymnocarpa*	Shrub	X	X			X	X			X						
Bigleaf maple	*Acer macrophyllum*	Deciduous tree						D	X	X					X		
Blue wildrye	*Elymus glaucus*	Graminoid												D		X	D
Bracken fern	*Pteridium aquilinum*	Fern				X											
Broad-leaved shootingstar	*Dodecatheon hendersonii*	Herbaceous	X		X												
Broad-leaved starflower	*Trientalis latifolia*	Herbaceous		X		X		X		X							
Broad-leaved stonecrop	*Broad-leaved stonecrop*	Herbaceous	X				X										X
Canadian thistle	*Cirsium arvense*	Herbaceous											X				
Chocolate lily	*Fritillaria lanceolata*	Herbaceous	X														
Cleavers (Scratch bedstraw)	*Galium aparine*	Herbaceous	X	D	X	X		D	X		X		X	X	X	X	
Common camas	*Camassia quamash*	Herbaceous	X		D		D										X
Common horsetail	*Equisetum arvense*	Herbaceous										X					
Common rush	*Juncus effusus*	Rush											D				
Common yarrow	*Achillea millefolium*	Herbaceous	X		D												
Creeping buttercup	*Ranunculus repens*	Herbaceous	X		X												
Dandelion	*Taraxacum officinale*	Herbaceous	X									X	X			X	
Daphne	*Daphne laureola*	Shrub		X		X		X	X	D					X		
Deer fern	*Blechnum spicant*	Fern															
Douglas fir	*Pseudotsuga menziesii*	Conifer tree	X	D		D		D	X	D					D	X	
Dovefoot geranium	*Geranium molle*	Herbaceous				X			X							X	
Dull Oregon grape	*Mahonia nervosa*	Shrub		X		X	X	X		X					X	X	
Electrified cat's tail moss	*Rhytidiadelphus triquetrus*	Moss									D			X			X

Common Name	Scientific Name	Type of Plant	Veg Survey 1	Veg Survey 2	Veg Survey 3	Veg Survey 4	Veg Survey 5	Veg Survey 6	Veg Survey 7	Veg Survey 8	Veg Survey 9	Veg Survey 10	Veg Survey 11	Veg Survey 12	Veg Survey 13	Veg Survey 14	Veg Survey 15
Fern leaved desert parsley (red listed)	*Lomatium dissectum dissectum*	Herbaceous	X	X	X	X											
Garry oak	*Quercus garryana*	Deciduous tree			X												
Grand fir	*Abies grandis*	Conifer tree							X								
Himalayan blackberry	*Rubus armeniacus*	Shrub										X	X				
Lanky Moss	*Rhytidiadelphus loreus*	Moss				X	X	X									
Meadow death camas	*Zigadenus venenosus*	Herbaceous			X											X	
Menzies larkspur	*Delphinium menziesii*	Herbaceous	X				X										
Miner's lettuce	*Claytonia perfoliata*	Herbaceous	X	X		X	D				X				X		
Nodding trisetem	*Trisetum cernum*	Herbaceous											X				
Oceanspray	*Holodiscus discolor*	Shrub	X	D	X	D			X	X					X	X	
Oxeye Daisy	*Leucanthemum vulgare*	Herbaceous															
Pacific dogwood	*Cornus nuttallii*	Shrub															
Pacific sanicle	*Sanicula crassicaulis*	Herbaceous	X	X	X	X	X	X	X					X		X	
Pathfinder	*Adenocaulon bicolor*	Herbaceous															
Purple peavine	*Lathyrus nevadensis*	Herbaceous										X				X	
Red alder	*Alnus rubra*	Deciduous tree						X	X	X		Juvenile					
Red columbine	*Aquilegia formosa*	Herbaceous							X								
Red sorrel	*Rumex acetosella*	Herbaceous										X					
Reed canary grass	*Phalaris arundinacea*	Graminoid											D				
Salal	*Gaultheria shallon*	Shrub		D		X				X				X	D		
Salmonberry	*Rubus spectabilis*	Shrub															
Scotch broom	*Cytisus scoparius*	Shrub	X						D			D	X			X	
Sea blush	*Plectritis congesta*	Herbaceous	D			X	D	X								X	D
Small-leaved montia	*Montia parvifolia*	Herbaceous	X		X	X	X				X			X		X	X
Smooth perennial sow thistle	*Sonchus arvense*	Herbaceous															

Common Name	Scientific Name	Type of Plant	Veg Survey 1	Veg Survey 2	Veg Survey 3	Veg Survey 4	Veg Survey 5	Veg Survey 6	Veg Survey 7	Veg Survey 8	Veg Survey 9	Veg Survey 10	Veg Survey 11	Veg Survey 12	Veg Survey 13	Veg Survey 14	Veg Survey 15
Snowberry	*Symphoricarpos spp*	Shrub	X														
Step Moss	*Hylocomium splendens*	Moss				X		X		X							
Sword fern	*Polystichum munitum*	Fern	X	X		X	X	D	X	X				X			
Tall butterbup	*Ranunculus acris*	Herbaceous		X								X	X				
Thimbleberry	*Rubus parviflorus*	Shrub										X					
Three-leaved foamflower	*Tiarella trifoliata*	Herbaceous															
Trailing blackberry	*Rubus ursinus*	Shrub				X		X	D		X		X		X		
Western trillium	*Trillium ovatum*	Herbaceous								X							
Vanilla leaf	*Achlys triphylla*	Herbaceous								X							
Western coralroot	*Corallorhiza maculata*	Herbaceous						X									
Western hemlock	*Tsuga heterophylla*	Conifer tree										Juvenile					
Western redcedar	*Thuja plicata*	Conifer tree							X	X					D		
Western trumpet honeysuckle	*Lonicera ciliosa*	Shrub		X													
White fawn lily	*Erythonium oregonum*	Herbaceous	X														
Wild Strawberry	*Fragaria vesca*	Herbaceous							X								
Yellow monkey flower	*Mimulus guttatus*	Herbaceous	X														

Appendix E

Wildlife Tree Stewardship Atlas


Royal Colwood Golf Club
Rosebank Rd
Forward Dr
University Dr
W Campus Rd
Hatley Park National Historic Site
BAEA-101-658
College Dr
University Dr
BAEA-101-631
Esquimalt Lagoon
Coburg Peninsula
Havenwood Park
Olympic View Golf Club

Appendix F

MOE BC Species and Ecosystems Explorer Database Search Results

Table 8. Ecological Communities Search Results – Relevant Terrestrial Ecosystems (CDF in the South Island Forest District)*

English Name	BC List	Ecosystem Group
grand fir / dull Oregon-grape	Red	Terrestrial Realm - Forest: Coniferous - mesic
grand fir / three-leaved foamflower	Red	Terrestrial Realm - Forest: Coniferous - moist/wet
arbutus / hairy manzanita	Red	Terrestrial Realm - Forest: Broadleaf - dry
Roemer's fescue - junegrass	Red	Terrestrial Realm - Grassland Group (G): Grassland Class (Gg)
Douglas-fir - arbutus	Red	Terrestrial Realm - Forest: Coniferous - dry
Douglas-fir / dull Oregon-grape	Red	Terrestrial Realm - Forest: Coniferous - mesic
Douglas-fir / Alaska oniongrass	Red	Terrestrial Realm - Forest: Coniferous - dry
Garry oak - arbutus	Red	Terrestrial Realm - Forest: Broadleaf - dry
Garry oak / California brome	Red	Terrestrial Realm - Forest: Broadleaf - dry
Garry oak / oceanspray	Red	Terrestrial Realm - Forest: Broadleaf - dry
Wallace's selaginella / reindeer lichens	Blue	Terrestrial Realm - Grassland Group (G): Grassland Class (Gg);Terrestrial Realm - Rock Group (R): Rock Outcrop Class (Ro)
western redcedar / vanilla-leaf	Red	Terrestrial Realm - Forest: Coniferous - moist/wet
western redcedar / Indian-plum	Red	Terrestrial Realm - Forest: Coniferous - moist/wet
western redcedar / sword fern - skunk cabbage	Blue	Terrestrial Realm - Forest: Coniferous - moist/wet;Wetland Realm - Mineral Wetland Group: Swamp Wetland Class (Ws)
western redcedar - Douglas-fir / Oregon beaked-moss	Red	Terrestrial Realm - Forest: Coniferous - moist/wet

*CDC. 2018. BC Species and Ecosystems Explorer. B.C. Ministry of Environment Victoria, B.C. Available: http://a100.gov.bc.ca/pub/eswp/ (accessed June 21, 2017)

Table 9. Vascular Plants Search Results – Terrestrial (CDF in the South Island Forest District)*

Scientific Name	English Name	BC List	SARA	General Status Canada	Name Category	Habitat Subtype
Allium amplectens	slimleaf onion	Blue		3 - Sensitive (2010)	Vascular Plant	Rock/Sparsely Vegetated Rock; Meadow; Garry Oak Woodland;
Anemone drummondii var. *drummondii*	alpine anemone	Blue			Vascular Plant	Rock/Sparsely Vegetated Rock; Meadow
Arceuthobium tsugense ssp. mertensianae	mountain hemlock dwarf mistletoe	Blue			Vascular Plant	Conifer Forest - Mesic (average)
Balsamorhiza deltoidea	deltoid balsamroot	Red	1-E (Jun 2003)	1 - At Risk (2010)	Vascular Plant	Rock/Sparsely Vegetated Rock; Mixed Forest (deciduous/coniferous mix); Garry Oak Woodland
Bulbostylis capillaris	densetuft hairsedge	Red		4 - Secure (2010)	Vascular Plant	Meadow; Garry Oak Woodland
Carex tumulicola	foothill sedge	Blue	1-E (Feb 2010)	1 - At Risk (2010)	Vascular Plant	Meadow; Garry Oak Woodland
Cephalanthera austiniae	phantom orchid	Red	1-T (Jun 2003)	1 - At Risk (2010)	Vascular Plant	Conifer Forest - Mesic (average); Mixed Forest (deciduous/coniferous mix)
Claytonia washingtoniana	Washington springbeauty	Red		2 - May be at risk (2010)	Vascular Plant	Cliff; Conifer Forest - Dry; Mixed Forest (deciduous/coniferous mix)
Dryopteris arguta	coastal wood fern	Blue	1-SC (Jun 2003)	3 - Sensitive (2010)	Vascular Plant	Cliff; Rock/Sparsely Vegetated Rock; Deciduous/Broadleaf Forest; Conifer Forest - Dry; Mixed Forest (deciduous/coniferous mix); Garry Oak Woodland;
Epilobium torreyi	brook spike-primrose	Red	1-E (Dec 2007)	1 - At Risk (2010)	Vascular Plant	Meadow; Conifer Forest - Dry; Garry Oak Woodland;
Erigeron salishii	Salish daisy	Blue		3 - Sensitive (2010)	Vascular Plant	Rock/Sparsely Vegetated Rock;
Eurybia radulina	rough-leaved aster	Red		2 - May be at risk (2010)	Vascular Plant	Rock/Sparsely Vegetated Rock; Conifer Forest - Dry; Garry Oak Woodland
Githopsis specularioides	common bluecup	Red		3 - Sensitive (2010)	Vascular Plant	Rock/Sparsely Vegetated Rock
Heterocodon rariflorus	heterocodon	Blue		3 - Sensitive (2010)	Vascular Plant	Conifer Forest - Mesic (average)
Hosackia gracilis	seaside bird's foot lotus	Red	1-E (Jun 2003)	1 - At Risk (2010)	Vascular Plant	Rock/Sparsely Vegetated Rock
Isoetes nuttallii	Nuttall's quillwort	Blue		3 - Sensitive (2010)	Vascular Plant	Rock/Sparsely Vegetated Rock; Meadow; Conifer Forest - Dry; Garry Oak Woodland;
Lasthenia maritima	hairy goldfields	Red		3 - Sensitive (2010)	Vascular Plant	Cliff; Rock/Sparsely Vegetated Rock; Marine Island
Limnanthes macounii	Macoun's meadow-foam	Red	1-T (Aug 2006)	1 - At Risk (2010)	Vascular Plant	Meadow; Deciduous/Broadleaf Forest;
Lomatium dissectum var. *dissectum*	fern-leaved desert-parsley	Red			Vascular Plant	Rock/Sparsely Vegetated Rock; Meadow; Mixed Forest (deciduous/coniferous mix);

Scientific Name	English Name	BC List	SARA	General Status Canada	Name Category	Habitat Subtype
Lomatium grayi var. *grayi*	Gray's desert-parsley	Red	1-T (Feb 2011)	1 - At Risk (2010)	Vascular Plant	Cliff; Rock/Sparsely Vegetated Rock; Conifer Forest - Dry; Garry Oak Woodland
Lupinus densiflorus var. *densiflorus*	dense-flowered lupine	Red	1-E (Aug 2006)		Vascular Plant	Cliff;
Lupinus lepidus	prairie lupine	Red	1-E (Jun 2003)	1 - At Risk (2010)	Vascular Plant	Rock/Sparsely Vegetated Rock; Meadow;
Lupinus oreganus var. *kincaidii*	Kincaid's lupine	Red	1-XX (Feb 2011)		Vascular Plant	Rock/Sparsely Vegetated Rock; Garry Oak Woodland
Lupinus rivularis	streambank lupine	Red	1-E (Jan 2005)	1 - At Risk (2010)	Vascular Plant	Meadow; Garry Oak Woodland
Marah oregana	coast manroot	Red		1 - At Risk (2010)	Vascular Plant	Rock/Sparsely Vegetated Rock; Meadow; Garry Oak Woodland
Meconella oregana	white meconella	Red	1-E (Aug 2006)	1 - At Risk (2010)	Vascular Plant	Rock/Sparsely Vegetated Rock; Deciduous/Broadleaf Forest;
Microseris bigelovii	coast microseris	Red	1-E (Dec 2007)	1 - At Risk (2010)	Vascular Plant	Rock/Sparsely Vegetated Rock; Meadow;
Mitellastra caulescens	leafy mitrewort	Blue		3 - Sensitive (2010)	Vascular Plant	Cliff; Rock/Sparsely Vegetated Rock; Conifer Forest - Mesic (average); Mixed Forest (deciduous/coniferous mix)
Montia diffusa	branching montia	Red		2 - May be at risk (2010)	Vascular Plant	Rock/Sparsely Vegetated Rock
Nuttallanthus texanus	Texas toadflax	Red		3 - Sensitive (2010)	Vascular Plant	Cliff; Rock/Sparsely Vegetated Rock;
Orobanche pinorum	pine broomrape	Red		2 - May be at risk (2010)	Vascular Plant	Conifer Forest - Mesic (average);
Orthocarpus imbricatus	mountain owl-clover	Red		2 - May be at risk (2010)	Vascular Plant	Cliff; Rock/Sparsely Vegetated Rock; Meadow;
Packera macounii	Macoun's groundsel	Blue		3 - Sensitive (2010)	Vascular Plant	Rock/Sparsely Vegetated Rock; Conifer Forest - Dry
Plagiobothrys tenellus	slender popcornflower	Red	1-T (Feb 2011)	1 - At Risk (2010)	Vascular Plant	Meadow; Conifer Forest - Dry; Garry Oak Woodland;
Platanthera ephemerantha	white-lip rein orchid	Red		2 - May be at risk (2010)	Vascular Plant	Conifer Forest - Dry; Garry Oak Woodland
Potentilla gracilis var. *gracilis*	graceful cinquefoil	Red			Vascular Plant	Rock/Sparsely Vegetated Rock; Meadow; Conifer Forest - Dry
Prosartes smithii	Smith's fairybells	Blue		3 - Sensitive (2010)	Vascular Plant	Deciduous/Broadleaf Forest; Mixed Forest (deciduous/coniferous mix)
Pyrola elliptica	shinleaf wintergreen	Blue		4 - Secure (2010)	Vascular Plant	Conifer Forest - Mesic (average); Conifer Forest - Dry; Mixed Forest (deciduous/coniferous mix)
Ranunculus californicus	California buttercup	Red	1-E (Feb 2011)	1 - At Risk (2010)	Vascular Plant	Rock/Sparsely Vegetated Rock;

Scientific Name	English Name	BC List	SARA	General Status Canada	Name Category	Habitat Subtype
Rubus lasiococcus	dwarf bramble	Blue		3 - Sensitive (2010)	Vascular Plant	Conifer Forest - Mesic (average);
Rupertia physodes	California-tea	Blue		3 - Sensitive (2010)	Vascular Plant	Deciduous/Broadleaf Forest; Garry Oak Woodland
Sabulina pusilla	dwarf sandwort	Red	1-E (Jul 2005)	1 - At Risk (2010)	Vascular Plant	Meadow; Conifer Forest - Dry;
Sanicula bipinnatifida	purple sanicle	Red	1-T (Jun 2003)	1 - At Risk (2010)	Vascular Plant	Rock/Sparsely Vegetated Rock; Deciduous/Broadleaf Forest; Garry Oak Woodland;
Sericocarpus rigidus	white-top aster	Blue	1-SC (Jun 2003)	3 - Sensitive (2010)	Vascular Plant	Rock/Sparsely Vegetated Rock; Meadow; Mixed Forest (deciduous/coniferous mix); Garry Oak Woodland
Silene scouleri ssp. *scouleri*	coastal Scouler's catchfly	Red	1-E (Jan 2005)		Vascular Plant	Garry Oak Woodland;
Syntrichia laevipila	twisted oak moss	Blue	1-SC (Jul 2005)		Nonvascular Plant	Garry Oak Woodland
Thelypteris nevadensis	Nevada marsh fern	Red		2 - May be at risk (2010)	Vascular Plant	Rock/Sparsely Vegetated Rock; Mixed Forest (deciduous/coniferous mix)
Thysanocarpus curvipes	sand lacepod	Blue		3 - Sensitive (2010)	Vascular Plant	Rock/Sparsely Vegetated Rock; Meadow; Garry Oak Woodland
Tonella tenella	small-flowered tonella	Red	1-E (Jul 2005)	1 - At Risk (2010)	Vascular Plant	Rock/Sparsely Vegetated Rock; Conifer Forest - Dry; Garry Oak Woodland
Trifolium depauperatum var. *depauperatum*	poverty clover	Blue			Vascular Plant	Rock/Sparsely Vegetated Rock; Meadow;
Trifolium dichotomum	Macrae's clover	Red		3 - Sensitive (2010)	Vascular Plant	Cliff; Rock/Sparsely Vegetated Rock; Meadow;
Triphysaria versicolor ssp. *versicolor*	bearded owl-clover	Red	1-E (Jun 2003)		Vascular Plant	Rock/Sparsely Vegetated Rock; Meadow;
Triteleia howellii	Howell's triteleia	Red	1-E (Jan 2005)		Vascular Plant	Meadow; Deciduous/Broadleaf Forest; Conifer Forest - Dry; Garry Oak Woodland;
Uropappus lindleyi	Lindley's microseris	Red	1-E (Feb 2010)	1 - At Risk (2010)	Vascular Plant	Cliff; Meadow; Deciduous/Broadleaf Forest; Conifer Forest - Dry;
Viola howellii	Howell's violet	Red		3 - Sensitive (2010)	Vascular Plant	Rock/Sparsely Vegetated Rock; Meadow; Garry Oak Woodland
Viola praemorsa var. *praemorsa*	yellow montane violet	Red	1-E (Jun 2003)		Vascular Plant	Meadow; Garry Oak Woodland
Woodwardia fimbriata	giant chain fern	Blue		3 - Sensitive (2010)	Vascular Plant	Rock/Sparsely Vegetated Rock
Zeltnera muehlenbergii	Muhlenberg's centaury	Red	1-E (Feb 2010)	1 - At Risk (2010)	Vascular Plant	Meadow; Garry Oak Woodland;

*CDC. 2018. BC Species and Ecosystems Explorer. B.C. Ministry of Environment Victoria, B.C.

Table 10. Provincially Listed Wildlife Species Potentially Occurring on Site based on Site Habitat Conditions– (CDF in the South Island Forest District)

Scientific Name	English Name	BC List	SARA	General Status Canada	Habitat Subtype
Accipiter gentilis laingi	Northern Goshawk, *laingi* subspecies	Red	1-T (Jun 2003)		Meadow; Conifer Forest - Mesic (average); Conifer Forest - Dry; Mixed Forest (deciduous/coniferous mix);
Ardea herodias fannini	Great Blue Heron, *fannini* subspecies	Blue	1-SC (Feb 2010)		Meadow; Conifer Forest - Mesic (average); Mixed Forest (deciduous/coniferous mix)
Brachyramphus marmoratus	Marbled Murrelet	Blue	1-T (Jun 2003)	1 - At Risk (2005)	Rock/Sparsely Vegetated Rock; Conifer Forest - Mesic (average)
Chordeiles minor	Common Nighthawk	Yellow	1-T (Feb 2010)	4 - Secure (2005)	Cliff; Rock/Sparsely Vegetated Rock; Meadow; Conifer Forest - Mesic (average); Conifer Forest - Dry; Mixed Forest (deciduous/coniferous mix)
Coccothraustes vespertinus	Evening Grosbeak	Yellow		4 - Secure (2005)	Conifer Forest - Mesic (average); Conifer Forest - Dry; Mixed Forest (deciduous/coniferous mix)
Contia tenuis	Sharp-tailed Snake	Red	1-E (Jun 2003)	1 - At Risk (2005)	Rock/Sparsely Vegetated Rock; Meadow; Conifer Forest - Dry
Contopus cooperi	Olive-sided Flycatcher	Blue	1-T (Feb 2010)	4 - Secure (2005)	Conifer Forest - Mesic (average); Mixed Forest (deciduous/coniferous mix)
Corynorhinus townsendii	Townsend's Big-eared Bat	Blue		2 - May be at risk (2005)	Conifer Forest - Mesic (average); Conifer Forest - Dry; Mixed Forest (deciduous/coniferous mix)
Cypseloides niger	Black Swift	Blue		4 - Secure (2005)	Cliff
Falco peregrinus anatum	Peregrine Falcon, *anatum* subspecies	Red	1-SC (Jun 2012)		Cliff; Rock/Sparsely Vegetated Rock; Meadow
Falco peregrinus pealei	Peregrine Falcon, *pealei* subspecies	Blue	1-SC (Jun 2003)		Cliff; Rock/Sparsely Vegetated Rock; Meadow
Glaucidium gnoma swarthi	Northern Pygmy-owl, *swarthi* subspecies	Blue			Meadow; Conifer Forest - Mesic (average); Conifer Forest - Dry; Mixed Forest (deciduous/coniferous mix); Urban/Suburban
Hirundo rustica	Barn Swallow	Blue	1-T (Nov 2017)	4 - Secure (2005)	Meadow; Conifer Forest - Mesic (average); Conifer Forest - Dry; Mixed Forest (deciduous/coniferous mix)
Megascops kennicottii kennicottii	Western Screech-Owl, *kennicottii* subspecies	Blue	1-T		Conifer Forest - Mesic (average); Conifer Forest - Dry; Mixed Forest (deciduous/coniferous mix)
Mustela erminea anguinae	Ermine, *anguinae* subspecies	Blue			Meadow; Conifer Forest - Mesic (average); Conifer Forest - Dry; Mixed Forest (deciduous/coniferous mix);
Myotis keenii	Keen's Myotis	Blue	3 (Mar 2005)	2 - May be at risk (2005)	Cliff; Rock/Sparsely Vegetated Rock; Conifer Forest - Mesic (average)

Scientific Name	English Name	BC List	SARA	General Status Canada	Habitat Subtype
Myotis lucifugus	Little Brown Myotis	Yellow	1-E (Dec 2014)	4 - Secure (2005)	Meadow; Conifer Forest - Mesic (average); Conifer Forest - Dry; Mixed Forest (deciduous/coniferous mix); Garry Oak Woodland
Patagioenas fasciata	Band-tailed Pigeon	Blue	1-SC (Feb 2011)	3 - Sensitive (2005)	Conifer Forest - Mesic (average); Mixed Forest (deciduous/coniferous mix)
Pituophis catenifer catenifer	Gopher Snake, *catenifer* subspecies	Red	1-XX (Jan 2005)		Rock/Sparsely Vegetated Rock
Progne subis	Purple Martin	Blue		4 - Secure (2005)	Conifer Forest - Mesic (average); Conifer Forest - Dry
Ptychoramphus aleuticus	Cassin's Auklet	Red		3 - Sensitive (2005)	Sub-soil; Cliff; Rock/Sparsely Vegetated Rock
Sialia mexicana pop. 1	Western Bluebird (Georgia Depression population)	Red			Meadow; Conifer Forest - Mesic (average); Conifer Forest - Dry; Mixed Forest (deciduous/coniferous mix); Garry Oak Woodland
Sympetrum vicinum	Autumn Meadowhawk	Blue		4 - Secure (2005)	Mixed Forest (deciduous/coniferous mix)
Tyto alba	Barn Owl	Red	1-SC (Jun 2003)	3 - Sensitive (2005)	Meadow; Mixed Forest (deciduous/coniferous mix)
Uria aalge	Common Murre	Red		4 - Secure (2005)	Cliff; Rock/Sparsely Vegetated Rock

*CDC. 2018. BC Species and Ecosystems Explorer. B.C. Ministry of Environment Victoria, B.C.

Table 11. Invertebrate Wildlife Search Results – (CDF in the South Island Forest District)*

English Name	BC List	SARA	General Status Canada	Name Category	Habitat Subtype
Oregon Forestsnail	Red	1-E (Jan 2005)		Invertebrate Animal	Mixed Forest (deciduous/coniferous mix)
Johnson's Hairstreak	Red		6 - Not Assessed (2000)	Invertebrate Animal	Conifer Forest - Mesic (average)
Moss' Elfin, *mossii* subspecies	Blue			Invertebrate Animal	Cliff; Rock/Sparsely Vegetated Rock
Western Thorn	Blue			Invertebrate Animal	Mixed Forest (deciduous/coniferous mix)
Common Wood-nymph, *incana* subspecies	Red			Invertebrate Animal	Cliff; Conifer Forest - Dry
Common Ringlet, *insulana* subspecies	Red			Invertebrate Animal	Meadow; Conifer Forest - Mesic (average); Conifer Forest - Dry; Mixed Forest (deciduous/coniferous mix)
Puget Oregonian	Red	1-XX (Jan 2005)		Invertebrate Animal	Mixed Forest (deciduous/coniferous mix)
Silver-spotted Skipper	Blue		6 - Not Assessed (2000)	Invertebrate Animal	Meadow; Conifer Forest - Mesic (average); Conifer Forest - Dry; Mixed Forest (deciduous/coniferous mix)
Propertius Duskywing	Red		6 - Not Assessed (2000)	Invertebrate Animal	Meadow; Mixed Forest (deciduous/coniferous mix); Garry Oak Woodland
Large Marble, *insulanus* subspecies	Red	1-XX (Jun 2003)		Invertebrate Animal	Meadow
Warty Jumping-slug	Red	1-SC (Jan 2005)		Invertebrate Animal	Mixed Forest (deciduous/coniferous mix)
Threaded Vertigo	Blue	1-SC (Jul 2012)		Invertebrate Animal	Mixed Forest (deciduous/coniferous mix)
Rocky Mountain Parnassian, *olympiannus* subspecies	Blue			Invertebrate Animal	Rock/Sparsely Vegetated Rock; Meadow
Greenish Blue, *insulanus* subspecies	Red	1-E (Jun 2003)		Invertebrate Animal	Meadow
Broadwhorl Tightcoil	Blue			Invertebrate Animal	Conifer Forest - Mesic (average); Conifer Forest - Dry; Mixed Forest (deciduous/coniferous mix)
Blue-grey Taildropper	Blue	1-E (Dec 2007)		Invertebrate Animal	Mixed Forest (deciduous/coniferous mix)
Zerene Fritillary, *bremnerii* subspecies	Red			Invertebrate Animal	Meadow;
Autumn Meadowhawk	Blue		4 - Secure (2005)	Invertebrate Animal	Mixed Forest (deciduous/coniferous mix)

English Name	BC List	SARA	General Status Canada	Name Category	Habitat Subtype
Pacific Vertigo	Red			Invertebrate Animal	Mixed Forest (deciduous/coniferous mix)

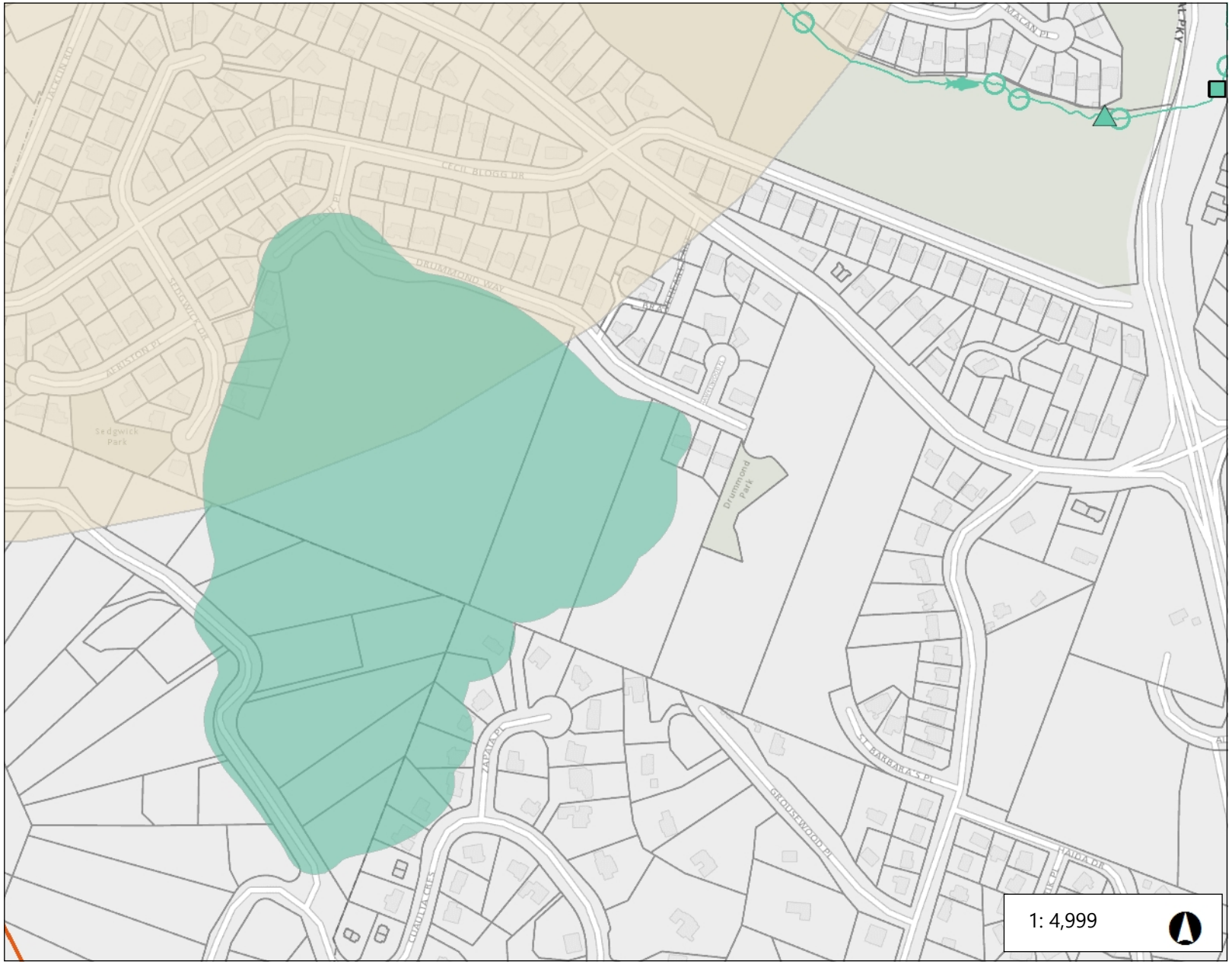
*CDC. 2018. BC Species and Ecosystems Explorer. B.C. Ministry of Environment Victoria, B.C.

Appendix G

Search Results for CDF in the CRD for Rare Species within 5 km of Study Area

CRD Rare Species Mapping

Making a difference...together



Legend

- Enhancements
- Photo Points
- Fish Habitat
- Modifications
- Obstructions
- Other Water Features
- Culverts
- Centreline

River Otter Latrine Sites

- 0-1 - Low
- >1-2 - Medium
- >2-5 - High
- >5 - Extremely High

Potential Sharp Tail Snake Hal

Rare Species

- Ecological Community
- Invertebrate Animal
- Nonvascular Plant
- Vascular Plant
- Vertebrate Animal

Notes

0.3 0 0.13 0.3 Kilometres

NAD_1983_UTM_Zone_10N

TALBOT MACKENZIE & ASSOCIATES

CONSULTING ARBORISTS

803 Drummond Way, Colwood

Development Impact Assessment &

Tree Management Plan

PREPARED FOR: Colwood Peak Homes Ltd.
#150 – 11120 Bridgeport Road
Richmond, BC V6X 1T2

PREPARED BY: Talbot, Mackenzie & Associates
Graham Mackenzie – Consulting Arborist
ISA Certified # PN-0428A
Tree Risk Assessment Qualified

DATE OF ISSUANCE: June 8, 2021

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CONTENTS

APPENDICES

1. INTRODUCTION

Talbot Mackenzie & Associates was asked to complete a tree inventory, construction impact assessment and management plan for the trees at the following proposed project:

Site:	Lot 9, Section 77, Esquimalt District, Plan 3294 Except that part in Plan 47033 and 50959
Municipality:	City of Colwood
Client Name:	McElhanney Ltd.
Dates of Site Visit:	Various
Site Conditions:	The site is primarily treed with a mix of second growth native species. Much of the site has areas of exposed bedrock and evidence of limited soil volumes.

The purpose of this report is to review the tree resource and the existing site conditions on the property and comment on the general health and species distribution of the trees. After reviewing the proposed development concept, that has been created after several revisions, we have identified areas that we feel offer the best opportunity for retaining existing trees that have a good potential for retention. Given the topography of the property and the anticipated impacts from the access road construction and servicing, we do not anticipate there will be much opportunity for retaining mature trees in the center of the property. Based on the information provided, we feel the trees on the neighbouring properties and trees on the subject property, near the property boundaries in areas where grade changes are not proposed, offer a good opportunity for retention. In addition, a significant portion of the Southern part of the property is being proposed as park dedication.

The Development impact assessment section of this report (section 6), is based on conceptual plans reviewed to date, including the Road design and townhouse plans (June 6, 2021) - Prepared by Christine Lintott Architects Inc. Proposed landscape concept plans (June 2, 2021) - prepared by LADR Landscape Architects and civil design drawings (June 4, 2021) – prepared by McEllhanney.

2. TREE INVENTORY METHODOLOGY

In December 2020, we inventoried all of the bylaw protected trees located on the property and trees near the property line on neighbouring properties that we felt had the potential to be impacted by the proposed development of the property. For ease of identification in the field, numbered metal tags were attached to the lower trunks of bylaw protected trees. For the purpose of this study, we have identified the potential tree retention areas and proposed conservation areas on the tree management plan. A comprehensive landscaping plan has been prepared by LADR Landscape Architects inc.

3. EXECUTIVE SUMMARY

Based on our review of the plans provided and an assessment of the existing site conditions, we anticipate that most of the trees located within the proposed area to be developed on the property will require removal due to impacts associated with the necessary blasting to level the rock areas for road access and servicing. Given the existing topography and soil volumes and the anticipated grade changes, we feel that any of the mature trees that are going to have substantial grade changes within their critical root zones will not survive the changes in hydrology even if they can physically be retained. For these reasons, we have concentrated tree retention efforts near the subject property boundaries where the existing soils and grades will for the most part be kept intact.

The project has been designed to preserve an 8020 sq meter area of proposed public park at the Southern end of the property with a walking trail that connects Zapata Place and Drummond Way. This area has several rock outcroppings and a mixture of healthy Garry oak, Arbutus and Douglas fir trees that will be up hill and isolated from any construction related impacts, providing an excellent opportunity for tree retention and park land. We have also identified areas on the tree management plan attached that show where we anticipate existing mature trees can be preserved provided their critical root systems can be adequately protected during the land preparation and construction process. Additionally, we have conservation areas where, although the large mature trees may not be suitable to retain, there is an opportunity to keep the existing native soils intact, preserving any young native trees that are suitable, the native understory along with keeping woody debris for nature habitat. In these areas, we suggest adding supplemental plantings of young native trees that can adapt to the new growing conditions being introduced. By completing the tree clearing and land development in stages, there may be opportunity for additional tree and land preservation once accurate site layout is completed.

Due to the existing topography and the current openings in the tree canopy, we feel that trees on neighboring properties to the East and West are not likely to be significantly impacted by the new wind patterns that are going to be introduced from tree clearing on the subject property. After initial site clearing has taken place, a comprehensive tree review will be required to address any new wind exposure that will result from the clearing. During this review, there may be additional tree removals or tree modifications recommended in areas surrounding the clearings.

4. SITE INFORMATION & PROJECT UNDERSTANDING

The subject site is 2.0 Ha. (4.95 acres) of property that slopes downward from South to North. Our understanding is that there will be an 8020 sq m. park allocation comprised of land at the North end of the property along with a proposed public walking path along the East boundary of the property that will connect Zapata Place to Drummond Way. The developed portion of the site will consist of a switchback access road connecting a series of townhouses with a proposed new landscape plan that blends new plantings into the existing native trees to be retained around the periphery.

Below is a general observation of the tree resource, as it appeared at the time of our site visit:

5. FIELD OBSERVATIONS

The tree resource consists of second growth forest, made up primarily of a mixture of Douglas fir, Grand fir, Western Red cedar Big Leaf maple and Red alder with some Arbutus and native willow. There is some evidence of windthrow on the property in Douglas fir trees in areas where there are shallow soils amongst bedrock. The existing trees have several openings within the canopy that has resulted in areas of low limbed, well-structured trees near the edges of the property and on neighbouring properties that tend to be good candidates for retention when exposed to new wind dynamics. Several of the Western red cedar trees on the property are showing indications of health decline as evidenced in their sparse foliage and dead tops, likely due to the shallow soil volumes and the dryer than average summers we have been experiencing.

Lot 9, Section 77, Esquimalt District, Plan 3294, Except that part in Plan 47033 and 50959

figure 1: Site context air photo: The boundary of the subject site is outlined in Yellow.

6. DEVELOPMENT IMPACT ASSESSMENT

Given the growing conditions of the existing trees and the site, along with the potential impacts from the proposed development, we anticipate that most of the trees in the portions of the properties that are being developed will require removal to mitigate the risk associated with them. The areas that have the greatest potential for tree retention are areas around the periphery where no significant grade changes are proposed and trees on neighbouring properties and proposed parkland are being retained. In these areas several trees have been listed as either retained or “to be determined”. After initial site clearing is completed, we recommend a follow up tree assessment be completed to better determined the suitability for some of the larger trees. It should be noted that although some of the larger trees may not be suitable for retention in these areas, it should be possible to keep

the native soils an understory intact, along with any young trees that have developed. The area can then be carefully replanted with additional native tree species.

6.1. TREE REPLACEMENT

A comprehensive landscaping plan has been prepared by LADR Landscape Architects inc.

We recommend replanting within the conservation areas amongst the undisturbed understory and small trees that are possible to retain. We feel it should be a mixture of deciduous and coniferous species, roughly in the following ratios: 20% Red alder, 30% Big Leaf Maple, 40% Douglas fir and 10% Grand fir. There may be some opportunity for planting Western red cedar on the edges of the lower areas where soil moisture content may be higher, but that will have to be better assessed once initial clearing is completed. Conifers should be no larger than 1 meter in height and deciduous trees should be no larger than 2 meters in height. Provisions may have to be made for soil amendment in areas that have less than 60 cm of soil depth and irrigation, invasive species control and deer protection will need to be provided for the first few years after planting until the trees become established.

Actual numbers will have to be determined after clearing has been completed, so the area is not over or under planted.

7. IMPACT MITIGATION

Tree Protection Barrier: The areas, surrounding the trees to be retained should be isolated from the construction activity by erecting protective barrier fencing. Where possible, the fencing should be erected at the perimeter of the critical root zone. The barrier fencing to be erected must be a minimum of 4 feet in height, of solid frame construction that is attached to wooden or metal posts. A solid board or rail must run between the posts at the top and the bottom of the fencing. This solid frame can then be covered with flexible snow fencing. The fencing must be erected prior to the start of any construction activity on site (i.e. demolition, excavation, construction), and remain in place through completion of the project. Signs should be posted around the protection zone to declare it off limits to all construction related activity. The project arborist must be consulted before this fencing is removed or moved for any purpose.

Arborist Supervision: All excavation occurring within the critical root zones of protected trees should be completed under supervision by the project arborist. Any severed or severely damaged roots must be pruned back to sound tissue to reduce wound surface area and encourage rapid compartmentalization of the wound. In particular, the following activities should be completed under the direction of the project arborist:

- Excavation for the proposed road where it encroaches into the critical root zones of trees to be retained along the East and West property lines.
- Any excavation for proposed underground services that encroach into the critical root zones of trees to be retained.

- The construction of the proposed foot path that will be located within the critical root zones of trees to be retained.
- Any excavation for proposed new planting areas that are within the critical root zones of trees to be retained.

Methods to Avoid Soil Compaction: In areas where construction traffic must encroach into the critical root zones of trees to be retained, efforts must be made to reduce soil compaction where possible by displacing the weight of machinery and foot traffic. This can be achieved by one of the following methods:

- Installing a layer of hog fuel or coarse wood chips at least 20 cm in depth and maintaining it in good condition until construction is complete.
- Placing medium weight geotextile cloth over the area to be used and installing a layer of crushed rock to a depth of 15 cm over top.
- Placing two layers of 19mm plywood.
- Placing steel plates.

Paved Surfaces Above Tree Roots:

If the new paved surfaces within the CRZ of tree to be retained require excavation down to bearing soil and roots are encountered in this area, this could impact their health and structural stability. If tree retention is desired, a raised and permeable paved surface could be considered in the areas within the critical root zone of the trees. The “paved surfaces above root systems” diagram and specifications is attached.

The objective is to avoid root loss and to instead raise the paved surface and its base layer above the roots. This may result in the grade of the paved surface being raised above the existing grade (the amount depending on how close roots are to the surface and the depth of the paving material and base layers). Final grading plans could take this potential change into account where possible. This may also result in soils which are high in organic content being left intact below the paved area.

To allow water to drain into the root systems below, the surface could be made of a permeable material (instead of conventional asphalt or concrete) such as permeable asphalt, paving stones, or other porous paving materials and designs such as those utilized by Grasspave, Gravelpave, Grasscrete and open-grid systems.

Mulching: Mulching can be an important proactive step in maintaining the health of trees and mitigating construction related impacts and overall stress. Mulch should be made from a natural material such as wood chips or bark pieces and be 5-8cm deep. No mulch should be touching the trunk of the tree. See “methods to avoid soil compaction” if the area is to have heavy traffic.

Blasting: Care must be taken to ensure that the area of blasting does not extend beyond the necessary footprints and into the critical root zones of surrounding trees. The use of small low-concussion charges and multiple small charges designed to pre-shear the rock face will reduce fracturing, ground vibration, and overall impact on the surrounding environment. Only explosives of low phytotoxicity and techniques that minimize tree damage should be used. Provisions must be made to ensure that blasted rock and debris are stored away from the critical root zones of trees.

Scaffolding: This assessment has not included impacts from potential scaffolding including canopy clearance pruning requirements. If scaffolding is necessary and this will require clearance pruning of retained trees, the project arborist should be consulted. Depending on the extent of pruning required, the project arborist may recommend that alternatives to full scaffolding be considered such as hydraulic lifts, ladders or platforms. Methods to avoid soil compaction may also be recommended (see “Minimizing Soil Compaction” section).

Landscaping and Irrigation Systems: The planting of new trees and shrubs should not damage the roots of retained trees. The installation of any in-ground irrigation system must take into account the critical root zones of the trees to be retained. Prior to installation, we recommend the irrigation technician consult with the project arborist about the most suitable locations for the irrigation lines and how best to mitigate the impacts on the trees to be retained. This may require the project arborist supervise the excavations associated with installing the irrigation system. Excessive frequent irrigation and irrigation which wets the trunks of trees can have a detrimental impact on tree health and can lead to root and trunk decay.

Windthrow: Where forest edge trees are proposed to be removed, we recommend that trees that may experience an increase in wind exposure be re-examined, once tree clearing has taken place, to ensure that they are structurally stable, and suitable for retention as leading-edge trees. Specific areas that must be examined by the project arborists after initial clearing include the areas at the south of the property where the portion of the property to be developed meets the proposed park land and along the East and West borders of the property.

Arborist Role: It is the responsibility of the client or his/her representative to contact the project arborist for the purpose of:

- Locating the barrier fencing
- Reviewing the report with the project foreman or site supervisor
- Locating work zones, where required
- Supervising any excavation within the critical root zones of trees to be retained
- Reviewing and advising of any pruning requirements for machine clearances

Review and site meeting: If the project receives zoning approval, it is important that the project arborist meet with the principals involved in the project to review the information contained herein. It is also important that the arborist meet with the site foreman or supervisor before any site clearing, tree removal, demolition, or other construction activity occurs and to confirm the locations of the tree protection barrier fencing.

8. DISCLOSURE STATEMENT

This arboricultural field review report was prepared by Talbot Mackenzie & Associates for the exclusive use of the Client and may not be reproduced, used or relied upon, in whole or in part, by a party other than the Client without the prior written consent of Talbot Mackenzie & Associates. Any unauthorized use of this report, or any part hereof, by a third party, or any reliance on or decisions to be made based on it, are at the sole risk of such third

parties. Talbot Mackenzie & Associates accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report, in whole or in part.

Arborists are professionals who examine trees and use their training, knowledge, and experience to recommend techniques and procedures that will improve a tree's health and structure or to mitigate associated risks. Trees are living organisms whose health and structure change and are influenced by age, continued growth, climate, weather conditions, and insect and disease pathogens. Indicators of structural weakness and disease are often hidden within the tree structure or beneath the ground. The arborist's review is limited to a visual examination of tree health and structural condition, without excavation, probing, resistance drilling, increment coring, or aerial examination. There are inherent limitations to this type of investigation, including, without limitation, that some tree conditions will inadvertently go undetected. The arborist's review followed the standard of care expected of arborists undertaking similar work in British Columbia under similar conditions. No warranties, either express or implied, are made as to the services provided and included in this report.

The findings and opinions expressed in this report are based on the conditions that were observed on the noted date of the field review only. The Client recognizes that passage of time, natural occurrences, and direct or indirect human intervention at or near the trees may substantially alter discovered conditions and that Talbot Mackenzie & Associates cannot report on, or accurately predict, events that may change the condition of trees after the described investigation was completed.

It is not possible for an Arborist to identify every flaw or condition that could result in failure nor can he/she guarantee that the tree will remain healthy and free of risk. The only way to eliminate tree risk entirely is to remove the entire tree. All trees retained should be monitored on a regular basis. Remedial care and mitigation measures recommended are based on the visible and detectable indicators present at the time of the examination and cannot be guaranteed to alleviate all symptoms or to mitigate all risk posed.

Immediately following land clearing, grade changes or severe weather events, all trees retained should be reviewed for any evidence of soil heaving, cracking, lifting or other indicators of root plate instability. If new information is discovered in the future during such events or other activities, Talbot Mackenzie & Associates should be requested to re-evaluate the conclusions of this report and to provide amendments as required prior to any reliance upon the information presented herein.

9. IN CLOSING

We trust that this report meets your needs. Should there be any questions regarding the information within this report, please do not hesitate to contact the undersigned.

Yours truly,

Talbot Mackenzie & Associates

Prepared by:

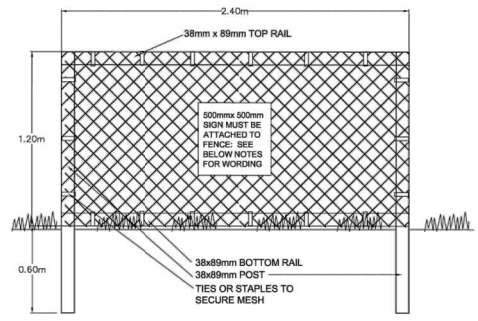
Graham Mackenzie
ISA Certified Arborist PN – 0428A
Tree Risk Assessment Qualification
Email: tmtreehelp@gmail.com

APPENDIX A - TREE MANAGEMENT PLAN (T1)

LEGEND

- Existing tree with tag or ID #
- Tree protection fencing
- Critical root zone radius (m)
- Tree to be removed (proposed)
- Non-bylaw undersize tree
- Unsurveyed tree
- Site boundary
- Trees to be retained
- Trees for possible retention (TBD)

TREE PROTECTION FENCING



TREE PROTECTION FENCING

1. FENCE WILL BE CONSTRUCTED USING 38 mm X 89mm WOOD FRAME: TOP, BOTTOM AND POSTS * USE ORANGE SNOW-FENCING MESH AND SECURE THE WOOD FRAME WITH"ZIP" TIES OR GALVANIZED STAPLES.
2. ATTACH A 500mm X 500mm SIGN WITH THE FOLLOWING WORDING: PROTECTED ROOT ZONE - NO ENTRY. THIS SIGN MUST BE AFFIXED ON EVERY FENCE OR AT LEAST EVERY 10 LINEAR METERS.

* IN ROCKY AREAS, METAL POSTS (T-BAR OR REBAR) DRILLED INTO ROCK WILL BE ACCEPTED

Proposed conservation areas where native soils, under story plantings and small trees should be retained where possible and inter planted with new native trees and plants.

Tree Management Plan - T1

803 Drummond Way
Colwood, BC

DATE:	June 07, 2021
PREPARED FOR:	Colwood Peak Homes Ltd.
SCALE:	1 : 750 @ 11" X 17"
DRAWN BY:	NT
REVISION:	0
REFERENCE DWG:	Site Plan By Christine Lintott Architects Inc.

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CONSULTING ARBORISTS
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APPENDIX B - TREE RESOURCE SPREADSHEET

Drummond Way -- Tree Resource Spreadsheet

Tree ID	Common Name	Latin Name	DBH (cm) ~ approximate	Crown Spread (diameter in metres)	Critical Root Zone (CRZ, radius in metres)	Health	Structure	Relative Tolerance (Good, Moderate, Poor)	Remarks and Recommendations	Bylaw Protected	Retention Status
1122	Big-Leaf Maple	*Acer macrophyllum*	41,40,35,15	9.0	8.5	Fair	Fair	Moderate	4m south of 140m band, one stem dead.	Yes	X
1123	Douglas-fir	*Pseudotsuga menziesii*	47.0	7.0	7.0	Fair	Fair	Poor	4m south of 140m band. Deflected trunk.	Yes	TBD
1124	Douglas-fir	*Pseudotsuga menziesii*	55.0	9.0	8.5	Fair	Fair-poor	Poor	Growing adjacent to stump, deflected trunk, Pini fruiting bodies.	Yes	X
1125	Douglas-fir	*Pseudotsuga menziesii*	42.0	7.0	6.5	Fair	Fair	Poor	Slight trunk deflection.	Yes	X
1126	Douglas-fir	*Pseudotsuga menziesii*	74.0	11.0	11.0	Good	Fair	Poor	Pitch flow lower trunk.	Yes	X
1127	Douglas-fir	*Pseudotsuga menziesii*	63.0	7.0	9.5	Fair	Fair	Poor	Bend lower trunk. Pini fruiting bodies.	Yes	X
1128	Douglas-fir	*Pseudotsuga menziesii*	44.0	7.0	6.5	Fair-poor	Poor	Poor	Corrected lean, growing out of old stump and unstable bank.	Yes	X
1129	Grand Fir	*Abies grandis*	40.0	7.0	6.0	Fair-poor	Fair-poor	Poor	Dead, decaying top.	Yes	X
1130	Douglas-fir	*Pseudotsuga menziesii*	44	8	6.5	Fair	Fair	Poor	Trunk bends, asymmetric crown due to canopy competition.	Yes	TBD
1131	Douglas-fir	*Pseudotsuga menziesii*	54	6	8	Fair	Fair	Poor	East PL. Leans east, asymmetric crown.	Yes	Retain
1132	Douglas-fir	*Pseudotsuga menziesii*	46	6	7	Fair	Fair	Poor	Near east PL.	Yes	TBD
NT1	Douglas-fir	*Pseudotsuga menziesii*	84	12	12.5	Fair	Fair	Poor	Neighbour's, 1m west of PL, hangers in canopy.	Yes	Retain
NT2	Douglas-fir	*Pseudotsuga menziesii*	90	14	13.5	Fair	Fair	Poor	Neighbour's, 5m west of PL, deflected trunk.	Yes	Retain
NT3	Douglas-fir	*Pseudotsuga menziesii*	82	10	12.5	Fair	Fair	Poor	Neighbour's, 1m west of PL. asymmetric crown	Yes	Retain
1133	Western Red Cedar	*Thuja plicata*	37	6	5.5	Fair-poor	Fair	Poor	Sparse foliage.	Yes	X

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1134	Douglas-fir	*Pseudotsuga menziesii*	51	7	7.5	Fair	Fair	Poor	Deflected leader.	Yes	X
1135	Douglas-fir	*Pseudotsuga menziesii*	55	6	8	Fair	Fair	Poor	Somewhat low LCR. West PL.	Yes	Retain
NT4	Arbutus	*Arbutus menziesii*	2	1	1	Good	Fair	Poor	Seedling, deer damage.	Yes	Retain
NT5	Douglas-fir	*Pseudotsuga menziesii*	68	9	10.5	Fair	Fair	Poor	Live crown ~35%.	Yes	Retain
1136	Douglas-fir	*Pseudotsuga menziesii*	54	7	8	Fair	Fair	Poor	Slight trunk bend, deflected leader.	Yes	X
NT6	Douglas-fir	*Pseudotsuga menziesii*	59	8	9	Fair	Fair	Poor	Asymmetric crown	Yes	Retain
NT7	Douglas-fir	*Pseudotsuga menziesii*	56	6	8	Fair	Fair	Poor	Past top failure likely.	Yes	Retain
1137	Douglas-fir	*Pseudotsuga menziesii*	49	6	7.5	Fair	Fair	Poor	Trunk wound.	Yes	X
1138	Big-Leaf Maple	*Acer macrophyllum*	40,23,23,8x10,20	14	7.5	Fair	Fair-poor	Moderate	Declining primary stem.	Yes	X
NT8	Douglas-fir	*Pseudotsuga menziesii*	30,60	9	6.5	Fair	Fair	Poor	Group of 5 between 30-60 DBH, asymmetric crowns.	Yes	Retain
1139	Arbutus	*Arbutus menziesii*	56	12	8	Fair	Fair	Poor	Trunk bend, canopy weighted north.	Yes	TBD
1140	Big-Leaf Maple	*Acer macrophyllum*	22,20,13	10	4	Good	Fair	Moderate	Primary stem prostrate.	Yes	TBD
1141	Western Red Cedar	*Thuja plicata*	33	7	5	Fair-poor	Fair-poor	Poor	Dead codominant top.	Yes	X
1142	Douglas-fir	*Pseudotsuga menziesii*	59	9	9	Good	Fair	Poor	Edge of open area near west PL.	Yes	X

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Tree ID	Common Name	Latin Name	DBH (cm) ~ approximate	Crown Spread (diameter in metres)	Critical Root Zone (CRZ, radius in metres)	Health	Structure	Relative Tolerance (Good, Moderate, Poor)	Remarks and Recommendations	Bylaw Protected	Retention Status
1143	Douglas-fir	*Pseudotsuga menziesii*	35	4	5.5	Fair	Fair-poor	Poor	Edge of open area near west PL. Pini fruiting bodies. Low LCR	Yes	TBD
1144	Douglas-fir	*Pseudotsuga menziesii*	44	6	6.5	Fair	Fair	Poor	Edge of open area near west PL. Asymmetric crown due to canopy competition. Trunk swelling.	Yes	Retain
1145	Douglas-fir	*Pseudotsuga menziesii*	45	7	6.5	Fair	Fair	Poor	Growing out of a stump. Asymmetric crown due to canopy competition.	Yes	Retain
1146	Douglas-fir	*Pseudotsuga menziesii*	52	7	8	Fair	Fair	Poor	Asymmetric crown due to canopy competition	Yes	Retain
1147	Douglas-fir	*Pseudotsuga menziesii*	42	7	6.5	Fair	Fair	Poor	Asymmetric crown due to canopy competition. Edge of open area near west property boundary.	Yes	Retain
1148	Douglas-fir	*Pseudotsuga menziesii*	30	5	4.5	Fair-poor	Fair-poor	Poor	Low LCR, past top failure.	Yes	Retain
1149	Douglas-fir	*Pseudotsuga menziesii*	50	8	7.5	Good	Fair	Poor	Slight corrected lean.	Yes	Retain
1150	Big-Leaf Maple	*Acer macrophyllum*	57 below burl, 20	13	7	Fair	Fair-poor	Moderate	Primary stem dead, decaying.	Yes	TBD
NT9	Douglas-fir	*Pseudotsuga menziesii*	52	8	8	Good	Fair	Poor	Neighbour's, 2m west of PL.	Yes	Retain
1151	Western Red Cedar	*Thuja plicata*	68	9	10	Fair-poor	Fair-poor	Poor	Dead top, may be shared ownership.	Yes	Retain
NT10	Scouler's Willow	*Salix scouleriana*	32	5	3	Fair	Fair-poor	Good	Within 3m of east PL	No	Retain
NT11	Scouler's Willow	*Salix scouleriana*	16	5	1.5	Fair-poor	Poor	Good	Within 3m of east PL	No	Retain
NT12	Big-Leaf Maple	*Acer macrophyllum*	47	10	5.5	Fair-poor	Fair-poor	Moderate	Cluster of maple suckers originating from functionally dead primary stem within 3m of east PL.	Yes	Retain
NT13	Douglas-fir	*Pseudotsuga menziesii*	18	4	2.5	Fair	Fair	Poor	Young df within 3m of east PL.	No	Retain
NT14	Arbutus	*Arbutus menziesii*	46	7	7	Fair	Poor	Poor	Within 3m of east PL, partially uprooted, decay at base.	Yes	Retain

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1152	Douglas-fir	*Pseudotsuga menziesii*	44	7	6.5	Fair	Fair	Poor	Trunk bend, near east PL.	Yes	TBD
1153	Arbutus	*Arbutus menziesii*	6	3	1	Good	Fair	Poor	Within 3m of east PL,lean east.	Yes	TBD
1154	Arbutus	*Arbutus menziesii*	8	1	1	Fair	Fair	Poor	Low LCR	Yes	TBD
1155	Arbutus	*Arbutus menziesii*	14	5	2	Fair	Fair	Poor	Heavy lean northwest.	Yes	TBD
1156	Arbutus	*Arbutus menziesii*	12	10	2	Fair	Fair-poor	Poor	Prostrate.	Yes	TBD
NT15	Garry Oak	*Quercus garryana*	12	3	1	Fair	Fair	Good	Within 3m of east PL, suppressed.	Yes	Retain
1157	Douglas-fir	*Pseudotsuga menziesii*	75	12	11	Good	Good	Poor	Bird nest north side of trunk 5 limbs up.	Yes	TBD
1158	Douglas-fir	*Pseudotsuga menziesii*	30	5	4.5	Good	Fair	Poor	Some lower branch dieback.	Yes	TBD
NT16	Arbutus	*Arbutus menziesii*	24	12	3.5	Fair	Poor	Poor	Decay at base, prostrate. Within 3m of east PL	Yes	Retain
NT17	Arbutus	*Arbutus menziesii*	42,32,30,12	14	9.5	Good	Fair	Poor	Cluster of arbutus within 3m of east PL. Dead limb mid canopy.	Yes	Retain
NT18	Douglas-fir	*Pseudotsuga menziesii*	49	6	7.5	Fair	Fair	Poor	Within 3m of east PL	Yes	Retain
NT19	Douglas-fir	*Pseudotsuga menziesii*	40	6	6	Fair	Fair	Poor	Within 3m of east PL	Yes	Retain
1159	Douglas-fir	*Pseudotsuga menziesii*	51	7	7.5	Good	Fair	Poor	Near east PL.	Yes	Retain
1160	Douglas-fir	*Pseudotsuga menziesii*	39	5	6	Fair	Fair	Poor	Low LCR , near east PL	Yes	Retain
1161	Douglas-fir	*Pseudotsuga menziesii*	30	5	4.5	Fair	Fair	Poor	Asymmetric crown due to canopy competition in group of small dfs.	Yes	Retain

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Tree ID	Common Name	Latin Name	DBH (cm) ~ approximate	Crown Spread (diameter in metres)	Critical Root Zone (CRZ, radius in metres)	Health	Structure	Relative Tolerance (Good, Moderate, Poor)	Remarks and Recommendations	Bylaw Protected	Retention Status
1162	Douglas-fir	*Pseudotsuga menziesii*	30	5	4.5	Fair	Fair	Poor	Asymmetric crown due to canopy competition in group of small dfs.	Yes	Retain
1163	Western Red Cedar	*Thuja plicata*	47,36,32,~30	13	11	Poor	Fair-poor	Poor	Cluster of declining WRCs. Tagged largest.	Yes	X
1164	Douglas-fir	*Pseudotsuga menziesii*	44	7	6.5	Fair	Fair	Poor	Deflected trunk.	Yes	Retain
1165	Arbutus	*Arbutus menziesii*	34,25	10	6.5	Fair	Fair	Poor	Low LCR due to phototropic extension.	Yes	Retain
1166	Arbutus	*Arbutus menziesii*	21	4	3	Fair	Fair	Poor	Suppressed, near east PL.	Yes	Retain
1167	Arbutus	*Arbutus menziesii*	31	5	4.5	Fair	Fair	Poor	Codominant, near east PL.	Yes	Retain
1168	Arbutus	*Arbutus menziesii*	43,37	12	8.5	Fair	Fair	Poor	Cavity at base and lower trunk. Located at base of rock near large snag.	Yes	Retain
NT20	Arbutus	*Arbutus menziesii*	47	10	7	Fair	Fair	Poor	Neighbour's. Lean northwest.	Yes	Retain
NT21	Douglas-fir	*Pseudotsuga menziesii*	21	5	3	Fair	Fair	Poor	Neighbour's, sparse foliage.	No	Retain
NT22	Arbutus	*Arbutus menziesii*	37	11	5.5	Fair	Fair	Poor	Neighbour's, lean northwest.	Yes	Retain
NT23	Arbutus	*Arbutus menziesii*	47,43	16	9.5	Fair	Fair	Poor	Neighbour's, larger stem lean northwest.	Yes	Retain
1169	Douglas-fir	*Pseudotsuga menziesii*	43	6	6.5	Fair	Fair	Poor	Edge of clearing	Yes	Retain
1170	Douglas-fir	*Pseudotsuga menziesii*	41	6	6	Fair	Fair	Poor	Edge of clearing	Yes	Retain
1171	Arbutus	*Arbutus menziesii*	48,41	18	9.5	Fair	Fair-poor	Poor	Cavity at base on opposite side of lean.	Yes	Retain
1172	Arbutus	*Arbutus menziesii*	39	9	6	Fair	Fair-poor	Poor	Decay at base. Lean west.	Yes	Retain

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1173	Douglas-fir	*Pseudotsuga menziesii*	146	12	22	Poor	Poor	Poor	Dead top, few live limbs.	Yes	TBD
1174	Douglas-fir	*Pseudotsuga menziesii*	58	8	8.5	Fair	Fair	Poor	Base of rock near large df.	Yes	TBD
1175	Douglas-fir	*Pseudotsuga menziesii*	40	6	6	Fair	Fair	Poor	Base of rock near large df.	Yes	X
1176	Douglas-fir	*Pseudotsuga menziesii*	30	5	4.5	Fair	Fair	Poor	Base of rock near large df.	Yes	X
1177	Douglas-fir	*Pseudotsuga menziesii*	58	11	8.5	Good	Fair	Poor	Near stream bed below rock outcropping.	Yes	X
1178	Big-Leaf Maple	*Acer macrophyllum*	31	7	3.5	Good	Fair	Moderate	West side of stream bed. Multiple tops.	Yes	X
1179	Douglas-fir	*Pseudotsuga menziesii*	34	7	5	Fair	Fair	Poor	East side of stream bed at base of rock outcropping.	Yes	X
1180	Douglas-fir	*Pseudotsuga menziesii*	31.0	7.0	4.5	Fair	Fair	Poor	East side of stream bed at base of rock outcropping.	Yes	X
1181	Douglas-fir	*Pseudotsuga menziesii*	41.0	8.0	6.0	Fair	Fair	Poor	East side of stream bed at base of rock outcropping.	Yes	X
1182	Douglas-fir	*Pseudotsuga menziesii*	31.0	5.0	4.5	Fair	Fair	Poor	Asymmetric crown, corrected lean, cavity at base.	Yes	X
1183	Big-Leaf Maple	*Acer macrophyllum*	~40+	12.0	5.0	Good	Fair-poor	Moderate	Growing next to DF stump near base of rock outcropping. Several stems emerging from failed tree.	Yes	X
1184	Douglas-fir	*Pseudotsuga menziesii*	56.0	9.0	8.5	Good	Fair	Poor	Growing at base of rock outcropping near 140m marker.	Yes	Retain
1185	Douglas-fir	*Pseudotsuga menziesii*	32.0	4.0	5.0	Fair	Fair	Poor	Low LCR	Yes	Retain
1186	Grand Fir	*Abies grandis*	30.0	4.0	4.5	Fair	Fair-poor	Poor	Asymmetric crown, dead top.	Yes	TBD
1187	Douglas-fir	*Pseudotsuga menziesii*	50.0	8.0	7.5	Fair	Fair	Poor	Slight corrected lean	Yes	TBD

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1188	Douglas-fir	*Pseudotsuga menziesii*	61.0	9.0	9.0	Fair	Fair	Poor	Corrected lean	Yes	Retain
1189	Douglas-fir	*Pseudotsuga menziesii*	62.0	9.0	9.5	Good	Fair	Poor	Corrected lean	Yes	X
1190	Douglas-fir	*Pseudotsuga menziesii*	50.0	8.0	7.5	Good	Fair	Poor	Slight lean	Yes	X
1191	Douglas-fir	*Pseudotsuga menziesii*	33.0	6.0	5.0	Good	Fair	Poor	2m east of stream, edge of clearing.	Yes	X
1192	Douglas-fir	*Pseudotsuga menziesii*	42.0	9.0	6.5	Fair	Fair	Poor	5m north of stream.	Yes	X
1193	Big-Leaf Maple	*Acer macrophyllum*	36.0	11.0	5.5	Good	Fair	Moderate	4m north of stream.	Yes	X
1194	Douglas-fir	*Pseudotsuga menziesii*	37.0	7.0	6.0	Fair	Fair	Poor	5m north of stream. Slight lean east.	Yes	X
1195	Douglas-fir	*Pseudotsuga menziesii*	30.0	5.0	4.5	Fair	Fair-poor	Poor	Previously uprooted, corrected lean, low LCR.	Yes	X
1196	Douglas-fir	*Pseudotsuga menziesii*	43.0	7.0	6.5	Fair	Fair-poor	Poor	Previously uprooted, corrected lean. Fair	Yes	X
1197	Douglas-fir	*Pseudotsuga menziesii*	38.0	9.0	5.5	Fair-poor	Fair-poor	Poor	Previous top failure. Asymmetric crown	Yes	X
1198	Douglas-fir	*Pseudotsuga menziesii*	39.0	7.0	6.0	Fair	Fair	Poor	Low LCR	Yes	X
1199	Douglas-fir	*Pseudotsuga menziesii*	36.0	7.0	5.5	Fair	Fair	Poor	Slight lean southeast.	Yes	X
1200	Big-Leaf Maple	*Acer macrophyllum*	30.0	9.0	3.5	Fair	Fair	Moderate	Low LCR	Yes	X
1110	Big-Leaf Maple	*Acer macrophyllum*	27,26,18	8.0	5.0	Good	Fair	Moderate	West side of stream bed.	Yes	X
1111	Big-Leaf Maple	*Acer macrophyllum*	25,21,19,14, 15,13	10.0	5.5	Good	Fair	Moderate	Multiple stems next to boulder.	Yes	X

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1112	Big-Leaf Maple	*Acer macrophyllum*	23,22,20,~20 ,~20,~14	9.0	5.0	Good	Fair	Moderate	Multiple stems west of stream.	Yes	X
1113	Douglas-fir	*Pseudotsuga menziesii*	55.0	10.0	8.5	Good	Good	Poor	Next to boulder, edge of bank.	Yes	X
1114	Big-Leaf Maple	*Acer macrophyllum*	~25x2, ~23x3,21,13	9.0	7.0	Good	Fair	Moderate	Canopy grows phototropically southest away from group of DFs.	Yes	X
1115	Douglas-fir	*Pseudotsuga menziesii*	48.0	10.0	6.0	Good	Fair	Poor	Slight trunk bend near base.	Yes	X
1116	Douglas-fir	*Pseudotsuga menziesii*	33.0	6.0	5.0	Fair	Fair	Poor	Low LCR.	Yes	X
1117	Grand Fir	*Abies grandis*	44.0	6.0	6.5	Fair	Fair	Poor	Some dieback lower branches.	Yes	X
1118	Grand Fir	*Abies grandis*	40.0	6.0	6.0	Good	Fair	Poor	Slight corrected lean	Yes	X
1119	Big-Leaf Maple	*Acer macrophyllum*	38,30,26	13.0	6.5	Good	Fair	Moderate	Two tightly spaced multistem maples just east of rock outcropping	Yes	X
1120	Big-Leaf Maple	*Acer macrophyllum*	29,27	9.0	5.0	Good	Fair	Moderate	Two tightly spaced multistem maples just east of rock outcropping	Yes	X
1121	Western Red Cedar	*Thuja plicata*	50.0	8.0	7.5	Good	Fair	Poor	Asymmetric crown due to canopy competition with 1119/1120.	Yes	X
211	Pacific Dogwood	*Cornus nuttallii*	24.0	4.0	3.0	Fair	Fair	Moderate	Low LCR	Yes	X
212	Pacific Dogwood	*Cornus nuttallii*	16.0	3.0	2.0	Fair	Fair	Moderate	Low LCR , lean southeast.	Yes	X
213	Douglas-fir	*Pseudotsuga menziesii*	37.0	7.0	5.5	Fair	Fair	Poor	Asymmetric crown due to canopy competition.	Yes	X
214	Western Red Cedar	*Thuja plicata*	58,40	9.0	10.5	Fair	Fair-poor	Poor	Uprooted historically, codominant, corrected lean southeast.	Yes	X
215	Douglas-fir	*Pseudotsuga menziesii*	52.0	10.0	8.0	Fair	Fair	Poor	Adjacent to 214.	Yes	X

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Drummond Way -- Tree Resource Spreadsheet

Tree ID	Common Name	Latin Name	DBH (cm) ~ approximate	Crown Spread (diameter in metres)	Critical Root Zone (CRZ, radius in metres)	Health	Structure	Relative Tolerance (Good, Moderate, Poor)	Remarks and Recommendations	Bylaw Protected	Retention Status
216	Douglas-fir	*Pseudotsuga menziesii*	34.0	5.0	5.0	Fair	Fair-poor	Poor	Historically uprooted, stem corrected, basal decay.	Yes	X
217	Douglas-fir	*Pseudotsuga menziesii*	45.0	8.0	7.0	Fair	Fair-poor	Poor	Previous top failure.	Yes	X
218	Douglas-fir	*Pseudotsuga menziesii*	31.0	5.0	4.5	Fair	Fair-poor	Poor	Previous top failure.	Yes	X
219	Douglas-fir	*Pseudotsuga menziesii*	39.0	8.0	6.0	Fair	Fair	Poor	Group of closely spaced trees.	Yes	X
220	Big-Leaf Maple	*Acer macrophyllum*	40,35,27,15	11.0	7.5	Good	Fair	Moderate	Multiple stems next to decaying stump.	Yes	X
221	Douglas-fir	*Pseudotsuga menziesii*	67.0	11.0	11.0	Good	Fair	Poor	Trunk bends, corrected lean.	Yes	X
222	Douglas-fir	*Pseudotsuga menziesii*	37.0	6.0	5.5	Fair	Fair	Poor	Edge of clearing	Yes	X
223	Douglas-fir	*Pseudotsuga menziesii*	49.0	9.0	7.5	Fair	Fair-poor	Poor	Adjacent to decaying stump, surface roots, undermined at edge of rock outcropping	Yes	X
224	Douglas-fir	*Pseudotsuga menziesii*	31.0	6.0	4.5	Fair	Fair-poor	Poor	South edge of clearing , previous top failure.	Yes	X
225	Douglas-fir	*Pseudotsuga menziesii*	35.0	6.0	5.5	Fair	Fair	Poor	South edge of clearing	Yes	X
226	Douglas-fir	*Pseudotsuga menziesii*	45.0	8.0	7.0	Good	Fair	Poor	Trunk growing into boulder.	Yes	X
227	Douglas-fir	*Pseudotsuga menziesii*	45.0	8.0	7.0	Fair	Fair	Poor	East edge of clearing	Yes	X
228	Douglas-fir	*Pseudotsuga menziesii*	~55	9.0	8.5	Good	Good	Poor	Just north of ivy covered snag.	Yes	X
229	Douglas-fir	*Pseudotsuga menziesii*	47.0	7.0	7.0	Fair	Fair	Poor	2m west of stream.	Yes	X
230	Big-Leaf Maple	*Acer macrophyllum*	33,19	8.0	4.5	Good	Fair	Moderate	4m northwest of stream.	Yes	X

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Tree ID	Common Name	Latin Name	DBH (cm) ~ approximate	Crown Spread (diameter in metres)	Critical Root Zone (CRZ, radius in metres)	Health	Structure	Relative Tolerance (Good, Moderate, Poor)	Remarks and Recommendations	Bylaw Protected	Retention Status
231	Douglas-fir	*Pseudotsuga menziesii*	38.0	7.0	5.5	Fair	Fair	Poor	Previous top failure. Ivy on trunk	Yes	X
232	Western Red Cedar	*Thuja plicata*	42,41	8.0	9.0	Poor	Fair-poor	Poor	Health stress, dead top.	Yes	X
233	Western Red Cedar	*Thuja plicata*	59.0	9.0	9.0	Poor	Fair-poor	Poor	Health stress, dead top.	Yes	X
234	Western Red Cedar	*Thuja plicata*	63.0	10.0	9.5	Poor	Fair-poor	Poor	Health stress, dead top.	Yes	X
235	Douglas-fir	*Pseudotsuga menziesii*	42.0	6.0	6.5	Fair	Fair	Poor	Slight trunk deflection	Yes	X
236	Douglas-fir	*Pseudotsuga menziesii*	43.0	7.0	6.5	Fair	Fair	Poor	Corrected lean	Yes	X
237	Douglas-fir	*Pseudotsuga menziesii*	33.0	5.0	5.0	Fair	Fair	Poor	35%LCR estimated. Adjacent to 236.	Yes	X
238	Big-Leaf Maple	*Acer macrophyllum*	51,18	10.0	6.5	Good	Fair	Moderate	Stems fused near base.	Yes	X
239	Douglas-fir	*Pseudotsuga menziesii*	47.0	7.0	7.0	Good	Fair	Poor	Pair of DFs adjacent to large decaying stump	Yes	X
240	Douglas-fir	*Pseudotsuga menziesii*	48.0	8.0	7.0	Good	Fair	Poor	Pair of DFs adjacent to large decaying stump	Yes	X
241	Douglas-fir	*Pseudotsuga menziesii*	30.0	7.0	4.5	Fair	Fair-poor	Poor	Previous top failure, new deflected leader.	Yes	X
242	Douglas-fir	*Pseudotsuga menziesii*	41.0	7.0	6.0	Good	Good	Poor	Supporting 243.	Yes	X
243	Douglas-fir	*Pseudotsuga menziesii*	40.0	6.0	6.0	Fair	Fair-poor	Poor	Heavy lean south, deflected top, recently uprooted.	Yes	X
244	Douglas-fir	*Pseudotsuga menziesii*	33.0	6.0	5.0	Good	Fair	Poor	Deflected trunk, partially uprooted historically, corrected.	Yes	X
245	Douglas-fir	*Pseudotsuga menziesii*	37.0	7.0	5.5	Good	Fair	Poor	3m north of 245.	Yes	X

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Tree ID	Common Name	Latin Name	DBH (cm) ~ approximate	Crown Spread (diameter in metres)	Critical Root Zone (CRZ, radius in metres)	Health	Structure	Relative Tolerance (Good, Moderate, Poor)	Remarks and Recommendations	Bylaw Protected	Retention Status
246	Douglas-fir	*Pseudotsuga menziesii*	50.0	9.0	7.5	Good	Fair	Poor	Lean south, deflected trunk.	Yes	X
247	Douglas-fir	*Pseudotsuga menziesii*	47.0	9.0	7.0	Good	Fair-poor	Poor	Edge of rock bank, undermined, exposed surface root.	Yes	X
248	Douglas-fir	*Pseudotsuga menziesii*	47.0	8.0	7.0	Fair	Fair	Poor	Surface rooted.	Yes	X
249	Garry Oak	*Quercus garryana*	12.0	3.0	1.0	Fair	Fair-poor	Poor	Trunk decay	Yes	X
250	Douglas-fir	*Pseudotsuga menziesii*	36.0	7.0	5.5	Fair	Fair-poor	Poor	Lean west, previous top failure, new deflected leaders, sap ooze.	Yes	X
251	Douglas-fir	*Pseudotsuga menziesii*	68.0	9.0	10.0	Fair	Fair-poor	Poor	Partially uprooted historically, corrected, Pini fruiting bodies on trunk.	Yes	X
252	Douglas-fir	*Pseudotsuga menziesii*	42.0	6.0	6.5	Fair	Fair	Poor	Slight corrected lean	Yes	X
253	Douglas-fir	*Pseudotsuga menziesii*	30.0	5.0	4.5	Poor	Poor	Poor	Few live limbs, surface rooted, deflected leader (dead).	Yes	X
254	Douglas-fir	*Pseudotsuga menziesii*	31.0	5.0	4.5	Fair	Fair	Poor	Asymmetric crown, past top failure.	Yes	X
255	Douglas-fir	*Pseudotsuga menziesii*	46.0	8.0	7.0	Fair	Fair	Poor	Growing at base of rock outcropping.	Yes	X
256	Big-Leaf Maple	*Acer macrophyllum*	61,54	11.0	10.0	Fair-poor	Fair-poor	Moderate	Dead/decaying stems/trunks.	Yes	X
257	Big-Leaf Maple	*Acer macrophyllum*	73.0	9.0	9.0	Fair-poor	Fair-poor	Moderate	Dead/decaying stems/trunks. Codominant, included bark.	Yes	X
258	Douglas-fir	*Pseudotsuga menziesii*	45.0	5.0	6.0	Fair	Fair	Poor	Corrected lean	Yes	X
259	Big-Leaf Maple	*Acer macrophyllum*	48,44,38,23	15.0	9.5	Fair-poor	Fair-poor	Moderate	One trunk dead/decaying.	Yes	X

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